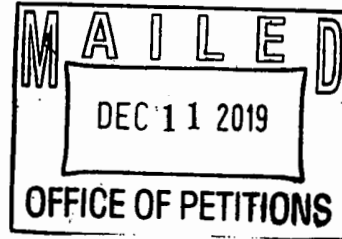




UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450  
www.uspto.gov

MICHAEL BEST & FRIEDRICH LLP (DEN)  
100 E WISCONSIN AVENUE  
Suite 3300  
MILWAUKEE WI WISCONSIN 53202



In re Patent of; 9,549,204  
Issue date: January 17, 2017  
Application No. 13/640,014  
Filed: October 8, 2012  
Attorney Docket No. PA0929-0

:  
:  
: NOTICE  
:  
:

This is a notice regarding the request for acceptance of a fee deficiency submission under 37 CFR 1.28(c) filed March 28, 2019.

The Office no longer investigates or rejects original or reissue applications under 37 CFR 1.56. **1098 Off. Gaz. Pat. Office 502 (January 3, 1989)**. Therefore, nothing in this Notice is intended to imply that an investigation was done.

The fee deficiency submission under 37 CFR 1.28(c) is hereby **ACCEPTED**.

It is noted that the \$520.00 fee deficiency has been charged from the petitioner's deposit account.

This application is no longer entitled to small entity status. Accordingly, all future fees paid in this application must be paid at the undiscounted rate.

There is no indication that petitioner herein was ever empowered to prosecute the instant application. If petitioner desires to receive future correspondence regarding this application, the appropriate power of attorney documentation must be mailed. A courtesy copy of this decision will be mailed to petitioner. However, all future correspondence will be directed to the address of record until such time as appropriate instructions are received to the contrary.

Telephone inquiries concerning this decision should be directed to Paula Britton at 571-272-1556. All other inquiries concerning the examination or status of the application is accessible in the PAIR system at <http://portal.uspto.gov/>.

/Irvin Dingle/  
Irvin Dingle  
Lead Paralegal Specialist  
Office of Petitions

Cc: Elliott Cho  
William Park & Associates, Ltd.  
930 N York Road  
Suite 201  
Hinsdale, IL 60521



# United States Patent and Trademark Office

*Office of the Chief Financial Officer*

Document Code:WFEE

User :C47345

Sale Accounting Date:11/25/2019

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Sale Item Reference Number	Effective Date
13640014	03/28/2019

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I2019AOA23309841	1461	1.28(C) SUBMISSIONS - APPLIC FILE FEE	\$520.00	Deposit Account



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Table with 5 columns: APPLICATION NUMBER, FILING OR 371(C) DATE, FIRST NAMED APPLICANT, ATTY.DOCKET NO./TITLE, REQUEST ID. Values: 13/640,014, 10/08/2012, Jin Ho Lee, 498195-9027-US01, 92124

Acknowledgement of Loss of Entitlement to Entity Status Discount

The entity status change request below filed through Private PAIR on 07/22/2019 has been accepted.

CERTIFICATIONS:

Change of Entity Status:
X Applicant changing to regular undiscounted fee status.
NOTE: Checking this box will be taken to be notification of loss of entitlement to small or micro entity status, as applicable.

This portion must be completed by the signatory or signatories making the entity status change in accordance with 37 CFR 1.4(d)(4).

Table with 2 columns: Label, Value. Rows: Signature: /scott m. alter/, Name: Scott M. Alter, Registration Number: 32879



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/640,014	10/08/2012	Jin Ho Lee	PA0929-0

**CONFIRMATION NO. 2830**

**POWER OF ATTORNEY NOTICE**

96767  
William Park & Associates LTD.  
930 N. York Road, Suite 201  
Hinsdale, IL 60521



Date Mailed: 04/23/2019

**NOTICE REGARDING CHANGE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 04/17/2019.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/ytdemisse/



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/640,014	10/08/2012	Jin Ho Lee	498195-9027-US01

**CONFIRMATION NO. 2830**

**POA ACCEPTANCE LETTER**



154359  
MICHAEL BEST & FRIEDRICH LLP (DEN)  
100 E WISCONSIN AVENUE  
Suite 3300  
MILWAUKEE, WI 53202

Date Mailed: 04/23/2019

**NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 04/17/2019.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/ytdemisse/

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

## TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

**NOTE:** This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	13/640,014
Filing Date	10-08-2012
First Named Inventor	Jin Ho Lee
Title	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
Art Unit	2485
Examiner Name	HABIB, IRFAN
Attorney Docket Number	498195-9027-US01

**SIGNATURE of Applicant or Patent Practitioner**

Signature	/michael p. santonocito/	Date (Optional)	
Name	Michael P. Santonocito	Registration Number	71189
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

**NOTE:** This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

\*Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

## POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

- I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 154359
- OR
- I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

- The address associated with the above-mentioned Customer Number
- OR
- The address associated with Customer Number:
- OR

Firm or Individual Name			
Address			
City	State	Zip	
Country			
Telephone	Email		

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

**ELECTRONICS AND TELECOMMUNICATIONS RESEARCH INSTITUTE**

- Inventor or Joint Inventor (title not required below)
- Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)
- Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)
- Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.48(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

**SIGNATURE of Applicant for Patent**

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	Date (Optional)	19 Mar 2019
Name	Kyung-Sik Kwon	
Title	Director	

**NOTE:** Signature -- This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.331, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 38 U.S.C. 422 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1460, Alexandria, VA 22313-1460. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1460, Alexandria, VA 22313-1460.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**STATEMENT UNDER 37 CFR 3.73(c)**Applicant/Patent Owner: ELECTRONICS AND TELECOMMUNICATIONS RESEARCH INSTITUTEApplication No./Patent No.: 13/640,014 Filed/Issue Date: 10-08-2012Titled: METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTERELECTRONICS AND TELECOMMUNICATIONS RESEARCH INSTITUTE, a Korean University

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1.  The assignee of the entire right, title, and interest.
2.  An assignee of less than the entire right, title, and interest (check applicable box):
- The extent (by percentage) of its ownership interest is \_\_\_\_\_%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3.  The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4.  The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

- A.  An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.
- B.  A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: LEE, JIN HO; KIM, HUI YONG; JEONG, SE YOON; CHO, SUK HEE; LEE, HA HYUN; KIM, JONG HO; LIM, SUN To: ELECTRONICS AND TELECOMMUNICATIONS RESEARCH INSTITUTEThe document was recorded in the United States Patent and Trademark Office at  
Reel 029092, Frame 0263, or for which a copy thereof is attached.

2. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

IPR2021-00827

Unified EX1012 Page 8



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**STATEMENT UNDER 37 CFR 3.73(c)**

3. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

4. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

5. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

6. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached. Additional documents in the chain of title are listed on a supplemental sheet(s). As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/michael p. santonocito/  
\_\_\_\_\_

Signature

**Michael P. Santonocito**  
\_\_\_\_\_

Printed or Typed Name

April 17, 2019  
\_\_\_\_\_

Date

Reg. No. 71189  
\_\_\_\_\_

Title or Registration Number

## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	35749863
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Michael Peter Santonocito/Laura Christiansen
<b>Filer Authorized By:</b>	Michael Peter Santonocito
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	17-APR-2019
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	11:51:38
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	25662963_1.PDF	907291  <small>d32b4894f6a31f48b2fca16aeafe246f23220816</small>	no	2

### Warnings:

IPR2021-00827

Information:					
2	Assignee showing of ownership per 37 CFR 3.73	25663036_1.PDF	127466	no	3
			00c047a25349a5c40dec76f5fc250573253a696f		
Warnings:					
Information:					
Total Files Size (in bytes):				1034757	
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>					

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant(s)/Assignee(s): Electronics and Telecommunications Research Institute	
Inventor(s): Jin Ho LEE et al.	Group Art Unit: 2485
U.S. Serial No.: 13/640,014	Examiner: Irfan HABIB
Filing Date: October 8, 2012	U.S. Patent No. 9,549,204
Title: METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER	

**LOSS OF ENTITLEMENT TO SMALL ENTITY STATUS AND  
PAYMENT OF THE TOTAL DEFICIENT PAYMENT OWED  
UNDER 37 CFR 1.28 AND MPEP 509.03(X)**

Mail Stop Petition

The Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

Dear Sir:

In the present application, the status as a small entity was established in good faith, and fees as a small entity were paid in good faith. However, the applicant has discovered that the entitlement to small-entity status was lost after the application was filed, but this was not recognized at the time, so the applicant continued paying small-entity fees in good faith after the entitlement to small-entity status was lost. Accordingly, the applicant owes a total deficiency payment of \$520 for all of the fees that have been paid in this application.

The applicant hereby respectfully requests the entity status of this application to be updated to "undiscounted" by presenting the table below, which itemizes the deficiency payment in accordance with 37 CFR 1.28(c)(2)(ii) by:

(A) Each particular type of fee that was erroneously paid as a small entity, (e.g., basic statutory filing fee, two-month extension of time fee) along with the current fee amount for a non-small entity;

(B) The small entity fee actually paid, and when;

(C) The deficiency owed amount (for each fee erroneously paid); and

(D) The total deficiency payment owed, which is the sum or total of the individual deficiency owed amounts.

Fee Type	Current Non-Small-Entity Fee		Small-Entity Fee Actually Paid			Deficiency Amount
	Fee Code	Total Fee	Fee Code	Total Fee	Date Paid	
	Utility issue fee	1501	\$ 1,000	2501	\$ 480	
<b>TOTAL</b>		<b>\$ 1,000</b>		<b>\$ 480</b>		<b>\$ 520</b>

The USPTO is authorized to charge to Deposit Account No. 50-6178 all deficient payment owed due to erroneous past payments as small entity (and all other fees owed to the USPTO, if there are any) in the present application.

Further, the applicant duly acknowledges that the payment of deficiency (in connection with submission of this paper) operates as notification of a loss of entitlement to small entity status pursuant to 37 CFR 1.28(d).

The USPTO is encouraged to contact the undersigned by telephone to discuss any issues remaining.

Respectfully submitted,

Dated: March 28, 2019

Electronic signature: /Elliott Cho/

Elliott Cho, Reg. No. 74,928

William Park & Associates Ltd.

930 N. York Road, Suite 201

Hinsdale IL 60521

630-908-7652

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	35559636
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Tammy Song
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	28-MAR-2019
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	14:36:46
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	no
------------------------	----

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition for review by the Office of Petitions	PA0929-0_Change_of_Entity_S tatus.pdf	105572  <small>62e46aef63ab29e8b331024413bb705a839 30c37</small>	no	2

### Warnings:

IPR2021-00827

<b>Information:</b>	
<b>Total Files Size (in bytes):</b>	105572
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>	





APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/640,014	01/17/2017	9549204	PA0929-0	2830

96767 7590 12/28/2016  
William Park & Associates LTD.  
930 N. York Road, Suite 201  
Hinsdale, IL 60521

### ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

#### **Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)** (application filed on or after May 29, 2000)

The Patent Term Adjustment is 255 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Jin Ho Lee, Daejeon-si, KOREA, REPUBLIC OF;  
Hui Yong Kim, Daejeon-si, KOREA, REPUBLIC OF;  
Se Yoon Jeong, Daejeon-si, KOREA, REPUBLIC OF;  
Suk Hee Cho, Daejeon-si, KOREA, REPUBLIC OF;  
Ha Hyun Lee, Seoul, KOREA, REPUBLIC OF;  
Jong Ho Kim, Daejeon-si, KOREA, REPUBLIC OF;  
Sung Chang Lim, Daejeon-si, KOREA, REPUBLIC OF;  
Jin Soo Choi, Daejeon-si, KOREA, REPUBLIC OF;  
Jin Woong Kim, Daejeon-si, KOREA, REPUBLIC OF;  
Chie Teuk Ahn, Daejeon-si, KOREA, REPUBLIC OF;

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor(s): Jin Ho LEE et al.	Group Art Unit: 2485
U.S. Serial No.: 13/640,014	Examiner: Irfan Habib
Filing Date: 10/08/2012	
Title: METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER	

**REPLY TO NOTICE TO FILE CORRECTED APPLICATION PAPERS****Mail Stop Issue Fee**

The Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

Dear Sir or Madam:

In the Notice to File Corrected Application Papers ("the Notice") mailed November 15, 2016 setting a 2-month shortened statutory period for a reply ending on January 15, 2015, amendment to the specification or replacement drawings in compliance with 37 CFR 1.84 for FIGS. 8-9 were required.

In response, the applicant submits **replacement** drawings for FIG. 8 in compliance with 37 CFR 1.84. The replacement drawing of FIG. 8 replaces the originally filed drawings labeled "FIG. 8" and "FIG. 9" (where the previous FIG. 8 has been canceled and previously numbered FIG. 9 has been renumbered to FIG. 8).

The USPTO is encouraged to contact the undersigned by telephone to discuss any issues remaining.

Respectfully submitted,

Dated: December 15, 2016

Electronic signature: /Marc A. Valdivia/  
Marc A. Valdivia, Reg. No. 56,597  
William Park & Associates Ltd.  
930 N. York Road, Suite 201  
Hinsdale IL 60521  
630-908-7652

FIG. 1

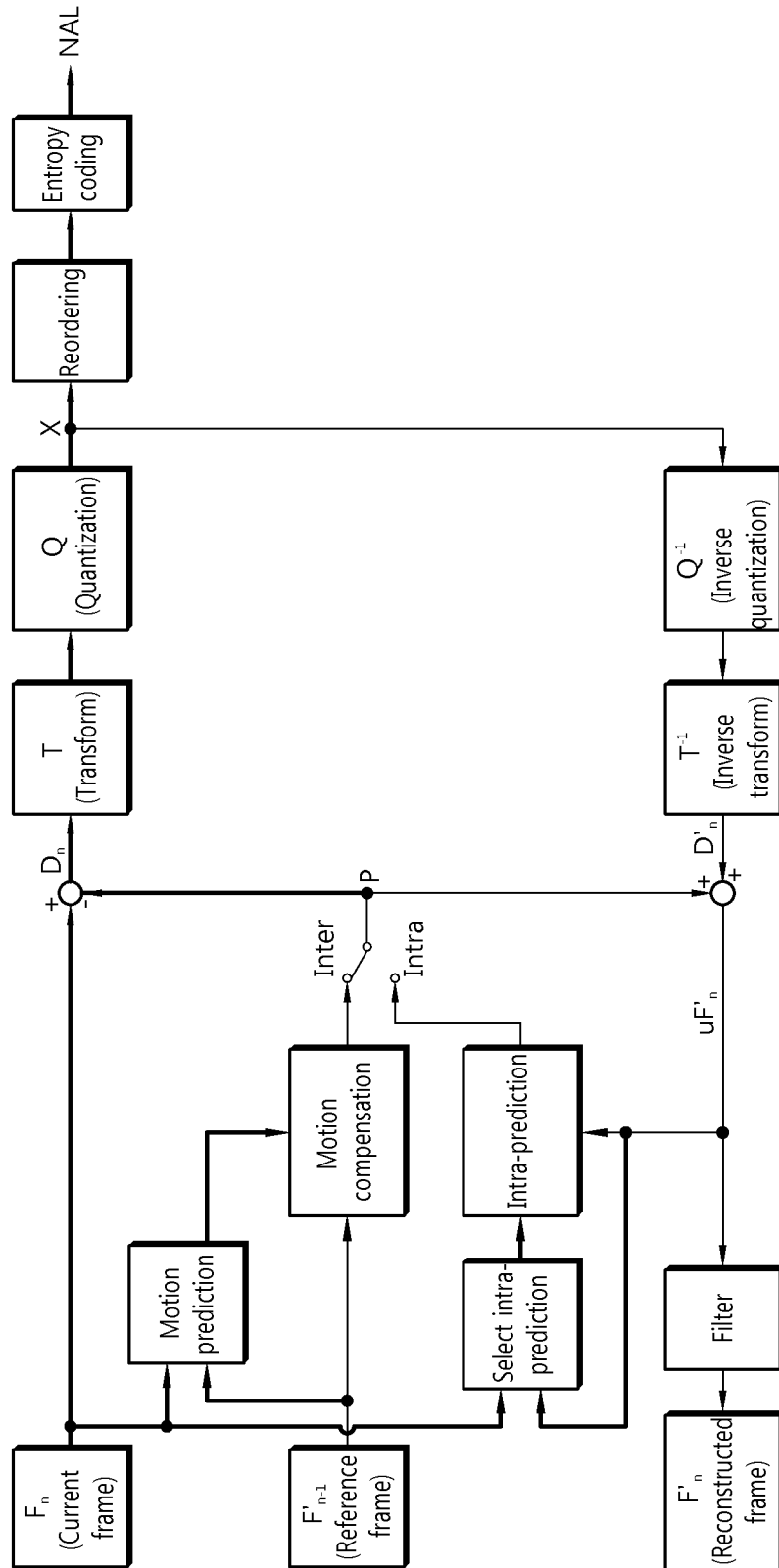


FIG. 2

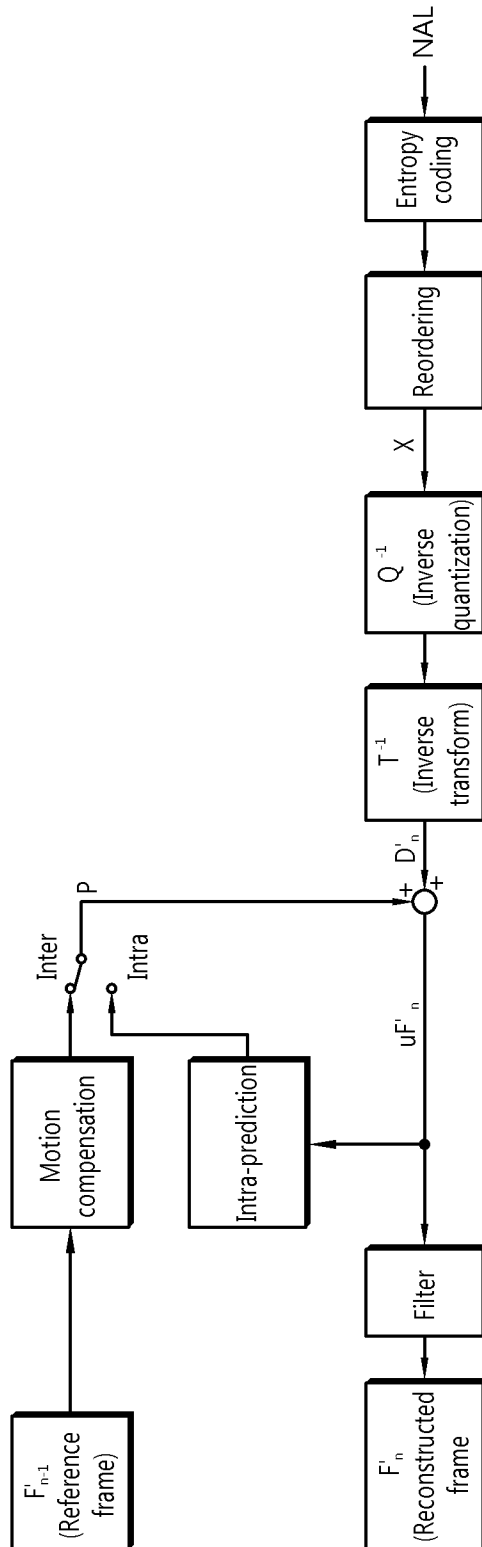


FIG. 3

M	A	B	C	D	E	F	G	H
I	a	b	c	d				
J	e	f	g	h				
K	i	j	k	l				
L	m	n	o	p				

FIG. 4

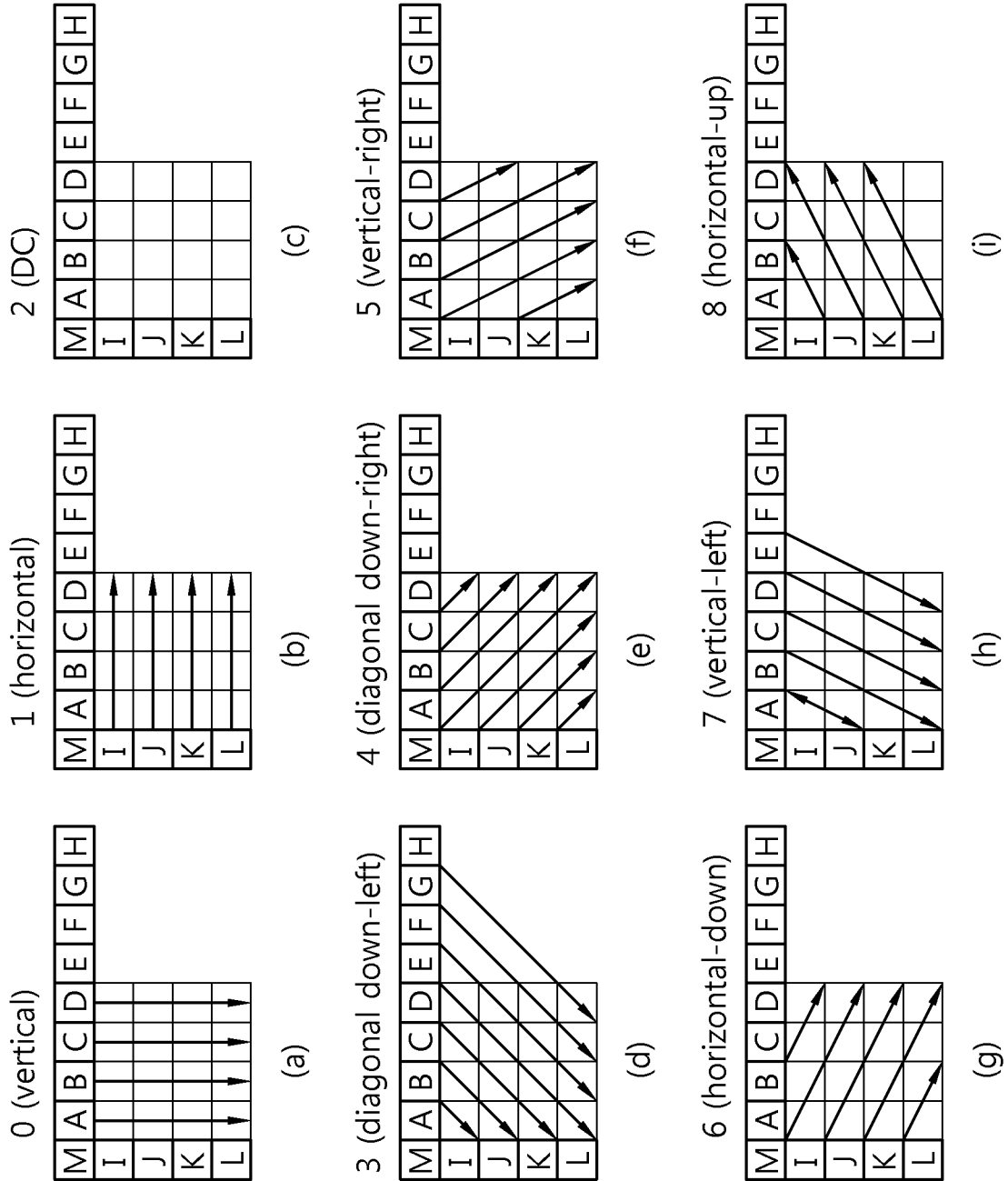


FIG. 5

Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Q																
R																
S																
T																
U																
V																
W																
X																

FIG. 6

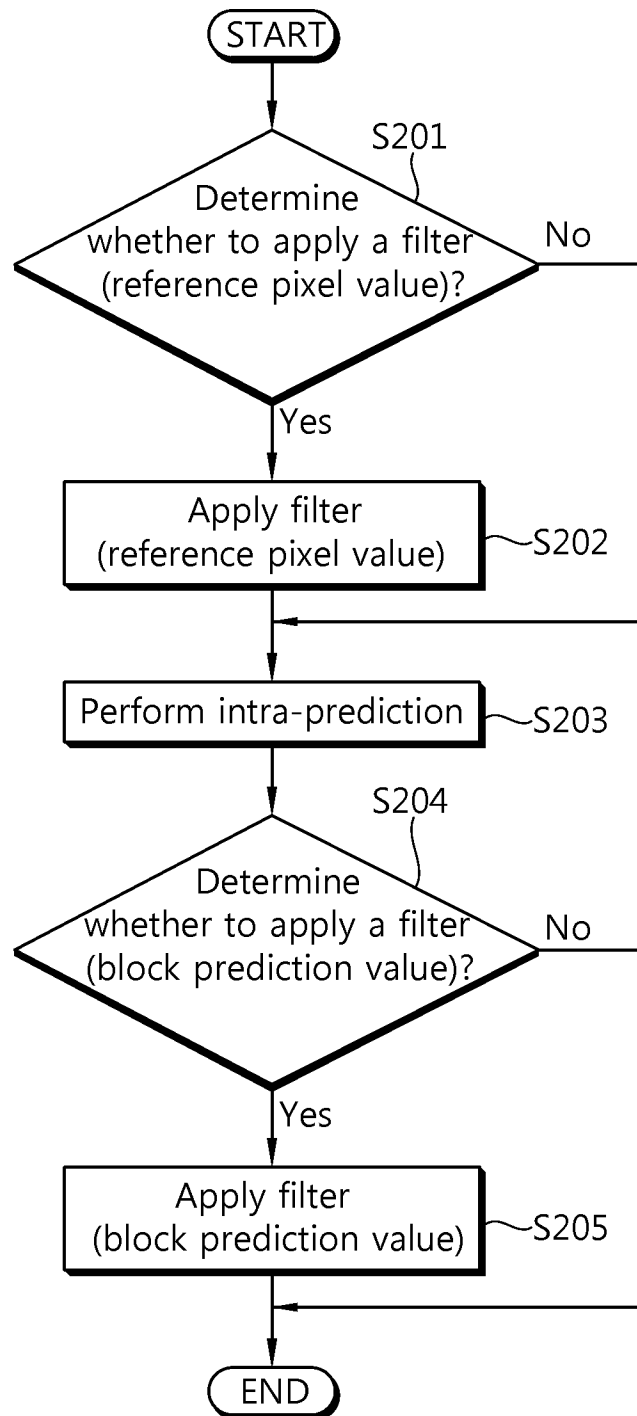




FIG. 7

Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Q	a1	b1	c1	d1	e1	f1	g1	h1								
R	a2	b2	c2	d2	e2	f2	g2	h2								
S	a3	b3	...	...	...	...	...	...								
T	a4	b4	...	...	...	...	...	...								
U	a5	b5	...	...	...	...	...	...								
V	a6	b6	...	...	...	f6	g6	h6								
W	a7	b7	...	...	...	f7	g7	h7								
X	a8	b8	...	...	...	f8	g8	h8								

FIG. 8

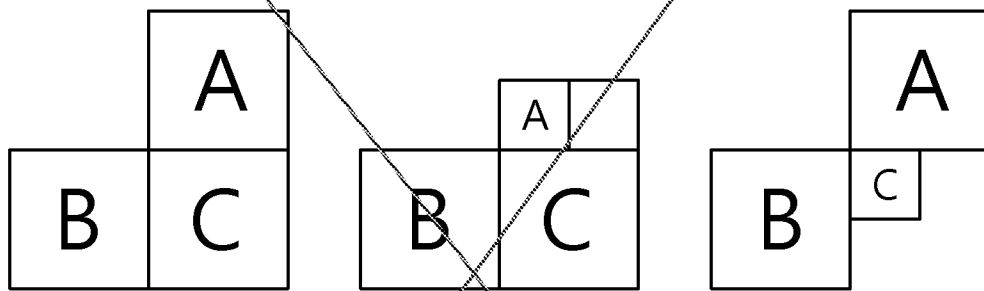


FIG. 9

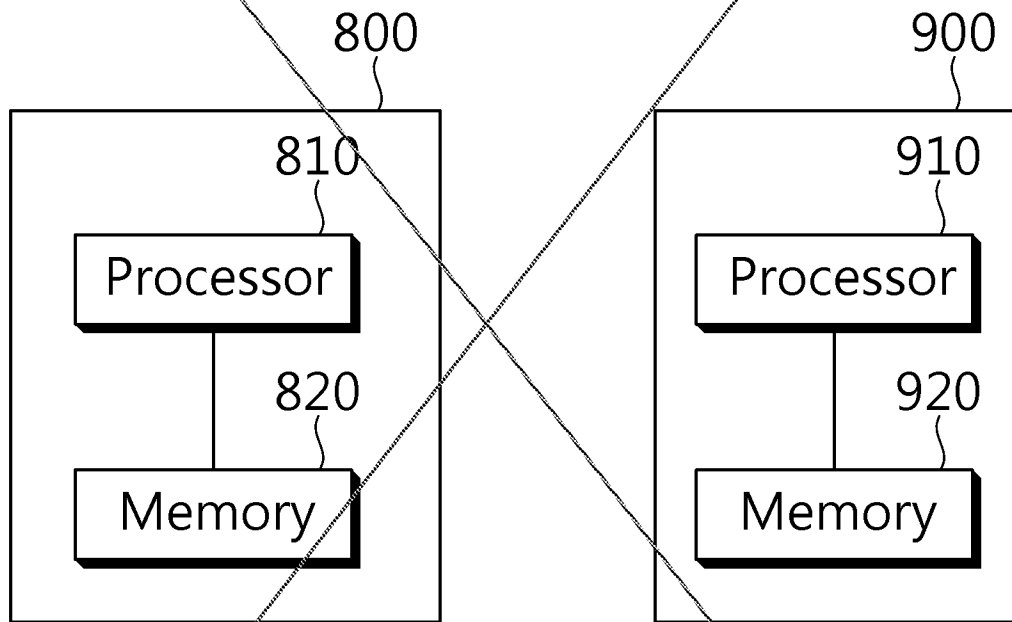


FIG. 1

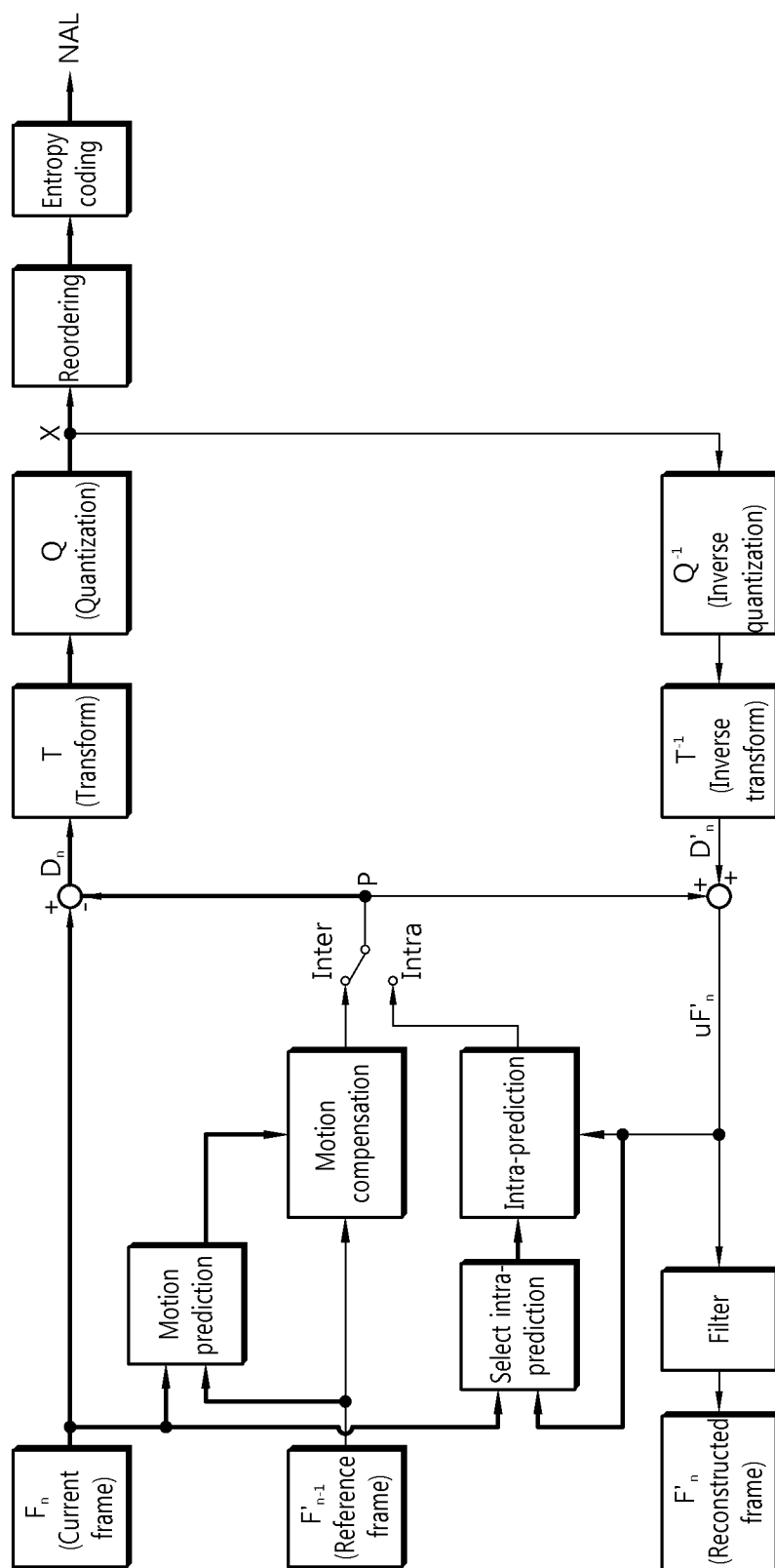


FIG. 2

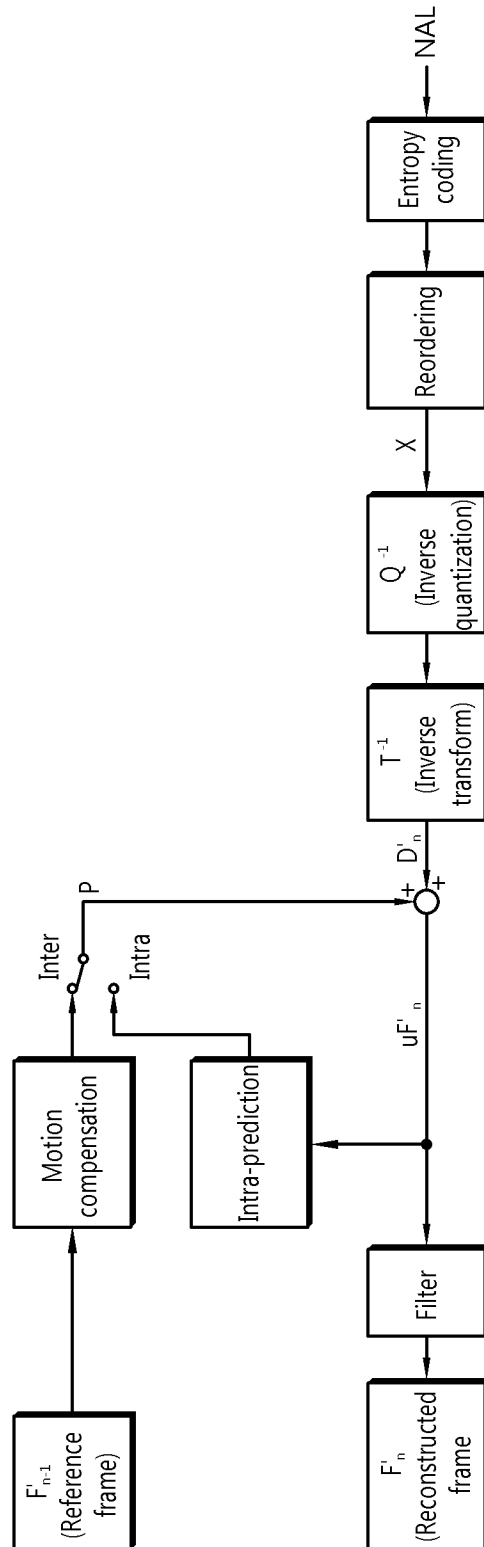


FIG. 3

M	A	B	C	D	E	F	G	H
I	a	b	c	d				
J	e	f	g	h				
K	i	j	k	l				
L	m	n	o	p				

FIG. 4

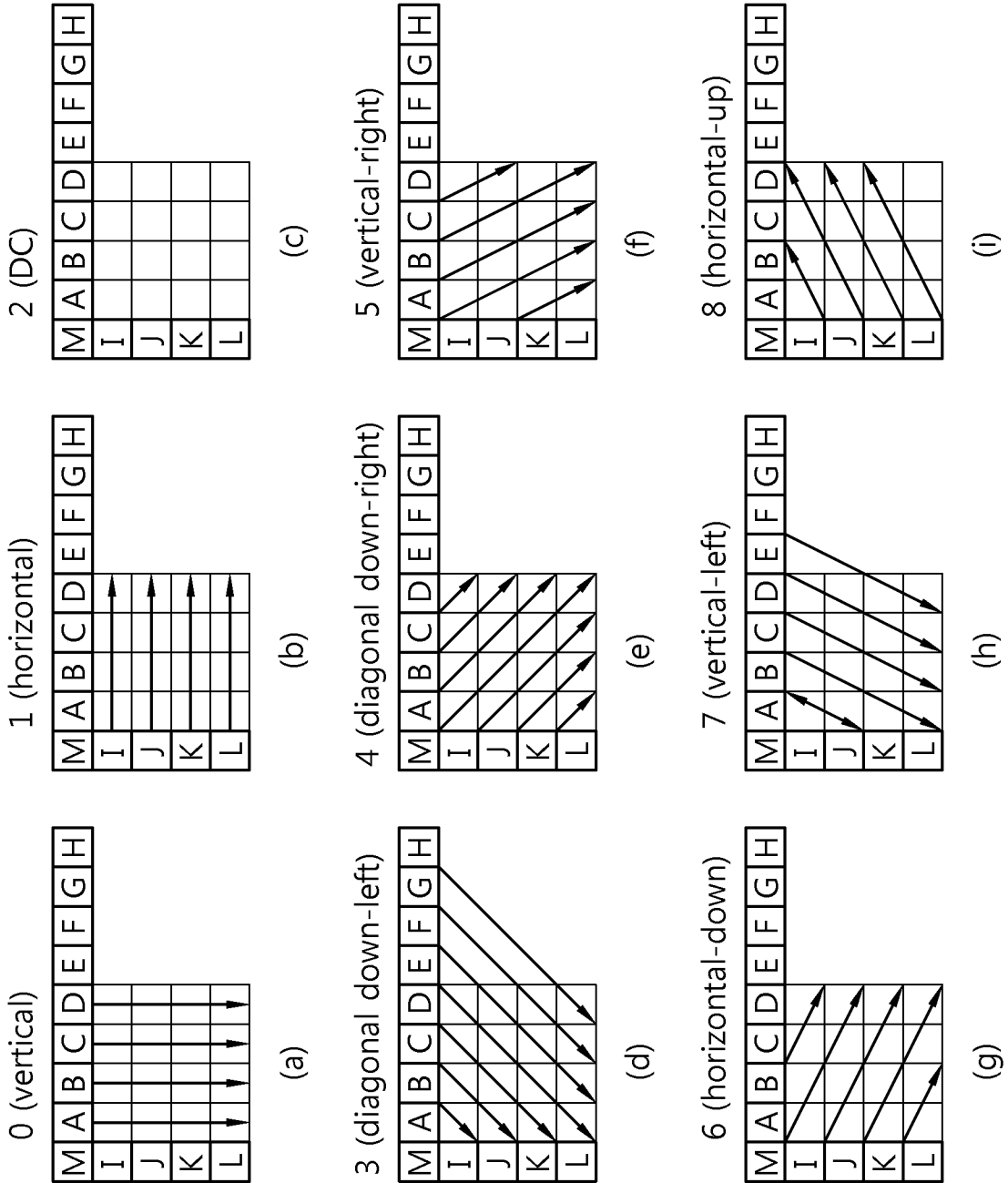


FIG. 5

Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Q																
R																
S																
T																
U																
V																
W																
X																



FIG. 6

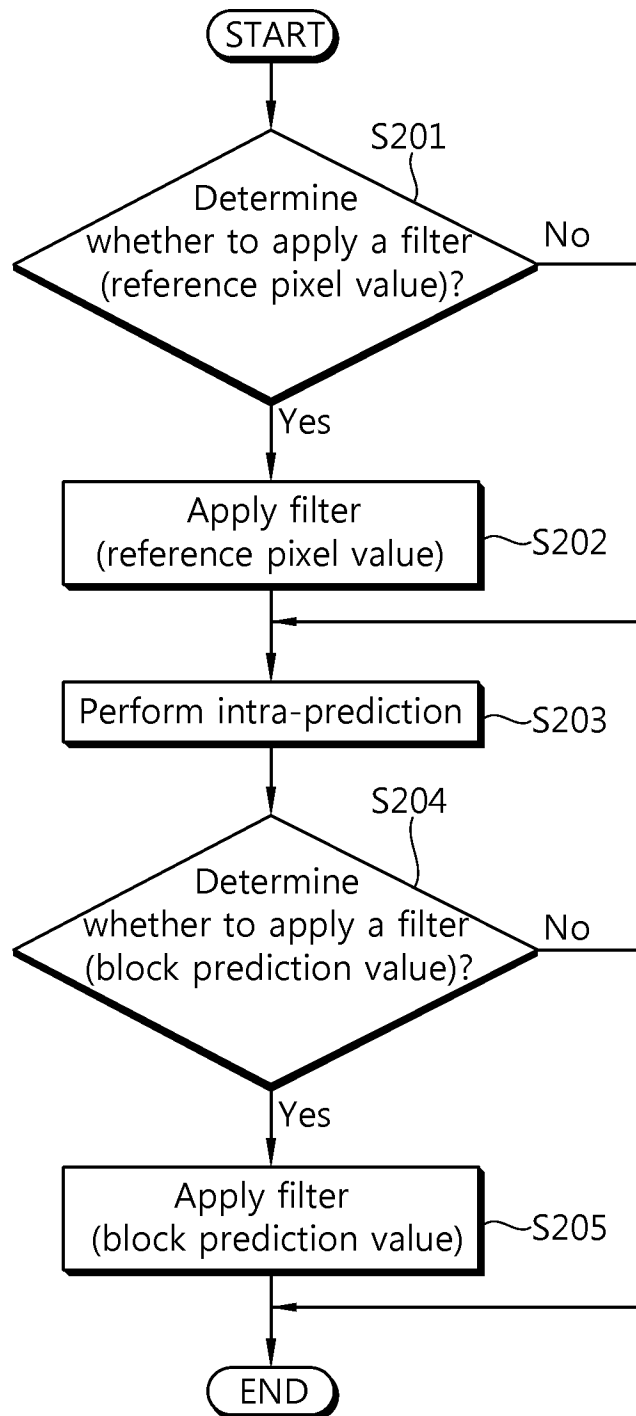
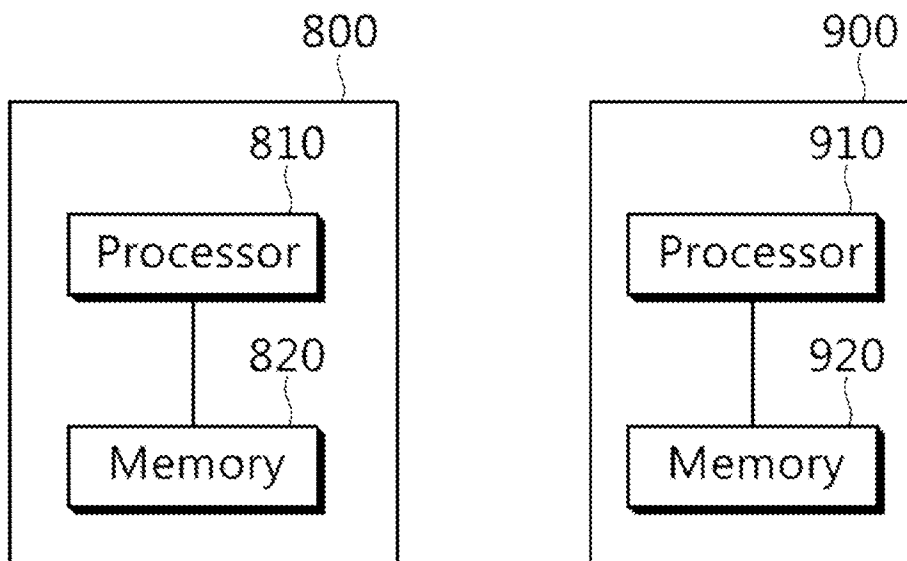




FIG. 8



## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	27802559
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Keren Lee
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	15-DEC-2016
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	11:37:05
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment after Notice of Allowance (Rule 312)	PA0929-0_Reply_to_NFCAP.pdf	14372  <small>fd8ea6074c879b98f71fed989d3c7d9d1b73f3f5</small>	no	1

### Warnings:

IPR2021-00827

Information:					
2	Amendment after Notice of Allowance (Rule 312)	PA0929-0_Reply_to_NFCAP_A nnotated_Drawings_and_Repl acement_Drawings.pdf	198160  d7a813e33cc1a81acbd473d997ee28306b5 12112	no	17
Warnings:					
Information:					
<b>Total Files Size (in bytes):</b>				212532	
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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 13/640,014, 10/08/2012, Jin Ho Lee, PA0929-0, 2830
Row 2: 7590, 11/30/2016, William Park & Associates LTD., 930 N. York Road, Suite 201, Hinsdale, IL 60521
Row 3: EXAMINER HABIB, IRFAN
Row 4: ART UNIT 2485, PAPER NUMBER
Row 5: NOTIFICATION DATE 11/30/2016, DELIVERY MODE ELECTRONIC

NOTICE OF NON-COMPLIANT INFORMATION DISCLOSURE STATEMENT

An Information Disclosure Statement (IDS) filed 11/25/16 in the above-identified application fails to meet the requirements of 37 CFR 1.97(d) for the reason(s) specified below. Accordingly, the IDS will be placed in the file, but the information referred to therein has not been considered.

The IDS is not compliant with 37 CFR 1.97(d) because:

- [X] The IDS lacks a statement as specified in 37 CFR 1.97(e).
[ ] The IDS lacks the fee set forth in 37 CFR 1.17(p).
[ ] The IDS was filed after the issue fee was paid. Applicant may wish to consider filing a petition to withdraw the application from issue under 37 CFR 1.313(c) to have the IDS considered. See MPEP 1308.

Handwritten signature

571-272-4200 or 1-888-786-0101
Application Assistance Unit
Office of Data Management

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014
	Filing Date	2012-10-08
	First Named Inventor	Jin Ho LEE
	Art Unit	
	Examiner Name	
	Attorney Docket Number	PA0929-0

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Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8630350	B2	2014-01-14	Limin WANG et al.	

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	1	2005-510985	JP	A	2005-04-21	GENERAL INSTRUMENT CORPORATION		
	2	2006-005438	JP	A	2006-01-05	SONY CORPORATION		
	3	2008-061044	JP	A	2008-03-13	FUJITSU TLD		

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		PA0929-0	

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	1		

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Examiner Signature		Date Considered	
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014
	Filing Date	2012-10-08
	First Named Inventor	Jin Ho LEE
	Art Unit	
	Examiner Name	
	Attorney Docket Number	PA0929-0

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2016-11-25
Name/Print	Woochoon W. Park	Registration Number	55523

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	27612160
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Lena Maxey
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	25-NOV-2016
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	13:36:54
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	no
------------------------	----

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	PA0929-0_IDS_sb08a.pdf	612337 <small>20c72c7655a70c933a02deb4f6d0f84835a6d75e</small>	no	4

### Warnings:

IPR2021-00827

Information:					
2	Foreign Reference	JP2005-510985A.pdf	933240 72e03e1b336a2b392d0639e22b0a3d96aa89f4909	no	30
Warnings:					
Information:					
3	Foreign Reference	JP2006-005438A.pdf	11572050 9e407bffa45603383381d742127b7ee20931f04be	no	47
Warnings:					
Information:					
4	Foreign Reference	JP2008-061044A.pdf	9279117 03bb6fcebecf98b567db304feb7f704d2bae0e0ed	no	44
Warnings:					
Information:					
<b>Total Files Size (in bytes):</b>				22396744	
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>					



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Values: 13/640,014, 10/08/2012, Jin Ho Lee, PA0929-0, 2830

96767 7590 11/15/2016
William Park & Associates LTD.
930 N. York Road, Suite 201
Hinsdale, IL 60521

EXAMINER

HABIB, IRFAN

ART UNIT PAPER NUMBER

2485

NOTIFICATION DATE DELIVERY MODE

11/15/2016

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto.actions@wpapat.com
eofficeaction@appcoll.com



## UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450  
www.uspto.gov

Application No. : 13640014  
Applicant : Lee  
Filing Date : 10/08/2012  
Date Mailed : 11/15/2016

### NOTICE TO FILE CORRECTED APPLICATION PAPERS

#### *Notice of Allowance Mailed*

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

**Applicant is given two (2) months from the mail date of this Notice within which to respond. This time period for reply is extendable under 37 CFR 1.136(a) for only TWO additional MONTHS.**

The informalities requiring correction are indicated in the attachment(s). If the informality pertains to the abstract, specification (including claims) or drawings, the informality must be corrected with an amendment in compliance with 37 CFR 1.121 (or, if the application is a reissue application, 37 CFR 1.173). Such an amendment may be filed after payment of the issue fee if limited to correction of informalities noted herein. See Waiver of 37 CFR 1.312 for Documents Required by the Office of Patent Publication, 1280 Off. Gaz. Patent Office 918 (March 23, 2004). In addition, if the informality is not corrected until after payment of the issue fee, for purposes of 35 U.S.C. 154(b)(1)(iv), "all outstanding requirements" will be considered to have been satisfied when the informality has been corrected. A failure to respond within the above-identified time period will result in the application being ABANDONED.

See attachment(s).

*A copy of this notice **MUST** be returned with the reply. Please address response to  
"Mail Stop Issue Fee, Commissioner for Patents,  
P.O. Box 1450, Alexandria, VA 22313-1450".*

/Marty Willis/  
Publication Branch  
Office of Data Management  
(571) 272-4200

**IDENTIFICATION OF SPECIFICATION/DRAWING INCONSISTENCIES**

- On Page of the specification there is a brief description of FIG. , but the drawings filed do not include a drawing with that designation. Applicant must respond either by supplying the omitted drawing or by amending the specification to remove all references to that drawing.
- The drawings filed 10/08/2012 include FIG. 9, but the specification's brief description of the drawings does not describe a drawing with that designation. Applicant must respond either by amending the specification to add a brief description of that drawing or by correcting the drawings to remove the drawing in question.
- Drawings are present in the application and are referred to in the detailed description of the invention, but the specification does not contain a brief description of the drawings as required by 37 CFR 1.74 and 37 CFR 1.77(b)(8).
- Page of the specification refers to FIG. , but no drawing with that designation is described in the brief description of the drawings and no drawing with that designation is present in the application. Applicant must respond either by amending the specification to remove all references to that drawing, or by supplying that drawing and amending the specification to add a brief description of it.
- In the reissue application, FIG. , is labeled as “New” but is not described in the reissue specification’s brief description of the drawings. Applicant must respond by amending the reissue specification’s brief description of the drawings to add a brief description of the new drawing.
- OTHER:
- COMMENTS:



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 7 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY. DOCKET NO, TOT CLAIMS, IND CLAIMS. Row 1: 13/640,014, 10/08/2012, 2485, 635, PA0929-0, 19, 3

CONFIRMATION NO. 2830
CORRECTED FILING RECEIPT

96767
William Park & Associates LTD.
930 N. York Road, Suite 201
Hinsdale, IL 60521



Date Mailed: 10/26/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections

Inventor(s)

- Jin Ho Lee, Daejeon-si, KOREA, REPUBLIC OF;
Hui Yong Kim, Daejeon-si, KOREA, REPUBLIC OF;
Se Yoon Jeong, Daejeon-si, KOREA, REPUBLIC OF;
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Chie Teuk Ahn, Daejeon-si, KOREA, REPUBLIC OF;

Applicant(s)

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Chie Teuk Ahn, Daejeon-si, KOREA, REPUBLIC OF;

Assignment For Published Patent Application

Electronics and Telecommunications Research Institute, Daejeon, KOREA, REPUBLIC OF

Power of Attorney: The patent practitioners associated with Customer Number 96767



**Domestic Priority data as claimed by applicant**

This application is a 371 of PCT/KR11/02514 04/11/2011

**Foreign Applications** (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)

REPUBLIC OF KOREA 10-2010-0032778 04/09/2010

REPUBLIC OF KOREA 10-2011-0032766 04/08/2011

REPUBLIC OF KOREA 10-2011-0026079 03/23/2011

**Permission to Access Application via Priority Document Exchange:** Yes

**Permission to Access Search Results:** No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

**If Required, Foreign Filing License Granted:** 11/05/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/640,014**

**Projected Publication Date:** Not Applicable

**Non-Publication Request:** No

**Early Publication Request:** No

**\*\* SMALL ENTITY \*\***

**Title**

METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER

**Preliminary Class**

375

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:**

**PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application

serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

**LICENSE FOR FOREIGN FILING UNDER**  
**Title 35, United States Code, Section 184**  
**Title 37, Code of Federal Regulations, 5.11 & 5.15**

**GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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## **SelectUSA**

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

Document Description: Issue Fee Payment (PTO-85B)

**Issue Fee Transmittal Form**

Application Number	Filing Date	First Named Inventor	Atty. Docket No.	Confirmation No.
13640014	08-Oct-2012	Jin Ho Lee	PA0929-0	2830

**TITLE OF INVENTION :**

METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER

Entity Status	Application Type	Art Unit	Class - Subclass	EXAMINER
Small	U.S. National Stage under 35 USC 371	2485	240290	IRFAN HABIB
Issue Fee Due	Publication Due	Total Fee(s) Due	Date Due	Prev. Paid Fee
\$480	\$0	\$480	06-Jan-2017	\$0

**1.Change of Correspondence Address and/or Indication Of Fee Address (37 CFR 1.33 & 1.363)**

Current Correspondence Address:	Current Indicated Fee Address :
96767 William Park & Associates LTD.  930 N. York Road, Suite 201  Hinsdale IL 60521 UNITED STATES 6309087652 eofficeaction@apcoll.com	
<input type="checkbox"/> Change of correspondence address requested, system generated AIA/122-EFS form attached	<input type="checkbox"/> Fee Address indication requested, system generated SB/47-EFS form attached

**2.Entity Status****Change in Entity Status**

Applicant certifying micro entity status; system generated Micro Entity certification form attached. See 37 CFR 1.29.

Note: Absent a valid certification of micro entity status, issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.  
 If this box is checked, you will be prompted to choose a micro entity status on the gross income basis (37 CFR 1.29(a)) or the institution of higher education basis (37 CFR 1.29(d)), and make the applicable certification online.

 Applicant asserting small entity status. See 37 CFR 1.27.

Note: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

 Applicant changing to regular undiscounted fee status.

Note: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

Document Description: Issue Fee Payment (PTO-85B)

**3.The Following Fee(s) Are Submitted:** Issue Fee I authorize USPTO to apply my previously paid issue fee to the current fees due Publication Fee The Director is hereby authorized to apply my previously paid issue fee to the current fee due and to charge deficient fees to Deposit Account Number \_\_\_\_\_ Advance Order - # of copies \_\_\_\_\_

If **in addition** to the payment of the issue fee amount submitted with this form, there are any discrepancies in any amount(s) due, the Director is authorized to charge any deficiency, or credit any overpayment, to Deposit Account Number 506178.

The **issue fee must be submitted** with this form. **If payment of the issue fee does not accompany this form, checking this box and providing a deposit account number will NOT be effective to satisfy full payment of the fee(s) due.**

**4.Firm and/or Attorney Names To Be Printed****NOTE: If no name is listed, no name will be printed**

For printing on the patent front page, list to be displayed as entered

1. WILLIAM PARK &amp; ASSOCIATES LTD.

2.

3.

**5.Assignee Name(s) and Residence Data To Be Printed**

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

Name	City	State	Country	Category
ELECTRONICS AND TELECOMMUNICATIONS RESEARCH INSTIT	DAEJEON		korea, republic of	corporation

**6.Signature**

I certify, in accordance with 37 CFR 1.4(d)(4) that I am an attorney or agent registered to practice before the Patent and Trademark Office who has filed and has been granted power of attorney in this application. I also certify that this Fee(s) Transmittal form is being transmitted to the USPTO via EFS-WEB on the date indicated below.

<b>Signature</b>	/Woochoon W. Park/	<b>Date</b>	10-24-2016
<b>Name</b>	Woochoon William Park	<b>Registration Number</b>	55523

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13640014
<b>Filing Date:</b>	08-Oct-2012
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Filer:</b>	Woochoon William Park/Jin Suh
<b>Attorney Docket Number:</b>	PA0929-0

Filed as Small Entity

### Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
UTILITY APPL ISSUE FEE	2501	1	480	480
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0

**Pages:**

**Claims:**

**Miscellaneous-Filing:**

**Petition:**

**Patent-Appeals-and-Interference:**

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>480</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	27305161
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Jin Suh
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	24-OCT-2016
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	17:33:01
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$480
RAM confirmation Number	102516INTEFSW17330000
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

IPR2021-00827



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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment after Notice of Allowance (Rule 312)	PA0929-0_IF_Transmittal_Letter.pdf	13126 17f6b0a4edc0eefd802db0d7bd25aa6c1b63cf13	no	1

**Warnings:**

**Information:**

2	Issue Fee Payment (PTO-85B)	Web85b.pdf	46224 0fdae5379be7fab1be505dad4491e79e690d164	no	2
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**Warnings:**

**Information:**

3	Fee Worksheet (SB06)	fee-info.pdf	32317 6ee69be149dda1355d16ea9cb4f418b8807200bc	no	2
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**Warnings:**

**Information:**

<b>Total Files Size (in bytes):</b>	91667
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**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor(s): Jin Ho Lee et al.	Group Art Unit: 2485
U.S. Serial No.: 13/640,014	Examiner: HABIB, IRFAN
Filing Date: October 8, 2012	
Title: METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER	

## TRANSMITTAL LETTER FOR ASSIGNEE SPELLING

**Mail Stop Issue Fee**

The Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

Dear Sir or Madam:

Please be informed that the Web Based Issue Fee incorrectly lists the Assignee's name because of insufficient space. Therefore, please print the correct Assignee name to match the Application Data sheet and the Assignment filed with EPAS. The correct spelling is as follows: **Electronics and Telecommunications Research Institute.**

The Office is encouraged to contact the undersigned by telephone to expeditiously resolve any remaining questions or concerns.

Respectfully submitted,

Dated: October 24 2016

Electronic signature: /William W. Park/

William W. Park, Reg. No. 55523

William Park & Associates Ltd.

930 N. York Road, Suite 201

Hinsdale IL 60521

630-908-7652

Page 1 of 1



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NUMBER, FILING OR 371(C) DATE, FIRST NAMED APPLICANT, ATTY.DOCKET NO./TITLE, REQUEST ID. Values: 13/640,014, 10/08/2012, Jin Ho Lee, PA0929-0, 27142

Acknowledgement of Change to Small Entity Status

The entity status change request below filed through Private PAIR on 10/24/2016 has been accepted.

CERTIFICATIONS:

Change of Entity Status:
X Applicant asserting small entity status. See 37 CFR 1.27.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

This portion must be completed by the signatory or signatories making the entity status change in accordance with 37 CFR 1.4(d)(4).

Table with 2 columns: Label, Value. Rows: Signature: /Woochoon W Park/, Name: Woochoon W Park, Registration Number: 55523



NOTICE OF ALLOWANCE AND FEE(S) DUE

96767 7590 10/06/2016
William Park & Associates LTD.
930 N. York Road, Suite 201
Hinsdale, IL 60521

Table with 2 columns: EXAMINER (HABIB, IRFAN), ART UNIT (2485), PAPER NUMBER (2830)

DATE MAILED: 10/06/2016

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

13/640,014 10/08/2012 Jin Ho Lee PA0929-0 2830
TITLE OF INVENTION: METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER

Table with 7 columns: APPLN. TYPE, ENTITY STATUS, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.
If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.
If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".
For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

**PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 or Fax (571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

96767 7590 10/06/2016  
**William Park & Associates LTD.**  
 930 N. York Road, Suite 201  
 Hinsdale, IL 60521

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/640,014	10/08/2012	Jin Ho Lee	PA0929-0	2830

TITLE OF INVENTION: METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	01/06/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
HABIB, IRFAN	2485	375-240290

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. <b>Use of a Customer Number is required.</b></p>	<p>2. For printing on the patent front page, list</p> <p>(1) The names of up to 3 registered patent attorneys or agents OR, alternatively, _____ 1</p> <p>(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. _____ 2</p> <p>_____ 3</p>
---	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE \_\_\_\_\_ (B) RESIDENCE: (CITY and STATE OR COUNTRY) \_\_\_\_\_

Please check the appropriate assignee category or categories (will not be printed on the patent) :  Individual  Corporation or other private group entity  Government

<p>4a. The following fee(s) are submitted:</p> <p><input type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (<b>Please first reapply any previously paid issue fee shown above</b>)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).</p>
---	--

5. **Change in Entity Status** (from status indicated above)

Applicant certifying micro entity status. See 37 CFR 1.29

Applicant asserting small entity status. See 37 CFR 1.27

Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

**NOTE:** This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature \_\_\_\_\_ Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_ Registration No. \_\_\_\_\_



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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

96767 7590 10/06/2016
William Park & Associates LTD.
930 N. York Road, Suite 201
Hinsdale, IL 60521

EXAMINER

HABIB, IRFAN

ART UNIT PAPER NUMBER

2485

DATE MAILED: 10/06/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

### Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IPR2021-00827

<b>Examiner-Initiated Interview Summary</b>	<b>Application No.</b> 13/640,014	<b>Applicant(s)</b> LEE ET AL.	
	<b>Examiner</b> IRFAN HABIB	<b>Art Unit</b> 2485	

All participants (applicant, applicant's representative, PTO personnel):

- (1) IRFAN HABIB. (3)\_\_\_\_\_.
- (2) Elliott Cho. (4)\_\_\_\_\_.

Date of Interview: 26 September 2016.

Type:  Telephonic  Video Conference  
 Personal [copy given to:  applicant  applicant's representative]

Exhibit shown or demonstration conducted:  Yes  No.  
If Yes, brief description: \_\_\_\_\_.

Issues Discussed 101 112 102 103 Others  
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 20 & 25.

Identification of prior art discussed: all.

**Substance of Interview**

(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Applicant's representative and examiner discussed proposed examiner amendment. Applicant accepted proposed examiner amendment. Further discussed current block adjacent to the boundary of the reference pixels and applies a 2-tap filter to remaining pixels among the prediction pixels of the current block adjacent to the boundary of the reference pixels, except for the top leftmost pixel of the current block.

**Applicant recordation instructions:** It is not necessary for applicant to provide a separate record of the substance of interview.

**Examiner recordation instructions:** Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Attachment

/I. H./  
Examiner, Art Unit 2485

/Jayanti K Patel/  
Supervisory Patent Examiner, Art Unit 2485



<b>Notice of Allowability</b>	<b>Application No.</b> 13/640,014	<b>Applicant(s)</b> LEE ET AL.	
	<b>Examiner</b> IRFAN HABIB	<b>Art Unit</b> 2485	<b>AIA (First Inventor to File) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to claim amendment filed on 7/7/16.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
2.  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
3.  The allowed claim(s) is/are 20. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).
4.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some    \*c)  None of the:
  1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5.  CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.  
 including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |   |
|--|---|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 5. <input checked="" type="checkbox"/> Examiner's Amendment/Comment       |
| 2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date <u>8/29/16, 8/30/16</u> | 6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material                           | 7. <input type="checkbox"/> Other _____.                                  |
| 4. <input checked="" type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date <u>9/26/16</u> .                          |   |

/I. H./  
Examiner, Art Unit 2485

/Jayanti K Patel/  
Supervisory Patent Examiner, Art Unit 2485

Art Unit: 2485

### **EXAMINER'S AMENDMENT**

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in an interview with Elliot Cho on 9/27/16.

The application has been amended as follows:

#### **IN THE CLAIMS:**

**Claim 20**, line 22 after "pixel value" --, wherein when the second filter is applied, the processor applies a 3-tap filter to a top leftmost pixel of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixels and applies a 2-tap filter to remaining pixels among the prediction pixels of the current block adjacent to the boundary of the reference pixels, except for the top leftmost pixel of the current block. -- has been inserted;

**Claim 25**, has been canceled;

#### ***Allowable Subject Matter***

**Claim 20 is allowed.**

**Claims 1-19 and 21-27 are canceled.**

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Art Unit: 2485

**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IRFAN HABIB whose telephone number is (571)270-7325. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/I. H./  
Examiner, Art Unit 2485

/Jayanti K Patel/  
Supervisory Patent Examiner, Art Unit 2485  
September 28, 2016

<b>Examiner-Initiated Interview Summary</b>	<b>Application No.</b> 13/640,014	<b>Applicant(s)</b> LEE ET AL.	
	<b>Examiner</b> IRFAN HABIB	<b>Art Unit</b> 2485	

All participants (applicant, applicant's representative, PTO personnel):

- (1) IRFAN HABIB. (3)\_\_\_\_\_.
- (2) Elliott Cho. (4)\_\_\_\_\_.

Date of Interview: 26 September 2016.

Type:  Telephonic  Video Conference  
 Personal [copy given to:  applicant  applicant's representative]

Exhibit shown or demonstration conducted:  Yes  No.  
If Yes, brief description: \_\_\_\_\_.

Issues Discussed 101 112 102 103 Others  
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 20 & 25.

Identification of prior art discussed: all.

**Substance of Interview**

(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Applicant's representative and examiner discussed proposed examiner amendment. Applicant accepted proposed examiner amendment. Further discussed current block adjacent to the boundary of the reference pixels and applies a 2-tap filter to remaining pixels among the prediction pixels of the current block adjacent to the boundary of the reference pixels, except for the top leftmost pixel of the current block.

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**Examiner recordation instructions:** Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Attachment

/I. H./  
Examiner, Art Unit 2485

/Jayanti K Patel/  
Supervisory Patent Examiner, Art Unit 2485

<b>Notice of References Cited</b>	Application/Control No. 13/640,014	Applicant(s)/Patent Under Reexamination LEE ET AL.	
	Examiner IRFAN HABIB	Art Unit 2485	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
	A US-				
	B US-				
	C US-				
	D US-				
	E US-				
	F US-				
	G US-				
	H US-				
	I US-				
	J US-				
	K US-				
	L US-				
	M US-				

**FOREIGN PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N				
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	P				
	Q				
	R				
	S				
	T				

**NON-PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)			
	U				
	V				
	W				
	X				

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014
	Filing Date	2012-10-08
	First Named Inventor	Jin Ho LEE
	Art Unit	
	Examiner Name	
	Attorney Docket Number	PA0929-0

U.S.PATENTS							Remove
Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
	1						

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Examiner Initial*	Cite No	Publication Number	Kind Code <sup>1</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
	1	20090252221	A1	2009-10-08	Joon Young PARK et al.		

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Examiner Initial*	Cite No	Foreign Document Number <sup>3</sup>	Country Code <sup>2</sup> i	Kind Code <sup>4</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T <sup>5</sup>
	1	1845732	EP	A2	2007-10-17	SAMSUNG ELECTRONICS CO., LTD.		
	2	2011021839	WO	A2	2011-02-24	SAMSUNG ELECTRONICS CO., LTD.		
	3	2600613	EP	A2	2013-06-05	Soo-mi OH		

**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**  
( Not for submission under 37 CFR 1.99)

Application Number	13640014
Filing Date	2012-10-08
First Named Inventor	Jin Ho LEE
Art Unit	
Examiner Name	
Attorney Docket Number	PA0929-0

4	2600614	EP	A2	2013-05-06	Soo-mi OH
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**NON-PATENT LITERATURE DOCUMENTS**

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>5</sup>
	1	MATHIAS WIEN, "Variable Block-Size Transforms for H.264/AVC," IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS FOR VIDEO TECHNOLOGY, July 1, 2003, pages 604-613, Vol. 13, No. 7, IEEE Service Center, Piscataway, NJ, USA.	
	2	SHAY HAR-NOY et al., "Adaptive In-Loop Prediction Refinement for Video Coding," Multimedia Signal Processing, 2007. MMSP 2007. IEEE 9th Workshop on, October 1, 2007, pages 171-174, IEEE, Piscataway, NJ, USA.	
	3	HUI YONG KIM et al., "Description of video coding technology proposal by ETRI," Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, April 15-23, 2010, pages 1-37.	
	4	YUNFEI ZHENG, "CE13: Mode Dependent Hybrid Intra Smoothing," Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, January 20-28, 2011, pages 1-5.	

If you wish to add additional non-patent literature document citation information please click the Add button

**EXAMINER SIGNATURE**

Examiner Signature	/Irfan Habib/	Date Considered	09/27/2016
--------------------	---------------	-----------------	------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE STATEMENT BY APPLICANT**  
( Not for submission under 37 CFR 1.99)

Application Number		13640014	
Filing Date		2012-10-08	
First Named Inventor	Jin Ho LEE		
Art Unit			
Examiner Name			
Attorney Docket Number		PA0929-0	

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2016-08-29
Name/Print	Woochoon W. Park	Registration Number	55523

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**



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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
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## EAST Search History

## EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1	13/640014.app.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2014/10/16 12:50
S2	272	H04N7/32.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2014/10/16 12:51
S3	1	13/640014.app.	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 11:48
S4	605	H04N7/32.cpc.	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 11:48
S6	2681	375/240.ccls.	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 11:49
S7	2	"20110176614"	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 12:01
S8	3	"20070253483"	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 12:05
S9	2	"20090310677"	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 17:09
S10	2	decod\$3 near3 filter\$2 near3 prediction near value near block	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 17:15
S11	2	"20040136458"	US-PGPUB; USPAT; FPRS	OR	ON	2014/10/29 17:20

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S12	4	"2009141969"	US-PGPUB; USPAT; FPRS	OR	ON	2014/10/29 17:21
S13	1	"20110176614"	US-PGPUB; USPAT; FPRS	OR	ON	2014/10/29 17:21
S14	61	intra near3 prediction near filter	US-PGPUB; USPAT; FPRS	OR	ON	2014/10/30 15:45
S16	61	intra near3 prediction near filter and prediction	US-PGPUB; USPAT; FPRS	OR	ON	2014/10/30 15:45
S17	308	(("Jin Ho") near2 (Lee)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:31
S18	55	(("Hui Yong") near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S19	84	(("Se Yoon") near2 (Jeong)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S20	61	(("Suk Hee") near2 (Cho)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S21	42	(("Ha Hyun") near2 (Lee)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S22	241	(("Jong Ho") near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S23	241	(("Jong Ho") near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S24	65	(("Sung Chang") near2 (Lim)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S25	313	(("Jin Soo") near2 (Choi)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S26	393	(("Jin Woong") near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S27	65	(("Chie Teuk") near2 (Ahn)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S28	0	"20050541929"	US-PGPUB; USPAT; FPRS	OR	ON	2014/11/09 11:45
S29	1	10/541929.app.	US-PGPUB; USPAT; FPRS	OR	ON	2014/11/09 11:45
S30	1	"5621467".pn.	US-	OR	ON	2014/11/09

			PGPUB; USPAT; FPRS			11:47
S31	3	"20080107177"	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 12:47
S32	1	(plurality near2 filter) near2 (intra adj prediction adj mode)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 12:49
S33	3	(second near2 filter) near2 (intra adj prediction adj mode)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 12:50
S34	3	"20120082224"	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 12:56
S35	3	(second near2 filter) near5 (intra adj prediction adj mode)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:03
S36	55	(intra-prediction mode) same2 (select near2 second near filter)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:04
S39	3	(intra-prediction) same2 (select near2 second near filter)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:06
S40	361	(apply near2 second near filter)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:11
S41	6	(apply near2 second near filter) near2 (block)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:12
S42	691	(second near filter) near2 (block)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:13
S44	7	(second near filter) near2 intra	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:17
S45	25	("20040184666"   "20060062299"   "20060188024"   "20060291557"	US- PGPUB;	OR	ON	2015/09/21 13:18

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		"20070098068"   "20070183072"   "20070291847"   "20080137752"   "20080260043"   "20090010568"   "20090074061"   "20090080535"   "20090112272"   "20090116760"   "20090168872"   "20090262803"   "20100118963"   "20100183072"   "20100260260"   "20100284467"   "20110122953"   "20110123131"   "5761200"   "6633676"   "7852853").PN.	USPAT; USOCR			
S46	17	S45 and filter	US- PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:19
S47	342	deblocking near2 picture	US- PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:48
S48	0	(deblocking near2 picture) near2 second	US- PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:48
S49	156	(deblocking near2 picture) near2 filter	US- PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:48
S50	6	(deblocking near2 picture) near2 filter near2 intra	US- PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:48
S51	1	"20080075166"	US- PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:50
S52	2	"20100086032"	US- PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:52
S53	12	("20050249291"   "20060153297"   "20070206679"   "20080025391"   "20080310504"   "20080310507"   "20080310512"   "20100086029"   "20100086030"   "20100086031"   "20100086049"   "7529302").PN.	US- PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:56
S54	9	S53 and filter	US- PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:56
S55	2	"20060268991"	US- PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:59
S56	1	("20060268991").PN.	DERWENT	OR	OFF	2015/09/21 14:27
S57	1	("20110176614").PN.	DERWENT	OR	OFF	2015/09/21 14:38
S58	1	"20130301720"	US- PGPUB; USPAT	OR	ON	2016/03/29 17:14

S59	1	("2013/0301720").URPN.	USPAT	OR	ON	2016/03/29 17:14
S60	17	("20120033736"   "7050504"   "7457362"   "9154781"   "7457362"   "20070206872"   "20140079128"   "7386048"   "8514942"   "8576906"   "8743949"   "20130336591"   "20140079128"   "7386048"   "20130336591"   "8644375"   "8743949"   "8576906"   "8654845"   "7050504"   "7609897"   "20120033736"   "20140328397"   "20140328397"   "20070206872"   "20150023405"   "8619857").PN.	US-PGPUB; USPAT	OR	ON	2016/03/29 17:16
S61	5	reference near pixel near2 intra near2 upper	US-PGPUB; USPAT	OR	ON	2016/03/30 09:27
S62	2	"20120082224"	US-PGPUB; USPAT	OR	ON	2016/03/30 09:30
S63	0	("9008175").URPN.	USPAT	OR	ON	2016/03/30 09:30
S64	12	("20040136458"   "20060072676"   "20060268991"   "20100080472"   "20100135389"   "20100239002"   "20110038415"   "20130177079"   "7349473"   "7555043"   "7706622"   "8005151").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/30 09:30
S65	3	S64 and second near filter	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/30 09:45
S66	0	intra near2 upper-left near2 "DC" near mode	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/30 10:18
S67	0	intra near2 upper-left	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/30 10:18
S68	12	intra near2 upper near left	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/30 10:18
S69	1	("20110261880").PN.	DERWENT	OR	OFF	2016/03/30 11:45
S70	2	"20080089417"	US-PGPUB; USPAT	OR	ON	2016/03/30 11:51
S71	1	("20080089417").PN.	DERWENT	OR	OFF	2016/03/30 11:55
S72	2	"20130101032"	US-PGPUB; USPAT	OR	ON	2016/03/30 12:03


9/ 27/ 2016 6:30:18 PM

C:\Users\ihabib\Documents\EAST\Workspaces\13640014.wsp

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<b>Search Notes</b>  	<b>Application/Control No.</b>  13640014	<b>Applicant(s)/Patent Under Reexamination</b>  LEE ET AL.
	<b>Examiner</b>  IRFAN HABIB	<b>Art Unit</b>  2485

CPC- SEARCHED		
Symbol	Date	Examiner
H04N7/32	10/16/14	IH
H04N 19/82	9/27/16	IH

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor Search	10/16/14	IH
EAST Search	10/16/14	IH
Update Search, EAST, google patent, and ip search	9/21/15	IH
Update Search	3/29/16	IH
Consult with Richard regarding allowance	3/29/16	IH
Update Search, EAST, google patent, and ip search	9/27/16	IH

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
H04N 19/82	General interference and search of claims (USPGPUB, UPAD)	9/27/16	IH

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CONFIRMATION NO. 2830

<b>SERIAL NUMBER</b> 13/640,014	<b>FILING or 371(c) DATE</b> 10/08/2012 <b>RULE</b>	<b>CLASS</b> 375	<b>GROUP ART UNIT</b> 2485	<b>ATTORNEY DOCKET NO.</b> PA0929-0
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**APPLICANTS**

**INVENTORS**

Jin Ho Lee, Daejeon-si, KOREA, REPUBLIC OF;  
 Hui Yong Kim, Daejeon-si, KOREA, REPUBLIC OF;  
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 Chie Teuk Ahn, Daejeon-si, KOREA, REPUBLIC OF;

**\*\* CONTINUING DATA \*\*\*\*\***  
 This application is a 371 of PCT/KR11/02514 04/11/2011

**\*\* FOREIGN APPLICATIONS \*\*\*\*\***  
 REPUBLIC OF KOREA 10-2010-0032778 04/09/2010  
 REPUBLIC OF KOREA 10-2011-0032766 04/08/2011  
 REPUBLIC OF KOREA 10-2011-0026079 03/23/2011

**\*\* IF REQUIRED, FOREIGN FILING LICENSE GRANTED \*\***  
 11/05/2012

Foreign Priority claimed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 35 USC 119(a-d) conditions met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Verified and Acknowledged <u>/IRFAN HABIB/</u> Examiner's Signature	<input type="checkbox"/> Met after Allowance Initials	<b>STATE OR COUNTRY</b> KOREA, REPUBLIC OF	<b>SHEETS DRAWINGS</b> 9	<b>TOTAL CLAIMS</b> 19	<b>INDEPENDENT CLAIMS</b> 3
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**ADDRESS**

William Park & Associates LTD.  
 930 N. York Road, Suite 201  
 Hinsdale, IL 60521  
 UNITED STATES

**TITLE**

METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER

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PTO/SB/08a (01-10)

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014
	Filing Date	2012-10-08
	First Named Inventor	Jin Ho LEE
	Art Unit	
	Examiner Name	
	Attorney Docket Number	PA0929-0

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STATEMENT BY APPLICANT**  
( Not for submission under 37 CFR 1.99)

Application Number		13640014
Filing Date		2012-10-08
First Named Inventor	Jin Ho LEE	
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STATEMENT BY APPLICANT**  
( Not for submission under 37 CFR 1.99)

Application Number		13640014
Filing Date		2012-10-08
First Named Inventor	Jin Ho LEE	
Art Unit		
Examiner Name		
Attorney Docket Number		PA0929-0

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That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2016-08-30
Name/Print	Woochoon W. Park	Registration Number	55523


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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

<b>Issue Classification</b> 	<b>Application/Control No.</b> 13640014	<b>Applicant(s)/Patent Under Reexamination</b> LEE ET AL.	
	<b>Examiner</b> IRFAN HABIB	<b>Art Unit</b> 2485	

CPC						
Symbol					Type	Version
H04N		19		82	F	2014-11-01
H04N		19		593	I	2014-11-01
H04N		19		117	I	2014-11-01
H04N		19		157	I	2014-11-01
H04N		19		176	A	2014-11-01
H04N		19		182	A	2014-11-01


CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

/IRFAN HABIB/ Examiner.Art Unit 2485  (Assistant Examiner)	(Date)	<b>Total Claims Allowed:</b>  1	
/JAY AU 2485 PATEL/ Supervisory Patent Examiner.Art Unit 2485  (Primary Examiner)	09/28/2016  (Date)	O.G. Print Claim(s)  1	O.G. Print Figure  6

<b>Issue Classification</b> 	<b>Application/Control No.</b> 13640014	<b>Applicant(s)/Patent Under Reexamination</b> LEE ET AL.
	<b>Examiner</b> IRFAN HABIB	<b>Art Unit</b> 2485

US ORIGINAL CLASSIFICATION						INTERNATIONAL CLASSIFICATION							
CLASS			SUBCLASS			CLAIMED				NON-CLAIMED			
375			240.290										
<b>CROSS REFERENCE(S)</b>													
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)												

/IRFAN HABIB/ Examiner.Art Unit 2485  (Assistant Examiner)	(Date)	<b>Total Claims Allowed:</b>  1	
/JAY AU 2485 PATEL/ Supervisory Patent Examiner.Art Unit 2485  (Primary Examiner)	09/28/2016  (Date)	O.G. Print Claim(s)  1	O.G. Print Figure  6

<b>Issue Classification</b> 	<b>Application/Control No.</b> 13640014	<b>Applicant(s)/Patent Under Reexamination</b> LEE ET AL.
	<b>Examiner</b> IRFAN HABIB	<b>Art Unit</b> 2485

<input type="checkbox"/> <b>Claims renumbered in the same order as presented by applicant</b>																<input type="checkbox"/> <b>CPA</b>		<input type="checkbox"/> <b>T.D.</b>		<input type="checkbox"/> <b>R.1.47</b>	
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original						
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	2		18																		
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/IRFAN HABIB/ Examiner. Art Unit 2485  (Assistant Examiner)	(Date)	<b>Total Claims Allowed:</b>  1	
/JAY AU 2485 PATEL/ Supervisory Patent Examiner. Art Unit 2485  (Primary Examiner)	09/28/2016  (Date)	O.G. Print Claim(s)  1	O.G. Print Figure  6



<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014
	Filing Date	2012-10-08
	First Named Inventor	Jin Ho LEE
	Art Unit	
	Examiner Name	
	Attorney Docket Number	PA0929-0

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U.S.PATENT APPLICATION PUBLICATIONS						Remove
Examiner Initial*	Cite No	Publication Number	Kind Code <sup>1</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20040136458	A1	2004-07-15	Achim DAHLHOFF et al.	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS							Remove	
Examiner Initial*	Cite No	Foreign Document Number <sup>3</sup>	Country Code <sup>2</sup> i	Kind Code <sup>4</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T <sup>5</sup>
	1							

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NON-PATENT LITERATURE DOCUMENTS				Remove
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>5</sup>	

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014
	Filing Date	2012-10-08
	First Named Inventor	Jin Ho LEE
	Art Unit	
	Examiner Name	
	Attorney Docket Number	PA0929-0

1	
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**EXAMINER SIGNATURE**

Examiner Signature		Date Considered	
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014
	Filing Date	2012-10-08
	First Named Inventor	Jin Ho LEE
	Art Unit	
	Examiner Name	
	Attorney Docket Number	PA0929-0

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2016-08-30
Name/Print	Woochoon W. Park	Registration Number	55523

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	26788324
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Lena Maxey
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	30-AUG-2016
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	15:07:21
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	PA0929-0_IDS_sb08a.pdf	612136  <small>2d9ba8c1e29463d5b2cf1e93c00cdf74181318e</small>	no	4

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<b>Information:</b>	
<b>Total Files Size (in bytes):</b>	612136
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>	

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014
	Filing Date	2012-10-08
	First Named Inventor	Jin Ho LEE
	Art Unit	
	Examiner Name	
	Attorney Docket Number	PA0929-0

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Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
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Examiner Initial*	Cite No	Publication Number	Kind Code <sup>1</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
	1	20090252221	A1	2009-10-08	Joon Young PARK et al.		

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Examiner Initial*	Cite No	Foreign Document Number <sup>3</sup>	Country Code <sup>2</sup> i	Kind Code <sup>4</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T <sup>5</sup>
	1	1845732	EP	A2	2007-10-17	SAMSUNG ELECTRONICS CO., LTD.		
	2	2011021839	WO	A2	2011-02-24	SAMSUNG ELECTRONICS CO., LTD.		
	3	2600613	EP	A2	2013-06-05	Soo-mi OH		

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		PA0929-0	

4	2600614	EP	A2	2013-05-06	Soo-mi OH	
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**NON-PATENT LITERATURE DOCUMENTS**

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>5</sup>
	1	MATHIAS WIEN, "Variable Block-Size Transforms for H.264/AVC," IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS FOR VIDEO TECHNOLOGY, July 1, 2003, pages 604-613, Vol. 13, No. 7, IEEE Service Center, Piscataway, NJ, USA.	
	2	SHAY HAR-NOY et al., "Adaptive In-Loop Prediction Refinement for Video Coding," Multimedia Signal Processing, 2007. MMSP 2007. IEEE 9th Workshop on, October 1, 2007, pages 171-174, IEEE, Piscataway, NJ, USA.	
	3	HUI YONG KIM et al., "Description of video coding technology proposal by ETRI," Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, April 15-23, 2010, pages 1-37.	
	4	YUNFEI ZHENG, "CE13: Mode Dependent Hybrid Intra Smoothing," Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, January 20-28, 2011, pages 1-5.	

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<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.



<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014
	Filing Date	2012-10-08
	First Named Inventor	Jin Ho LEE
	Art Unit	
	Examiner Name	
	Attorney Docket Number	PA0929-0

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See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2016-08-29
Name/Print	Woochoon W. Park	Registration Number	55523

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## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	26776567
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Lena Maxey
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	29-AUG-2016
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	16:23:48
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	PA0929-0_IDS_sb08a.pdf	613036 <small>0680ef0dafcb9990fbabdc2378652804522d367d</small>	no	4

### Warnings:

IPR2021-00827

<b>Information:</b>					
2	Foreign Reference	EP1845732A2.pdf	767713	no	26
			a8ed5bdb370106d5ef313aa6fd21c0da20708584		
<b>Warnings:</b>					
<b>Information:</b>					
3	Foreign Reference	WO2011021839A2.pdf	6130253	no	54
			c4d46dbfd6ddb07214e868a655cec3efaba2e7e8		
<b>Warnings:</b>					
<b>Information:</b>					
4	Foreign Reference	EP2600613A2.pdf	598071	no	18
			47b49ab86295cce231328ae9e0a8a8fb6634f20		
<b>Warnings:</b>					
<b>Information:</b>					
5	Foreign Reference	EP2600614A2.pdf	505420	no	18
			1fb5756461eb0f19772f39b76f8b62b0ac4f3c78		
<b>Warnings:</b>					
<b>Information:</b>					
6	Non Patent Literature	Variable_Block-Size_Transforms_for_H264-AVC.pdf	3303996	no	10
			277c7ce8a798ebca1b29c2e9a1ba36af2d4bfb43		
<b>Warnings:</b>					
<b>Information:</b>					
7	Non Patent Literature	Adaptive_In-Loop_Prediction_Refinement_for_Video_Coding.pdf	1149880	no	4
			25e0bccf931dc71c45c0b5ba8f17120c83d112b8		
<b>Warnings:</b>					
<b>Information:</b>					
8	Non Patent Literature	Description_of_video_coding_technology_proposal_by_ETRI.pdf	2581492	no	37
			4b4a02e44ac285acb72b17a380d586298b4c0dab		
<b>Warnings:</b>					
<b>Information:</b>					

9	Non Patent Literature	CE13_Mode_Dependent_Hybrid_Intra_Smoothing.pdf	223205  1977bd55b7f4f84f033251aa8a804aeff16ab7de	no	5
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**Warnings:**

**Information:**

<b>Total Files Size (in bytes):</b>	15873066
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**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

### REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL (Submitted Only via EFS-Web)

Application Number	13/640,014	Filing Date	2012-10-08	Docket Number (if applicable)	PA0929-0	Art Unit	2485
First Named Inventor	Jin Ho LEE			Examiner Name	Habib, Irfan		

**This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.**  
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

#### SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

Consider the arguments in the Appeal Brief or Reply Brief previously filed on \_\_\_\_\_

Other Amendment After Final filed on July 7, 2016.

Enclosed

Amendment/Reply

Information Disclosure Statement (IDS)

Affidavit(s)/ Declaration(s)

Other \_\_\_\_\_

#### MISCELLANEOUS

Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months \_\_\_\_\_  
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

Other \_\_\_\_\_

#### FEES

**The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**

The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No \_\_\_\_\_

#### SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

<input checked="" type="checkbox"/> Patent Practitioner Signature
<input type="checkbox"/> Applicant Signature

Signature of Registered U.S. Patent Practitioner			
Signature	WOOCHOON W. PARK/	Date (YYYY-MM-DD)	2016-08-04
Name	WOOCHOON W. PARK	Registration Number	55523

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13640014
<b>Filing Date:</b>	08-Oct-2012
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Filer:</b>	Woochoon William Park/Lena Maxey
<b>Attorney Docket Number:</b>	PA0929-0

Filed as Small Entity

**Filing Fees for U.S. National Stage under 35 USC 371**

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 1 month with \$0 paid	2251	1	100	100
<b>Miscellaneous:</b>				
RCE- 2nd and Subsequent Request	2820	1	850	850
<b>Total in USD (\$)</b>				<b>950</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	26548594
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Lena Maxey
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	04-AUG-2016
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	14:35:43
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$950
RAM confirmation Number	1164
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

IPR2021-00827

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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	PA0929-0_RCE_sb30EFS.pdf	697630	no	3
			f639f515673964886659c8c042f456d2c9727895		

**Warnings:**

**Information:**

2	Fee Worksheet (SB06)	fee-info.pdf	32729	no	2
			9b15912dc23c072fb1425839f1380fc2fb0ee08c		

**Warnings:**

**Information:**

<b>Total Files Size (in bytes):</b>	730359
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**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875	Application or Docket Number <b>13/640,014</b>	Filing Date <b>10/08/2012</b>	<input type="checkbox"/> To be Mailed
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ENTITY:  LARGE  SMALL  MICRO

**APPLICATION AS FILED – PART I**

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

**APPLICATION AS AMENDED – PART II**

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>	<b>08/04/2016</b>	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR			
	Total (37 CFR 1.16(i))	* 2	Minus	** 20	= 0	X \$80 = 0
	Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X \$420 = 0
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))					
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	<b>0</b>

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR			
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))					
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE  
 PARTHENIA D. MERRILL

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/640,014 10/08/2012 Jin Ho Lee PA0929-0 2830

96767 7590 07/21/2016
William Park & Associates LTD.
930 N. York Road, Suite 201
Hinsdale, IL 60521

EXAMINER

HABIB, IRFAN

ART UNIT PAPER NUMBER

2485

NOTIFICATION DATE DELIVERY MODE

07/21/2016

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto.actions@wpapat.com
cofficeaction@apcoll.com

<b>Advisory Action Before the Filing of an Appeal Brief</b>	<b>Application No.</b> 13/640,014	<b>Applicant(s)</b> LEE ET AL.	
	<b>Examiner</b> IRFAN HABIB	<b>Art Unit</b> 2485	<b>AIA (First Inventor to File) Status</b> No

**--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

THE REPLY FILED on 7/7/16 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

**NO NOTICE OF APPEAL FILED**

1.  The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:

- a)  The period for reply expires 3 months from the mailing date of the final rejection.
- b)  The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
- c)  A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection. The current period for reply expires \_\_\_\_\_ months from the mailing date of the prior Advisory Action or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.

*Examiner Note:* If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANT'S FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**NOTICE OF APPEAL**

2.  The Notice of Appeal was filed on \_\_\_\_\_. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

**AMENDMENTS**

3.  The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because
- a)  They raise new issues that would require further consideration and/or search (see NOTE below);
  - b)  They raise the issue of new matter (see NOTE below);
  - c)  They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
  - d)  They present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: \_\_\_\_\_. (See 37 CFR 1.116 and 41.33(a)).

- 4.  The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
- 5.  Applicant's reply has overcome the following rejection(s): \_\_\_\_\_.
- 6.  Newly proposed or amended claim(s) \_\_\_\_\_ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
- 7.  For purposes of appeal, the proposed amendment(s): (a)  will not be entered, or (b)  will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

**AFFIDAVIT OR OTHER EVIDENCE**

- 8.  A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
- 9.  The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
- 10.  The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
- 11.  The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

**REQUEST FOR RECONSIDERATION/OTHER**

- 12.  The request for reconsideration has been considered but does NOT place the application in condition for allowance because: \_\_\_\_\_.
- 13.  Note the attached Information *Disclosure Statement(s)*. (PTO/SB/08) Paper No(s). \_\_\_\_\_
- 14.  Other: Newly amended claims raises new issue, examiner will require additional examining hours to update search for new amended claim limitations.

**STATUS OF CLAIMS**

15. The status of the claim(s) is (or will be) as follows:  
 Claim(s) allowed: \_\_\_\_\_  
 Claim(s) objected to: \_\_\_\_\_  
 Claim(s) rejected: 20 & 25.  
 Claim(s) withdrawn from consideration: \_\_\_\_\_

/Jayanti K Patel/ Supervisory Patent Examiner, Art Unit 2485	/I. H./ Examiner, Art Unit 2485
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U.S. Serial No.: 13/640,014

PATENT  
DOCKET: PA0929-0**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Assignee(s): Electronics and Telecommunications Research Institute	
Inventor(s): Jin Ho LEE et al.	Group Art Unit: 2485
U.S. Serial No.: 13/640,014	Examiner: Habib, Irfan
Filing Date: October 8, 2012	
Title: METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER	

**AMENDMENT AFTER FINAL UNDER 37 CFR 1.116****Mail Stop AF**

The Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

Sir/Madam:

In response to the **final** office action mailed on April 7, 2016, setting a 3-month shortened statutory period for a reply ending on July 7, 2016, the applicant submits the following amendment and response.

- Listing of Claims (with or without amendment)**
- Remarks/Arguments**

**Fee Transmittal:**

No fee is believed to be required in connection with filing of this paper.

However, in the event any fee including the fee for extension of time is required, the Commissioner is authorized to charge the Deposit Account No. 50-6178.

DO NOT ENTER: /IH/



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Assignee(s): Electronics and Telecommunications Research Institute	
Inventor(s): Jin Ho LEE et al.	Group Art Unit: 2485
U.S. Serial No.: 13/640,014	Examiner: Habib, Irfan
Filing Date: October 8, 2012	
Title: METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER	

**AMENDMENT AFTER FINAL UNDER 37 CFR 1.116****Mail Stop AF**

The Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

Sir/Madam:

In response to the **final** office action mailed on April 7, 2016, setting a 3-month shortened statutory period for a reply ending on July 7, 2016, the applicant submits the following amendment and response.

- Listing of Claims (with or without amendment)**
- Remarks/Arguments**

**Fee Transmittal:**

No fee is believed to be required in connection with filing of this paper.

However, in the event any fee including the fee for extension of time is required, the Commissioner is authorized to charge the Deposit Account No. 50-6178.

**Listing of Claims**

The listing of claims (with or without amendment) presented below will replace all prior versions and listings of claims in the application.

1-19. (Canceled)

20. **(Currently amended)** A video decoding apparatus comprising:

a processor to determine whether to apply a first filter to a reference pixel value of a current block based on an intra prediction mode of the current block and a size of the current block, to derive a prediction value of the current block using the reference pixel value derived according to whether to apply the first filter, and to apply a second filter to the prediction value based on the intra prediction mode of the current block and the size of the current block, for thereby producing a filtered prediction value,

wherein the first filter is used for the reference pixel value and the second filter is used for the prediction value,

wherein the reference pixel value is used for the intra prediction mode and corresponds to at least one of an upper position, an upper-right position, an upper-left position and a left position of the current block,

wherein when the intra prediction mode of the current block is a DC mode, the processor applies the second filter to prediction pixels of the current block adjacent to a boundary of the reference pixel value,

wherein when the intra prediction mode of the current block is the DC mode, the processor applies the second filter to top pixels of the current block and leftmost pixels of the current block ~~among the prediction pixels of the current block adjacent to the boundary of the reference pixel value,~~

**wherein when the second filter is applied, the processor selectively applies a 3-tap filter or a 2-tap filter according to positions of the prediction pixels adjacent to the boundary of the reference pixel value.**

21-24. (Canceled)

25. (Previously presented) The video decoding apparatus of claim 20, wherein when the second filter is applied, the processor applies a 3-tap filter to a top leftmost pixel of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixels and applies a 2-tap filter to remaining pixels among the prediction pixels of the current block adjacent to the boundary of the reference pixels, except for the top leftmost pixel of the current block.

26-27. (Canceled)

**Remarks/Arguments**

This response is submitted in reply to the **final** office action mailed on April 7, 2016. Reconsideration is respectfully requested.

**I. Claim Status**

Claims 20 and 25 were pending in the present application prior to this response.

By the present amendment, no claim has been canceled or added.

As a result of the present amendment, claims 20 and 25 continue to remain pending (claim 25 is independent).

**II. Claim Rejections 35 U.S.C. §103**

**In the office action page 2, claim 20 stands rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. 2013/0101032 A1 (Wittman) in view of U.S. 2011/0261880 (Auyeung).**

The applicant respectfully disagrees with the rejection of the claims, especially as amended herein, and submits that these claims are not anticipated by or rendered obvious by the references for at least the following reasons.

As to claim 20, this claim has been amended as follows to clearly distinguish from the cited references:

20. **(Currently amended)** A video decoding apparatus comprising:

a processor to determine whether to apply a first filter to a reference pixel value of a current block based on an intra prediction mode of the current block and a size of the current block, to derive a prediction value of the current block using the reference pixel value derived according to whether to apply the first filter, and to apply a second filter to the prediction value based on the intra prediction mode of the current block and the size of the current block, for thereby producing a filtered prediction value,

wherein the first filter is used for the reference pixel value and the second filter is used for the prediction value,

wherein the reference pixel value is used for the intra prediction mode and corresponds to at least one of an upper position, an upper-right position, an upper-left position and a left position of the current block,

wherein when the intra prediction mode of the current block is a DC mode, the processor applies the second filter to prediction pixels of the current block adjacent to a boundary of the reference pixel value,

wherein when the intra prediction mode of the current block is the DC mode, the processor applies the second filter to top pixels of the current block and leftmost pixels of the current block,

**wherein when the second filter is applied, the processor selectively applies a 3-tap filter or a 2-tap filter according to positions of the prediction pixels adjacent to the boundary of the reference pixel value.**

Wittmann in view of Auyeung is substantially different from the presently claimed invention at least for the reasons that Wittmann and Auyeung fails to teach the above recited limitations. Similarly, Bao does not teach the above recited limitations.

The examiner's attention is directed to FIG. 7 and related descriptions thereof (specifically, specification page 22, last paragraph, and page 23, first paragraph).

Referring to FIG. 7, in the case where the prediction mode of a current block is a non-directional mode, a difference between a reference pixel value and a prediction value may become relatively greater than that of other prediction modes. **Accordingly, the filter may be applied to only the prediction values of pixels adjacent to the boundary with surrounding restored reference pixel values.** For example, filtering may be performed for prediction values corresponding to **a1~a8, and b1, c1, d1, e1, f1, g1, and h1** corresponding to the pixels of one line which is placed at the boundary in FIG. 7. Alternatively, filtering may be performed for prediction values corresponding to **a1~a8, b1~b8, and c1~c2, d1~d2, e1~e2, f1~f2, g1~g2, and h1~h2** corresponding to the pixels of two lines which are placed at the boundary in FIG. 7. Here, the applied filter may be a common filter. **For example, the 3-tap filter of Equation 1 may be used or a 2-tap filter may be used.** When the 2-tap filter is used, various filter

coefficients, such as (1/8, 7/8), (2/8, 6/8), and (3/8, 5/8), may be used. **Alternatively, any one of the 2-tap filter and the 3-tap filter may be selected and sued according to the positions of pixels.**

That is, when a second filter is applied, a processor can selectively apply a 3-tap filter or a 2-tap filter according to positions of the prediction pixels adjacent to the boundary of the reference pixel value.

As noted, the Office Action page 4 states that Wittmann and Auyeung do not describe such novel features of the claimed invention.

However, even Bao, the reference the Office action relies upon, does not describe such novel features of the claimed invention. Referring to paragraph [0039] of Bao, Bao merely discloses that a smoothing filter, such as a 3-tap filter, may be applied in either the horizontal dimension or vertical dimension, or both, for motion vectors having integer pixel precision in those dimensions, a 2-tap motion compensation filter, such as a bilinear filter, and may be applied for interpolation in at least one of the dimensions in the event motion vectors have fractional precision in such dimensions, and for motion vectors having fractional pixel precision in both dimensions, a 2-tap interpolation filter may be applied for both vertical and horizontal dimensions. That is, Bao, at most, discloses the application of a 3-tap filter and 2-tap filter as a smoothing filter, motion compensation filter, or a combination filter; however, Bao does not disclose **--wherein when the second filter is applied, the processor selectively applies a 3-tap filter or a 2-tap filter according to positions of the prediction pixels adjacent to the boundary of the reference pixel value--**, as recited in claim 20.

Since the cited references do not set forth each and every limitations of the rejected claim, the applicant respectfully submits that claim 20, as amended, is in condition for allowance and should be passed to issuance.

The dependent claim 25 recite patently distinguishable limitations, and the applicant respectfully reasserts the arguments above made with respect to the claim 20, and submits that claim 25 is now in condition for allowance.

### **III. Conclusion**

For at least the reasons set forth above, the applicant respectfully submits that claims 20 and 25, now pending in this application (claim 20 is independent), are in condition for allowance over the cited references. Accordingly, the applicant respectfully requests reconsideration and withdrawal of the outstanding rejections and earnestly solicits an indication of allowable subject matter.

The applicant believes that this response is responsive to the office action. The examiner is encouraged to contact the undersigned by telephone to expeditiously resolve any remaining questions or concerns.

Respectfully submitted,

Dated: July 7, 2016

Electronic signature: /Elliott S. Cho/  
Elliott Cho, Reg. No. 74,928  
William Park & Associates Ltd.  
930 N. York Road, Suite 201  
Hinsdale IL 60521  
630-908-7652

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	26288259
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Lena Maxey
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	07-JUL-2016
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	17:57:16
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Response After Final Action	PA0929-0_AAF.pdf	38962  <small>3eec341ee631eb8ed9d8ff5d1be6e9874e024da</small>	no	7

### Warnings:

IPR2021-00827



<b>Information:</b>	
<b>Total Files Size (in bytes):</b>	38962
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>	

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875	Application or Docket Number <b>13/640,014</b>	Filing Date <b>10/08/2012</b>	<input type="checkbox"/> To be Mailed
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ENTITY:  LARGE  SMALL  MICRO

**APPLICATION AS FILED – PART I**

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

**APPLICATION AS AMENDED – PART II**

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>	<b>07/07/2016</b>	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR			
	Total (37 CFR 1.16(i))	* 2	Minus	** 20	= 0	X \$80 = 0
	Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X \$420 = 0
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))					
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	<b>0</b>

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR			
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))					
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE  
 DONNA 1. SMALLS LOGAN

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/640,014 10/08/2012 Jin Ho Lee PA0929-0 2830

96767 7590 04/07/2016
William Park & Associates LTD.
930 N. York Road, Suite 201
Hinsdale, IL 60521

Table with 1 column: EXAMINER

HABIB, IRFAN

Table with 2 columns: ART UNIT, PAPER NUMBER

2485

Table with 2 columns: NOTIFICATION DATE, DELIVERY MODE

04/07/2016

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto.actions@wpapat.com
officeaction@apcoll.com

<b>Office Action Summary</b>	<b>Application No.</b> 13/640,014	<b>Applicant(s)</b> LEE ET AL.	
	<b>Examiner</b> IRFAN HABIB	<b>Art Unit</b> 2485	<b>AIA (First Inventor to File) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 12/28/15.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims\***

- 5)  Claim(s) 20 and 25 is/are pending in the application.  
    5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 6)  Claim(s) \_\_\_\_\_ is/are allowed.
- 7)  Claim(s) 20 and 25 is/are rejected.
- 8)  Claim(s) \_\_\_\_\_ is/are objected to.
- 9)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

- 10)  The specification is objected to by the Examiner.
- 11)  The drawing(s) filed on 10/8/12 is/are: a)  accepted or b)  objected to by the Examiner.  
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some\*\*    c)  None of the:
  - 1.  Certified copies of the priority documents have been received.
  - 2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1)  Notice of References Cited (PTO-892)
- 2)  Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)  
    Paper No(s)/Mail Date \_\_\_\_\_
- 3)  Interview Summary (PTO-413)  
    Paper No(s)/Mail Date \_\_\_\_\_
- 4)  Other: \_\_\_\_\_

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**Response to Amendment**

**Claim Rejections - 35 USC § 103**

1. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claim 20 rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Wittmann et al. US 2013/0101032 A1 in view of Auyeung US 2011/0261880 A1

**Per claim 20**, Wittmann et al. discloses a processor (**e.g. processor**) to determine whether to apply a first filter (**e.g. first filter, i.e. element 320 in fig. 3**) to a reference pixel value (**i.e. a line of reference pixels**) of a current block (**e.g. current block**) based on an intra prediction mode (**e.g. intra mode**) of the current block and a size (**e.g. 8x8**) of the current block, to derive a prediction value (**e.g. calculation unit calculates prediction value to determine if edge is present**) of the current block using the reference pixel value derived according to whether to apply the first filter (**Para: 0071, e.g. filtering may be applied if the variance of the**

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**signal of the surrounding blocks is below a predefined threshold), and to apply a second filter (e.g. second filter, e.g. element 340 in fig. 3) to the prediction value based on the intra prediction mode of the current block and the size of the current block, for thereby producing a filtered prediction value (Para: 0071, e.g. second filter is applied to filter the output of the directional prediction unit, to produce prediction signal), wherein the first filter is used for the reference pixel value and the second filter is used for the prediction value (Para: 0071, e.g. first filter is used for reference pixels and second is used for prediction).**

Wittmann et al. differs from the present invention in that it fails to explicitly disclose position of the current block and intra prediction mode of the current block is the DC mode as specified in claim 20. However Auyeung in the same field of endeavor teaches the concept of intra prediction is performed separately for each pixel along the left side and/or top side within a current block, wherein the reference pixel value is used for an intra prediction and corresponds to at least one of an upper-left position and a left position of the current block (Para: 0050, e.g. intra prediction which takes into account multiple pixels along the left and/or top border of a current block), wherein when the intra prediction mode of the current block is a DC mode (Para: 0067, e.g. DC intra prediction within a current block, in fig. 5), the processor applies the second filter to prediction pixels of the current block adjacent to a boundary of reference pixels (Para: 0057, e.g. boundary strength is calculated and based on conditions, smoothness filter is activated), wherein when the intra prediction mode of the current block is the DC mode (e.g. DC intra prediction within a current block, in fig. 5), the processor applies the second filter to top pixels of the current block and leftmost pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixels (Para: 0054, e.g. filtering determined in response to boundary strength).

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Therefore, in view of disclosures by Auyeung, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine Wittmann et al. and Auyeung with the motivation to incorporate the concept of position of the current block and intra prediction mode of the current block is the DC mode as taught by Auyeung in the filtering is applied in accordance with a decision based on characteristics of image signal of Wittmann et al. in order to ensure high definition video.

4. Claim 25 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Wittmann et al. in view of Auyeung and Bao et al. US 2008/0089417 A1.

**Per claim 25**, it is noted that Wittmann et al. fails to explicitly teach tap filter. Bao et al. however in the same field of endeavor teaches video decoding apparatus of claim 20, wherein when the second filter is applied, the processor applies a 3-tap filter to a top leftmost pixel of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixels (**Para: 0038**) and applies a 2-tap filter to remaining pixels among the prediction pixels of the current block adjacent to the boundary of the reference pixels, except for the top leftmost pixel of the current block (**Para: 0039**).

Therefore, in view of disclosures by Bao et al., it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine Wittmann et al., Auyeung and Bao et al. with the motivation to incorporate the concept of plurality of tap filters as taught by Bao et al. in the filtering is applied in accordance with a decision based on characteristics of image signal of Wittmann et al. by adaptively adjusting to apply one of the filter modes to each of the blocks based on the filter mode decision.

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***Response to Arguments***

5. Applicant's arguments with respect to claims 20 & 25 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

***Conclusion***

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IRFAN HABIB whose telephone number is (571)270-7325. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/I. H./  
Examiner, Art Unit 2485

/RICHARD TORRENTE/  
Primary Examiner, Art Unit 2485

<b>Notice of References Cited</b>	Application/Control No. 13/640,014	Applicant(s)/Patent Under Reexamination LEE ET AL.	
	Examiner IRFAN HABIB	Art Unit 2485	Page 1 of 2

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-5,621,467 A	04-1997	Chien; Max	H04N19/895	348/616
*	B	US-2004/0136458 A1	07-2004	Dahlhoff, Achim	H04N19/61	375/240.12
*	C	US-2006/0268991 A1	11-2006	Segall; Christopher Andrew	H04B1/66	375/240.24
*	D	US-2007/0206872 A1	09-2007	Song; Byung-cheol	H04N19/176	382/236
*	E	US-2007/0253483 A1	11-2007	Lee; Sang-jo	H04N19/176	375/240.12
*	F	US-2008/0089417 A1	04-2008	Bao; Yiliang	H04N19/176	375/240.16
*	G	US-2008/0225952 A1	09-2008	Wang; Xianglin	H04N19/105	375/240.16
*	H	US-2009/0310677 A1	12-2009	Shiodera; Taichiro	H04N19/70	375/240.15
*	I	US-2010/0239002 A1	09-2010	Park; Joon Young	H04N19/176	375/240.12
*	J	US-2011/0038415 A1	02-2011	MIN; Jung-hye	H04N19/00763	375/240.12
*	K	US-2011/0176614 A1	07-2011	Sato; Kazushi	H04N19/105	375/240.16
*	L	US-2012/0082224 A1	04-2012	Van Der Auwera; Geert	H04N19/176	375/240.12
*	M	US-8,619,857 B2	12-2013	Zhao; Jie	H04N19/50	375/240.12

**FOREIGN PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<b>Notice of References Cited</b>	Application/Control No. 13/640,014	Applicant(s)/Patent Under Reexamination LEE ET AL.	
	Examiner IRFAN HABIB	Art Unit 2485	Page 2 of 2

**U.S. PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A US-8,644,375 B2	02-2014	Segall; Christopher A.	H04N19/436	375/240
*	B US-9,154,781 B2	10-2015	Lee; Jin Ho	H04N19/00024	1/1
*	C US-2013/0101032 A1	04-2013	Wittmann; Steffen	H04N19/00763	375/240.12
	D US-				
	E US-				
	F US-				
	G US-				
	H US-				
	I US-				
	J US-				
	K US-				
	L US-				
	M US-				


**FOREIGN PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N				
	O				
	P				
	Q				
	R				
	S				
	T				

**NON-PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)				
	U				
	V				
	W				
	X				

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<b>Search Notes</b>  	<b>Application/Control No.</b>  13640014	<b>Applicant(s)/Patent Under Reexamination</b>  LEE ET AL.
	<b>Examiner</b>  IRFAN HABIB	<b>Art Unit</b>  2485

CPC- SEARCHED		
Symbol	Date	Examiner
H04N7/32	10/16/14	IH

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
375	240.25	10/16/14	IH

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor Search	10/16/14	IH
EAST Search	10/16/14	IH
Update Search, EAST, google patent, and ip search	9/21/15	IH
Update Search	3/29/16	IH
Consult with Richard regarding allowance	3/29/16	IH

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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## EAST Search History

## EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	("20110261880").PN.	DERWENT	OR	OFF	2016/03/30 11:45
L2	2	"20080089417"	US- PGPUB; USPAT	OR	ON	2016/03/30 11:51
L3	1	("20080089417").PN.	DERWENT	OR	OFF	2016/03/30 11:55
S1	1	13/640014.app.	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2014/10/16 12:50
S2	272	H04N7/32.cpc.	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2014/10/16 12:51
S3	1	13/640014.app.	US- PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 11:48
S4	605	H04N7/32.cpc.	US- PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 11:48
S6	2681	375/240.ccls.	US- PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 11:49
S7	2	"20110176614"	US- PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 12:01
S8	3	"20070253483"	US- PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 12:05
S9	2	"20090310677"	US- PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 17:09
S10	2	decod\$3 near3 filter\$2 near3 prediction near value near block	US- PGPUB;	OR	ON	2014/10/29 17:15

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			USPAT; FPRS; DERWENT			
S11	2	"20040136458"	US- PGPUB; USPAT; FPRS	OR	ON	2014/10/29 17:20
S12	4	"2009141969"	US- PGPUB; USPAT; FPRS	OR	ON	2014/10/29 17:21
S13	1	"20110176614"	US- PGPUB; USPAT; FPRS	OR	ON	2014/10/29 17:21
S14	61	intra near3 prediction near filter	US- PGPUB; USPAT; FPRS	OR	ON	2014/10/30 15:45
S16	61	intra near3 prediction near filter and prediction	US- PGPUB; USPAT; FPRS	OR	ON	2014/10/30 15:45
S17	308	(("Jin Ho") near2 (Lee)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:31
S18	55	(("Hui Yong") near2 (Kim)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S19	84	(("Se Yoon") near2 (Jeong)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S20	61	(("Suk Hee") near2 (Cho)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S21	42	(("Ha Hyun") near2 (Lee)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S22	241	(("Jong Ho") near2 (Kim)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S23	241	(("Jong Ho") near2 (Kim)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S24	65	(("Sung Chang") near2 (Lim)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S25	313	(("Jin Soo") near2 (Choi)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S26	393	(("Jin Woong") near2 (Kim)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S27	65	(("Chie Teuk") near2 (Ahn)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S28	0	"20050541929"	US- PGPUB;	OR	ON	2014/11/09 11:45

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			USPAT; FPRS			
S29	1	10/541929.app.	US- PGPUB; USPAT; FPRS	OR	ON	2014/11/09 11:45
S30	1	"5621467".pn.	US- PGPUB; USPAT; FPRS	OR	ON	2014/11/09 11:47
S31	3	"20080107177"	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 12:47
S32	1	(plurality near2 filter) near2 (intra adj prediction adj mode)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 12:49
S33	3	(second near2 filter) near2 (intra adj prediction adj mode)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 12:50
S34	3	"20120082224"	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 12:56
S35	3	(second near2 filter) near5 (intra adj prediction adj mode)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:03
S36	55	(intra-prediction mode) same2 (select near2 second near filter)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:04
S39	3	(intra-prediction) same2 (select near2 second near filter)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:06
S40	361	(apply near2 second near filter)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:11
S41	6	(apply near2 second near filter) near2 (block)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:12
S42	691	(second near filter) near2 (block)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:13

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S44	7	(second near filter) near2 intra	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:17
S45	25	("20040184666"   "20060062299"   "20060188024"   "20060291557"   "20070098068"   "20070183072"   "20070291847"   "20080137752"   "20080260043"   "20090010568"   "20090074061"   "20090080535"   "20090112272"   "20090116760"   "20090168872"   "20090262803"   "20100118963"   "20100183072"   "20100260260"   "20100284467"   "20110122953"   "20110123131"   "5761200"   "6633676"   "7852853").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:18
S46	17	S45 and filter	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:19
S47	342	deblocking near2 picture	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:48
S48	0	(deblocking near2 picture) near2 second	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:48
S49	156	(deblocking near2 picture) near2 filter	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:48
S50	6	(deblocking near2 picture) near2 filter near2 intra	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:48
S51	1	"20080075166"	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:50
S52	2	"20100086032"	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:52
S53	12	("20050249291"   "20060153297"   "20070206679"   "20080025391"   "20080310504"   "20080310507"   "20080310512"   "20100086029"   "20100086030"   "20100086031"   "20100086049"   "7529302").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:56
S54	9	S53 and filter	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:56
S55	2	"20060268991"	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:59




S56	1	("20060268991").PN.	DERWENT	OR	OFF	2015/09/21 14:27
S57	1	("20110176614").PN.	DERWENT	OR	OFF	2015/09/21 14:38
S58	1	"20130301720"	US- PGPUB; USPAT	OR	ON	2016/03/29 17:14
S59	1	("2013/0301720").URPN.	USPAT	OR	ON	2016/03/29 17:14
S60	17	("20120033736"   "7050504"   "7457362"   "9154781"   "7457362"   "20070206872"   "20140079128"   "7386048"   "8514942"   "8576906"   "8743949"   "20130336591"   "20140079128"   "7386048"   "20130336591"   "8644375"   "8743949"   "8576906"   "8654845"   "7050504"   "7609897"   "20120033736"   "20140328397"   "20140328397"   "20070206872"   "20150023405"   "8619857").PN.	US- PGPUB; USPAT	OR	ON	2016/03/29 17:16
S61	5	reference near pixel near2 intra near2 upper	US- PGPUB; USPAT	OR	ON	2016/03/30 09:27
S62	2	"20120082224"	US- PGPUB; USPAT	OR	ON	2016/03/30 09:30
S63	0	("9008175").URPN.	USPAT	OR	ON	2016/03/30 09:30
S64	12	("20040136458"   "20060072676"   "20060268991"   "20100080472"   "20100135389"   "20100239002"   "20110038415"   "20130177079"   "7349473"   "7555043"   "7706622"   "8005151").PN.	US- PGPUB; USPAT; USOCR	OR	ON	2016/03/30 09:30
S65	3	S64 and second near filter	US- PGPUB; USPAT; USOCR	OR	ON	2016/03/30 09:45
S66	0	intra near2 upper-left near2 "DC" near mode	US- PGPUB; USPAT; USOCR	OR	ON	2016/03/30 10:18
S67	0	intra near2 upper-left	US- PGPUB; USPAT; USOCR	OR	ON	2016/03/30 10:18
S68	12	intra near2 upper near left	US- PGPUB; USPAT; USOCR	OR	ON	2016/03/30 10:18

3/ 30/ 2016 11:58:15 AM

C:\Users\ihabib\Documents\EAST\Workspaces\13640014.wsp

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<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  13640014	<b>Applicant(s)/Patent Under Reexamination</b>  LEE ET AL.
	<b>Examiner</b>  IRFAN HABIB	<b>Art Unit</b>  2485

✓	<b>Rejected</b>
=	<b>Allowed</b>

-	<b>Cancelled</b>
÷	<b>Restricted</b>

N	<b>Non-Elected</b>
I	<b>Interference</b>

A	<b>Appeal</b>
O	<b>Objected</b>

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

CLAIM		DATE							
Final	Original	10/16/2014	04/29/2015	09/21/2015	03/29/2016				
	20	✓	✓	✓	✓				
	21	✓	✓	-	-				
	22	✓	✓	-	-				
	23	✓	✓	✓	-				
	24	✓	✓	✓	-				
	25	✓	✓	✓	✓				
	26	✓	✓	✓	-				
	27	✓	✓	✓					

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor(s): Jin Ho LEE et al.

Group Art Unit: 2485

U.S. Serial No.: 13/640,014

Examiner: HABIB, IRFAN

Filing Date: October 8, 2012

Title: METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION  
USING ADAPTIVE FILTER

**AMENDMENT UNDER 37 CFR 1.111**

**Mail Stop Amendment**

The Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

Sir:

In response to the non-final Office Action of September 28, 2015, setting a 3-month shortened statutory period for a reply ending on Monday, December 28, 2015, the Applicant submits the following response.

- Amendment to the Abstract
- Amendment to the Specification
- Amendment to the Drawings
- Listing of the Claims**
- Remarks/Arguments**
- Appendix: # is/are attached to the last page of this paper.

Fee Transmittal: The following fee(s), when checked, are paid via credit card.

- large entity; or  **small entity**; or  micro entity status is asserted by the applicant.
- x-month extension of time is hereby requested, thereby extending the due date of the present response to \_\_\_\_\_
- # indep claims in excess of 3 (# indep cls now pending - # indep cls already pd)
- # total claims in excess of 20 (# total cls now pending - # total cls already pd).
- # terminal disclaimers (when checked, terminal disclaimer(s) are filed herewith).
- IDS fee (when checked, an IDS is filed herewith).
- RCE fee (when checked, an RCE is filed herewith).
- Others: \_\_\_\_\_

**Listing of The Claims**

The listing of claims presented below replaces all prior versions and listings of claims in the present application.

1-19. (Canceled)

20. **(Currently Amended)** A video decoding apparatus comprising:

a processor to determine whether to apply a first filter to a reference pixel value of a current block based on ~~at least one of~~ an intra prediction mode of the current block and a size of the current block, to derive a prediction value of the current block using the reference pixel value derived according to whether to apply the first filter, and to apply a second filter to the prediction value based on ~~at least one of~~ the intra prediction mode of the current block and the size of the current block, for thereby producing a filtered prediction value,

wherein the first filter is used for the reference pixel value and the second filter is used for the prediction value,

wherein the reference pixel value is used for an intra prediction and corresponds to at least one of an upper position, an upper-right position, an upper-left position and a left position of the current block,

wherein when the intra prediction mode of the current block is a DC mode, the processor applies the second filter to prediction pixels of the current block adjacent to a boundary of reference pixels,

wherein when the intra prediction mode of the current block is the DC mode, the processor applies the second filter to top pixels of the current block and leftmost pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixels.

21. (Canceled)

22. (Canceled)

23. ~~(Canceled) The video decoding apparatus of claim 20, wherein when the intra prediction mode of the current block is a DC mode, the processor applies the second filter to prediction pixels of the current block adjacent to a boundary of the reference pixel value.~~

24. ~~(Canceled) The video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the DC mode, the processor applies the second filter to top pixels of the current block and leftmost pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value.~~

25. **(Currently Amended)** The video decoding apparatus of claim ~~[[24]]~~ **20**, wherein when the second filter is applied, the processor applies a 3-tap filter to a top leftmost pixel of the current block among the prediction pixels of the current block adjacent to the boundary of the reference ~~pixels~~**value** and applies a 2-tap filter to remaining pixels among the prediction pixels of the current block adjacent to the boundary of the reference ~~pixels~~**value**, except for the top leftmost pixel of the current block.

26. ~~(Canceled) The video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the vertical mode, the processor applies the second filter to leftmost pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value.~~

27. ~~(Canceled) The video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the horizontal mode, the processor applies the second filter to top pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value.~~

**Remarks/Arguments**

This response is submitted in reply to the non-final Office Action of September 28, 2015 for the above-referenced patent application. Reconsideration is respectfully requested.

**I. Claim Status**

Claims 20, 23-27 were pending in the present application prior to this response. In the present response, claims 20 and 25 are amended, claims 23, 24, 26, 27 are canceled. Support for the new claims can be found at least on pages 6, 7, and 11-15 of the specification, as well as the claims as previously filed. Thus, no new matter is added. Claims 20 and 25 are now pending in the current application.

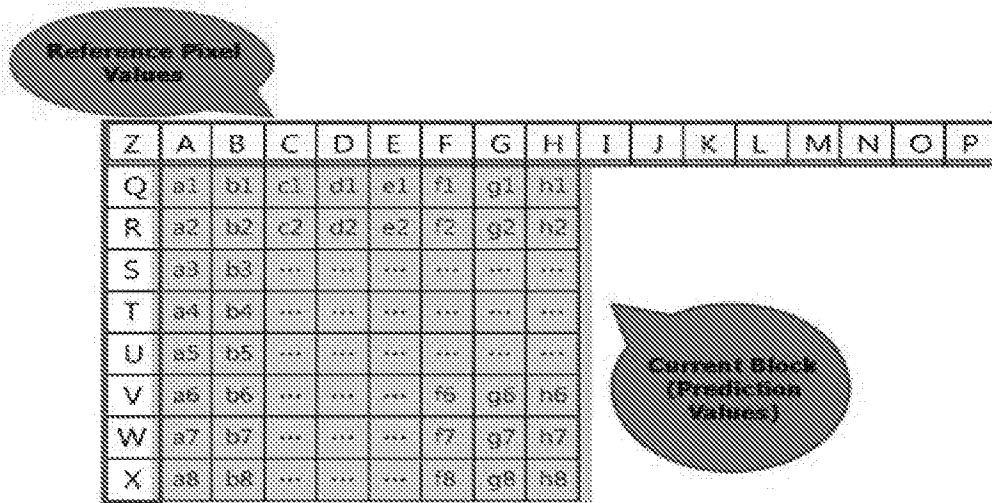
**II. Claim Rejections under 35 U.S.C. §103(a)**

**Claim 20 was rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. US 2009/0310677 A1 to Shiodera et al. in view of U.S. Patent Application Publication No. US2006/0268991 A1 to Segall et al.**

**Claim 25 was rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Shiodera in view of U.S. Patent Application No. 2011/0176614 A1 (WO 2010/001918 A1) to Sato et al.**

In response, the Applicant amended independent claim 20 and claim 25, and submits that the claims are allowable over the relied upon art for at least the following reasons.

**1. The First and Second filter**



The first filter is applied to a reference pixel value (top bubble labeled “Reference Pixel Values”) and whether to apply the first filter (to the reference pixel value) is determined based on the intra prediction mode and the size of the current block (lower right bubble labeled “Current Block (Prediction Values)”). The second filter is applied to the current block (prediction values).

The reference pixel values are used for the intra prediction and correspond to at least one of an upper position (A-H), an upper-right position (I-P), an upper-left position (Z), and a left position (Q-X) of the current block.

The cited references do not disclose limitations of the first filter and the second filter that are applied based on the intra prediction mode and the size of the current block. Especially, the cited references does not disclose or suggest the filter which is applied to the reference pixels based on the size of the current block and the intra prediction mode.

## 2. DC mode

The second filter is applied to the top pixels (a1, b1, c1, ..., h1) and the leftmost pixels (a1, a2, a3, ..., a8) of the current block when the intra prediction mode of the current block is the DC mode.

The cited references do not disclose the second filter which is applied to the top pixels (a1, b1, c1, ..., h1) and the leftmost pixels (a1, a2, a3, ..., a8) based on the size of the current block when the intra prediction mode is the DC mode. Moreover, the up-sample filter of Segall is totally different from the second filter because the second filter is not for up-sampling but revising the predicted values.

### **III. Conclusion**

For at least the reasons set forth above, the Applicant respectfully submits that claims 20 and 25 as amended are in condition for allowance. Accordingly, the Applicant earnestly solicits a Notice of Allowance for the present application.

The Applicant believes that this response is fully responsive to the Office Action. The Examiner is encouraged to contact the undersigned to expeditiously resolve any remaining questions or concerns.

Respectfully submitted,

Dated: December 28, 2015

Electronic signature: /Marc A. Valdivia/

Marc A. Valdivia, Reg. No. 56,597

William Park & Associates Ltd.

930 N. York Road, Suite 201

Hinsdale IL 60521

630-908-7652



## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	24457057
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/William Maxey
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	28-DEC-2015
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	11:20:21
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	no
------------------------	----

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	PA0929-0_OAR.pdf	86436 <small>758e7690e67bd44c6ecb62d513ceb0f9522dff5a</small>	no	6

### Warnings:

### Information:

IPR2021-00827

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875	Application or Docket Number <b>13/640,014</b>	Filing Date <b>10/08/2012</b>	<input checked="" type="checkbox"/> To be Mailed
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ENTITY:  LARGE  SMALL  MICRO

**APPLICATION AS FILED – PART I**

	(Column 1)	(Column 2)		(Column 2)
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A	
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 =	*	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

**APPLICATION AS AMENDED – PART II**

	(Column 1)	(Column 2)	(Column 3)	(Column 3)		(Column 2)	(Column 3)	
<b>AMENDMENT</b>	<b>12/28/2015</b>	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)		
	Total <small>(37 CFR 1.16(i))</small>	* 2	Minus	** 20	= 0	X \$80 =	0	
	Independent <small>(37 CFR 1.16(h))</small>	* 1	Minus	***3	= 0	X \$420 =	0	
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>							
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>							
					TOTAL ADD'L FEE	<b>0</b>		

	(Column 1)	(Column 2)	(Column 3)	(Column 3)		(Column 2)	(Column 3)	
<b>AMENDMENT</b>		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)		
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	X \$ =		
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	X \$ =		
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>							
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>							
					TOTAL ADD'L FEE			

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".  
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE  
/LISA THOMAS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/640,014 10/08/2012 Jin Ho Lee PA0929-0 2830

96767 7590 09/28/2015
William Park & Associates LTD.
930 N. York Road, Suite 201
Hinsdale, IL 60521

Table with 1 column: EXAMINER

HABIB, IRFAN

Table with 2 columns: ART UNIT, PAPER NUMBER

2485

Table with 2 columns: NOTIFICATION DATE, DELIVERY MODE

09/28/2015

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto.actions@wpapat.com

<b>Office Action Summary</b>	<b>Application No.</b> 13/640,014	<b>Applicant(s)</b> LEE ET AL.	
	<b>Examiner</b> IRFAN HABIB	<b>Art Unit</b> 2485	<b>AIA (First Inventor to File) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 7/15/15.
  - A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims\***

- 5)  Claim(s) 20 and 23-27 is/are pending in the application.
  - 5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 6)  Claim(s) \_\_\_\_\_ is/are allowed.
- 7)  Claim(s) 20, 23-27 is/are rejected.
- 8)  Claim(s) \_\_\_\_\_ is/are objected to.
- 9)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

- 10)  The specification is objected to by the Examiner.
- 11)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some\*\*    c)  None of the:
  - 1.  Certified copies of the priority documents have been received.
  - 2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1)  Notice of References Cited (PTO-892)
- 2)  Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)  
Paper No(s)/Mail Date 8/26/15
- 3)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 4)  Other: \_\_\_\_\_

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**DETAILED ACTION*****Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/14/15 has been entered.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 20 rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Shiodera et al. US 2009/0310677 A1 in view of Segall et al. US 2006/0268991 A1.

**Per claim 20**, Shiodera discloses a video decoding apparatus (**Fig. 40-41**) comprising: a processor (**Fig. 40, e.g. prediction signal generator**) to determine whether to apply a first filter (**e.g. filter**) to a reference pixel value (**Para: 0239, e.g. examiner interpreted the claim term/phrase as reference pixel is stored in memory, where processor determines whether or not to apply filter in fig.40 depending on its prediction modes**) of a current block (**Para: 0303**) based on at least one of an intra-prediction mode of the current block and a size of the current block (**Para: 0242-0243, Fig. 40-44, e.g. examiner interpreted the claim term/phrase as an intra-prediction**), and to derive a prediction value (**i.e. prediction value**) of the current block using the reference pixel value derived according to whether to apply the first filter (**Para:**

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**0305-0307, Fig. 40-41 e.g. prediction order switch is controlled based on prediction value).**

Although Shiodera discloses a video decoding apparatus, it is noted Shiodera differs from the present invention in that it fails to explicitly disclose a second filter to the prediction value based on at least one of the intra prediction mode as specified in claim 20. However Segall in the same field of endeavor teaches the concept of plurality set of up-sampling filters to improve compression efficiency wherein apply a second filter (e.g. up-sample filter) to the prediction value based on at least one of the intra prediction mode of the current block (Para: 0040-0041, e.g. up-sample filter is selected based on intra prediction from multiple filter set) and the size of the current block, for thereby producing a filtered prediction value (Para: 0055-0056).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, having both the references of Shiodera and Segall before him/her, to modify a video decoding apparatus as disclosed by Shiodera, by adding or integrating the feature of second filter as taught by Segall, in order to adaptively select one or more available up-sample filters for up-sampling different image blocks to improve compression efficiency of spatially scalable coding system.

4. Claims 23-27 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Shiodera et al. in view of Segall Sato et al. WO 2010/001918 A1 (English translation document US 2011/0176614 A1 is cited hereinafter), for the same reason set forth in the last office action dated 11/17/2014.

**Per claim 23**, it is noted that Shiodera discloses video encoding and decoding apparatus, but fails to explicitly teach vertical and horizontal mode. Sato et al. however in FIG.

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15, in the same field of endeavor teaches the video decoding apparatus of claim 20, wherein when the intra prediction mode of the current block is one of a vertical mode, a horizontal mode and a DC mode, the processor applies the second filter to prediction pixels of the current block adjacent to a boundary of the reference pixel value (**Para: 0192-0195, Fig. 4, 14-15, 18-19**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, having both the references of Shiodera, Segall and Sato before him/her, to modify a video decoding apparatus as disclosed by Shiodera, by adding or integrating the feature of vertical and horizontal mode as taught by Sato, by implementing compression efficiency of the image encoding apparatus can be improved by searching for the motion vector of color difference block corresponding to luminance block using template which is produced from decoded image.

**Per claim 24**, in combination of all three references where Sato further teaches the video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the DC mode, the processor applies the second filter to top pixels of the current block and leftmost pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value (**Para: 0178-0180, Fig. 4, 14-15, 35**).

**Per claim 25**, in combination of all three references where Sato further teaches the video decoding apparatus of claim 24, wherein when the second filter is applied, the processor applies a 3-tap filter to a top leftmost pixel of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value and applies a 2-tap filter to remaining pixels among the prediction pixels of the current block adjacent to the boundary of the reference pixel value, except for the top leftmost pixel of the current block (**Para: 0074-0078, Fig. 1-3**).



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**Per claim 26**, in combination of all three references where Sato further teaches the video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the vertical mode, the processor applies the second filter to leftmost pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value (**Para: 0074-0078, Fig. 1-3**).

**Per claim 27**, in combination of all three references where Sato further teaches the video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the horizontal mode, the processor applies the second filter to top pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value (**Para: 0022-0023, FIG. 1-3, 23-26**).

#### ***Response to Arguments***

4. Applicant's arguments filed 7/15/15 have been fully considered but they are not persuasive.
5. Applicant's arguments with respect to claims 20, 23-27 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

#### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IRFAN HABIB whose telephone number is (571)270-7325. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2485

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/I. H./  
Examiner, Art Unit 2485

/RICHARD TORRENTE/  
Primary Examiner, Art Unit 2485

<b>Notice of References Cited</b>	Application/Control No. 13/640,014	Applicant(s)/Patent Under Reexamination LEE ET AL.	
	Examiner IRFAN HABIB	Art Unit 2485	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-5,621,467 A	04-1997	Chien; Max	H04N19/895	348/616
*	B	US-2004/0136458 A1	07-2004	Dahlhoff, Achim	H04N19/61	375/240.12
*	C	US-2006/0268991 A1	11-2006	Segall; Christopher Andrew	H04B1/66	375/240.24
*	D	US-2007/0253483 A1	11-2007	Lee; Sang-jo	H04N19/176	375/240.12
*	E	US-2008/0225952 A1	09-2008	Wang; Xianglin	H04N19/105	375/240.16
*	F	US-2009/0310677 A1	12-2009	Shiodera; Taichiro	H04N19/70	375/240.15
*	G	US-2011/0176614 A1	07-2011	Sato; Kazushi	H04N19/105	375/240.16
*	H	US-2012/0082224 A1	04-2012	Van Der Auwera; Geert	H04N19/176	375/240.12
	I	US-				
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	K	US-				
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**FOREIGN PATENT DOCUMENTS**

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**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		PA0929-0	

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	1	2012134085	WO	A2	2012-10-04	IBEX PT HOLDINGS CO., LTD.		<input type="checkbox"/>

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**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**  
( Not for submission under 37 CFR 1.99)

Application Number		13640014	
Filing Date		2012-10-08	
First Named Inventor	Jin Ho LEE		
Art Unit			
Examiner Name			
Attorney Docket Number		PA0929-0	

	1	Hui Yong KIM et al., Description of video coding technology proposal by ETRI, JCT-VC, April 19, 2010, pgs. 1-9, ETRI, Daejeon, South Korea.	<input type="checkbox"/>
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**EXAMINER SIGNATURE**

Examiner Signature	/Irfan Habib/	Date Considered	09/21/2015
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE STATEMENT BY APPLICANT**  
( Not for submission under 37 CFR 1.99)

Application Number		13640014	
Filing Date		2012-10-08	
First Named Inventor	Jin Ho LEE		
Art Unit			
Examiner Name			
Attorney Docket Number		PA0929-0	

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

- See attached certification statement.
- Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2015-08-25
Name/Print	Woochoon W. Park	Registration Number	55523

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

## EAST Search History

## EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	3	"20080107177"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 12:47
L3	1	(plurality near2 filter) near2 (intra adj prediction adj mode)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 12:49
L4	3	(second near2 filter) near2 (intra adj prediction adj mode)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 12:50
L5	3	"20120082224"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 12:56
L6	3	(second near2 filter) near5 (intra adj prediction adj mode)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:03
L7	55	(intra-prediction mode) same2 (select near2 second near filter)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:04
L10	3	(intra-prediction) same2 (select near2 second near filter)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:06
L11	361	(apply near2 second near filter)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:11
L12	6	(apply near2 second near filter) near2 (block)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:12
L13	691	(second near filter) near2 (block)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:13

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L15	7	(second near filter) near2 intra	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2015/09/21 13:17
L16	25	("20040184666"   "20060062299"   "20060188024"   "20060291557"   "20070098068"   "20070183072"   "20070291847"   "20080137752"   "20080260043"   "20090010568"   "20090074061"   "20090080535"   "20090112272"   "20090116760"   "20090168872"   "20090262803"   "20100118963"   "20100183072"   "20100260260"   "20100284467"   "20110122953"   "20110123131"   "5761200"   "6633676"   "7852853").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:18
L17	17	16 and filter	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:19
L18	342	deblocking near2 picture	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:48
L19	0	(deblocking near2 picture) near2 second	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:48
L20	156	(deblocking near2 picture) near2 filter	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:48
L21	6	(deblocking near2 picture) near2 filter near2 intra	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:48
L22	1	"20080075166"	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:50
L23	2	"20100086032"	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:52
L24	12	("20050249291"   "20060153297"   "20070206679"   "20080025391"   "20080310504"   "20080310507"   "20080310512"   "20100086029"   "20100086030"   "20100086031"   "20100086049"   "7529302").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:56
L25	9	24 and filter	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:56
L26	2	"20060268991"	US-PGPUB; USPAT; USOCR	OR	ON	2015/09/21 13:59

L27	1	("20060268991").PN.	DERWENT	OR	OFF	2015/09/21 14:27
L28	1	("20110176614").PN.	DERWENT	OR	OFF	2015/09/21 14:38
S1	1	13/640014.app.	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2014/10/16 12:50
S2	272	H04N7/32.cpc.	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2014/10/16 12:51
S3	1	13/640014.app.	US- PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 11:48
S4	605	H04N7/32.cpc.	US- PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 11:48
S6	2681	375/240.ccls.	US- PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 11:49
S7	2	"20110176614"	US- PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 12:01
S8	3	"20070253483"	US- PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 12:05
S9	2	"20090310677"	US- PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 17:09
S10	2	decod\$3 near3 filter\$2 near3 prediction near value near block	US- PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 17:15
S11	2	"20040136458"	US- PGPUB; USPAT; FPRS	OR	ON	2014/10/29 17:20
S12	4	"2009141969"	US- PGPUB; USPAT; FPRS	OR	ON	2014/10/29 17:21
S13	1	"20110176614"	US- PGPUB;	OR	ON	2014/10/29 17:21

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			USPAT; FPRS			
S14	61	intra near3 prediction near filter	US- PGPUB; USPAT; FPRS	OR	ON	2014/10/30 15:45
S16	61	intra near3 prediction near filter and prediction	US- PGPUB; USPAT; FPRS	OR	ON	2014/10/30 15:45
S17	308	(("Jin Ho") near2 (Lee)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:31
S18	55	(("Hui Yong") near2 (Kim)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S19	84	(("Se Yoon") near2 (Jeong)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S20	61	(("Suk Hee") near2 (Cho)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S21	42	(("Ha Hyun") near2 (Lee)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S22	241	(("Jong Ho") near2 (Kim)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S23	241	(("Jong Ho") near2 (Kim)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S24	65	(("Sung Chang") near2 (Lim)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S25	313	(("Jin Soo") near2 (Choi)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S26	393	(("Jin Woong") near2 (Kim)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S27	65	(("Chie Teuk") near2 (Ahn)).INV.	US- PGPUB; USPAT	OR	ON	2014/11/07 12:32
S28	0	"20050541929"	US- PGPUB; USPAT; FPRS	OR	ON	2014/11/09 11:45
S29	1	10/541929.app.	US- PGPUB; USPAT; FPRS	OR	ON	2014/11/09 11:45
S30	1	"5621467".pn.	US- PGPUB; USPAT; FPRS	OR	ON	2014/11/09 11:47


9/ 21/ 2015 2:45:51 PM

C:\Users\ihabib\Documents\EAST\Workspaces\13640014.wsp

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<b>Search Notes</b>  	<b>Application/Control No.</b>  13640014	<b>Applicant(s)/Patent Under Reexamination</b>  LEE ET AL.
	<b>Examiner</b>  IRFAN HABIB	<b>Art Unit</b>  2485

CPC- SEARCHED		
Symbol	Date	Examiner
H04N7/32	10/16/14	IH


CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
375	240.25	10/16/14	IH

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor Search	10/16/14	IH
EAST Search	10/16/14	IH
Update Search, EAST, google patent, and ip search	9/21/15	IH

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  13640014	<b>Applicant(s)/Patent Under Reexamination</b>  LEE ET AL.
	<b>Examiner</b>  IRFAN HABIB	<b>Art Unit</b>  2485

✓	<b>Rejected</b>
=	<b>Allowed</b>

-	<b>Cancelled</b>
÷	<b>Restricted</b>

N	<b>Non-Elected</b>
I	<b>Interference</b>

A	<b>Appeal</b>
O	<b>Objected</b>

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

CLAIM		DATE							
Final	Original	10/16/2014	04/29/2015	09/21/2015					
	20	✓	✓	✓					
	21	✓	✓	-					
	22	✓	✓	-					
	23	✓	✓	✓					
	24	✓	✓	✓					
	25	✓	✓	✓					
	26	✓	✓	✓					
	27	✓	✓	✓					

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		PA0929-0	

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		PA0929-0	

1	Hui Yong KIM et al., Description of video coding technology proposal by ETRI, JCT-VC, April 19, 2010, pgs. 1-9, ETRI, Daejeon, South Korea.	<input type="checkbox"/>
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Examiner Signature		Date Considered	
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<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.



<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014
	Filing Date	2012-10-08
	First Named Inventor	Jin Ho LEE
	Art Unit	
	Examiner Name	
	Attorney Docket Number	PA0929-0

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2015-08-25
Name/Print	Woochoon W. Park	Registration Number	55523

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13640014
<b>Filing Date:</b>	08-Oct-2012
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Filer:</b>	Woochoon William Park/Lena Maxey
<b>Attorney Docket Number:</b>	PA0929-0

Filed as Small Entity

### Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Miscellaneous:</b>				
Submission- Information Disclosure Stmt	2806	1	90	90
<b>Total in USD (\$)</b>				<b>90</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	23322636
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Lena Maxey
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	26-AUG-2015
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	18:44:23
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

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1	Information Disclosure Statement (IDS) Form (SB08)	PA0929-0_IDS_sb08a.pdf	612305	no	4
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			677e84512ab06d7c09dfd11be5631fa9cbe83716		
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3	Non Patent Literature	Description_of_video_coding_technology_proposal_by_ETRI.pdf	556943	no	9
			34cf0fb0d73ede806aa6a5e633efea285f38f1a		
<b>Warnings:</b>					
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4	Fee Worksheet (SB06)	fee-info.pdf	30672	no	2
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**National Stage of an International Application under 35 U.S.C. 371**

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**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

**REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL  
(Submitted Only via EFS-Web)**

Application Number	13640014	Filing Date	2012-10-08	Docket Number (if applicable)	PA0929-0	Art Unit	2485
First Named Inventor	Jin Ho LEE			Examiner Name	Habib, Irfan		

**This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.**  
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

**SUBMISSION REQUIRED UNDER 37 CFR 1.114**

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

Consider the arguments in the Appeal Brief or Reply Brief previously filed on \_\_\_\_\_

Other Amendment After Final filed on July 15, 2015

Enclosed

Amendment/Reply

Information Disclosure Statement (IDS)

Affidavit(s)/ Declaration(s)

Other \_\_\_\_\_

**MISCELLANEOUS**

Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months \_\_\_\_\_  
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

Other \_\_\_\_\_

**FEES**

**The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**

The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No \_\_\_\_\_

**SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED**

Patent Practitioner Signature

Applicant Signature



Signature of Registered U.S. Patent Practitioner			
Signature	/WOOCHOON W. PARK/	Date (YYYY-MM-DD)	2015-08-14
Name	WOOCHOON W. PARK	Registration Number	55523

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*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13640014
<b>Filing Date:</b>	08-Oct-2012
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Filer:</b>	Woochoon William Park/Daniel Yu
<b>Attorney Docket Number:</b>	PA0929-0

Filed as Small Entity

### Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Miscellaneous:</b>				
Request for Continued Examination	2801	1	600	600
<b>Total in USD (\$)</b>				<b>600</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	23217203
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Daniel Yu
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	14-AUG-2015
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	17:54:08
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$600
RAM confirmation Number	13184
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

IPR2021-00827

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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	PA0929-0_RCE_sb30EFS.pdf	697623	no	3
			51e77ddcd308cf71176d262bb0699e44f9622bfa		

**Warnings:**

**Information:**

2	Fee Worksheet (SB06)	fee-info.pdf	30719	no	2
			d8f23d7141bfc3a6285eb98cc9e232c2f2c96302		

**Warnings:**

**Information:**

<b>Total Files Size (in bytes):</b>	728342
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**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**



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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/640,014 10/08/2012 Jin Ho Lee PA0929-0 2830

96767 7590 08/05/2015
William Park & Associates LTD.
930 N. York Road, Suite 201
Hinsdale, IL 60521

EXAMINER

HABIB, IRFAN

ART UNIT PAPER NUMBER

2485

NOTIFICATION DATE DELIVERY MODE

08/05/2015

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto.actions@wpapat.com

<b>Advisory Action Before the Filing of an Appeal Brief</b>	<b>Application No.</b> 13/640,014	<b>Applicant(s)</b> LEE ET AL.	
	<b>Examiner</b> IRFAN HABIB	<b>Art Unit</b> 2485	<b>AIA (First Inventor to File) Status</b> No

**--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

THE REPLY FILED 15 July 2015 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

**NO NOTICE OF APPEAL FILED**

1.  The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:

- a)  The period for reply expires \_\_\_\_\_ months from the mailing date of the final rejection.
- b)  The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
- c)  A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection. The current period for reply expires \_\_\_\_\_ months from the mailing date of the prior Advisory Action or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.

*Examiner Note:* If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANT'S FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**NOTICE OF APPEAL**

2.  The Notice of Appeal was filed on \_\_\_\_\_. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

**AMENDMENTS**

3.  The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because
- a)  They raise new issues that would require further consideration and/or search (see NOTE below);
  - b)  They raise the issue of new matter (see NOTE below);
  - c)  They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
  - d)  They present additional claims without canceling a corresponding number of finally rejected claims.

*NOTE: Newly amended claims raises new issue, examiner will require additional examining hours to update search for new amended claim limitations.* (See 37 CFR 1.116 and 41.33(a)).

- 4.  The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
- 5.  Applicant's reply has overcome the following rejection(s): \_\_\_\_\_.
- 6.  Newly proposed or amended claim(s) \_\_\_\_\_ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
- 7.  For purposes of appeal, the proposed amendment(s): (a)  will not be entered, or (b)  will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

**AFFIDAVIT OR OTHER EVIDENCE**

- 8.  A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
- 9.  The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
- 10.  The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
- 11.  The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

**REQUEST FOR RECONSIDERATION/OTHER**

12.  The request for reconsideration has been considered but does NOT place the application in condition for allowance because: \_\_\_\_\_.

13.  Note the attached Information *Disclosure Statement(s)*. (PTO/SB/08) Paper No(s). IDS 7/15/15

14.  Other: \_\_\_\_\_.

**STATUS OF CLAIMS**

15. The status of the claim(s) is (or will be) as follows:

Claim(s) allowed: \_\_\_\_\_  
 Claim(s) objected to: \_\_\_\_\_  
 Claim(s) rejected: 20, 23-27.  
 Claim(s) withdrawn from consideration: \_\_\_\_\_

/I. H./  
Examiner, Art Unit 2485

/RICHARD TORRENTE/  
Primary Examiner, Art Unit 2485



Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit	2485		
	Examiner Name	Irfan HABIB		
	Attorney Docket Number	PA0929-0		

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code <sup>1</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number <sup>3</sup>	Country Code <sup>2</sup> j	Kind Code <sup>4</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	2007252256	JP	A	2007-10-04	AMANO MASAYUKI	<input type="checkbox"/>

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>5</sup>

**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**  
( Not for submission under 37 CFR 1.99)

Application Number		13640014	
Filing Date		2012-10-08	
First Named Inventor	Jin Ho LEE		
Art Unit	2485		
Examiner Name	Irfan HABIB		
Attorney Docket Number	PA0929-0		

1		<input type="checkbox"/>
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If you wish to add additional non-patent literature document citation information please click the Add button **Add**

**EXAMINER SIGNATURE**

Examiner Signature	/Irfan Habib/	Date Considered	07/29/2015
--------------------	---------------	-----------------	------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT  
( Not for submission under 37 CFR 1.99)**

Application Number		13640014	
Filing Date		2012-10-08	
First Named Inventor	Jin Ho LEE		
Art Unit	2485		
Examiner Name	Irfan HABIB		
Attorney Docket Number	PA0929-0		

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

- See attached certification statement.
- Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2015-07-15
Name/Print	Woochoon W. Park	Registration Number	55523

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

U.S. Serial No.: 13/640,014

PATENT  
DOCKET: PA0929-0

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Jin Ho LEE et al.	)	Group Art Unit: 2485
	)	
U.S. Serial No.: 13/640,014	)	Examiner: Habib, Irfan
	)	
Filing Date: October 8, 2012	)	

Title: METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION  
USING ADAPTIVE FILTER

**AMENDMENT AFTER FINAL**

**Mail Stop Amendment**

The Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

Sir:

In response to the final Office Action of May 15, 2015, setting a 2-month shortened statutory period for a reply ending on July 15, 2015, the Applicant submits the following response.

- Amendment to the Abstract
- Amendment to the Specification
- Amendment to the Drawings
- Listing of the Claims**
- Remarks/Arguments**
- Appendix: # is/are attached to the last page of this paper.

Fee Transmittal: The following fee(s), when checked, are paid via credit card.

- large entity; or  **small entity**; or  micro entity status is asserted by the applicant.
- x-month extension of time is hereby requested, thereby extending the due date of the present response to \_\_\_\_\_
- # indep claims in excess of 3 (# indep cls now pending - # indep cls already pd)
- # total claims in excess of 20 (# total cls now pending - # total cls already pd).
- # terminal disclaimers (when checked, terminal disclaimer(s) are filed herewith).
- IDS fee (when checked, an IDS is filed herewith).
- RCE fee (when checked, an RCE is filed herewith).
- Others: \_\_\_\_\_

### Remarks/Arguments

This response is submitted in reply to the non-final Office Action of May 15, 2015 for the above-referenced patent application. Reconsideration is respectfully requested.

#### I. Claim Status

Claims 20 and 22-27 were pending in the present application prior to this response. In the present response, claims 20 and 23 are amended, and claim 22 is canceled; no claims are added. Thus, claims 20 and 23-27 as amended are now pending in the application.

#### II. Claim Rejections under 35 U.S.C. §102(b) / 103(a)

**Claims 20 and 22 are rejected under pre-AIA 35 U.S.C. §102(b) as being anticipated by U.S. Patent Application Publication No. US 2009/0310677 A1 to Shiodera et al.**

**Claims 23-27 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Shiodera et al. in view of WO 2010/001918 A1 (US 2011/0176614 A1) to Sato et al.**

In response, the Applicant respectfully disagrees with the claim rejections, especially in light of the clarifying amendments made herein, and submits that the claims are allowable over the relied upon art for at least the following reasons.

According to independent claim 20, a video decoding apparatus comprises a processor configured to perform particular actions. For one, the processor operates to determine whether to apply a first filter to a reference pixel value of a current block based on at least one of an intra prediction mode of the current block and a size of the current block. The processor further operates to derive a prediction value of the current block using the reference pixel value derived according to whether to apply the first filter. Finally, the processor further operates to apply a second filter to the prediction value based on at least one of the intra prediction mode of the current block and the size of the current block, for thereby producing a filtered prediction value.

Notably, independent claim 20 recites, inter alia, a “processor” which operates “to apply a second filter to the prediction value based on at least one of the intra prediction mode of the current block and the size of the current block, for thereby producing a filtered prediction value.”

In the rejection of claims 20-22, the Examiner makes reference to particular passages in Shiodera et al. In particular, the Examiner makes reference to, most notably, paragraphs [0304-0307] of Shiodera et al., as well as paragraphs [0321-0323] for alleged teachings related to the *application of a second filter*.

In response, the Applicant respectfully disagrees with the Examiner's assessment in relation to Shiodera et al.

For one, paragraphs [0304-0307] of Shiodera et al. relate to the operation of a prediction signal generator 309 in FIGs. 40-41, and not to the application of any second filter. Prediction signal generator 309 operates to select one of the prediction signals generated by unidirectional predictor 371 or bidirectional predictor 372. A prediction order switch 370 is used to switch prediction orders of the sub-blocks. There is no discussion of an application of a second filter.

In addition, paragraphs [0321-0323] of Shiodera et al. relate to a data structure of macroblock layer syntax. The discussion helps explain an equation and a table for inversely transforming a decoded index into a prediction mode. As is apparent, these further passages do not relate to the application of any second filter.

On the other hand, paragraph [0239] of Shiodera et al. describes a filter that may be used to calculate a prediction pixel. The Examiner made reference to this paragraph in relation to the claimed application of a first filter. Note, however, this paragraph does not teach or suggest the use of a second filter which is applied to a derived prediction value, as claimed.

Further, in paragraphs [0192-0195], what are described are various equations of interpolation blocks of unidirectional predictor 171. Relatedly, the table of FIG. 17 merely lists the prediction mode names of the various prediction modes of unidirectional predictor 171 which may be selected. The unidirectional predictor 171 **is not and does not include any** second filter applied to a derived prediction value, as claimed. Rather, unidirectional predictor 171 is a prediction signal generator which generates a prediction signal.

Again, the claimed subject matter includes the application of a **first filter** to a reference pixel value, as well as the application of a **second filter** to a prediction value for producing a filtered prediction value.

Note that Sato et al. is not relied upon for and does not teach or suggest the above claimed features either.

As Shiodera et al. and other art fail to teach or suggest each and every feature in independent claim 20, the Applicant respectfully requests the Examiner to withdraw the §102(b) rejection of independent claim 20 and to allow such claim.

Dependent claims 23-27 depend ultimately from independent claim 20, which has been shown to be allowable above. Again, Sato et al. is not relied upon for and does not teach or suggest the above claimed features as well. Thus, dependent claims 23-27 which were rejected under §103(a) are now also in condition for allowance, for at least these reasons.

### **III. Conclusion**

For at least the reasons set forth above, the Applicant respectfully submits that claims 20 and 23-27 as amended are in condition for allowance. Accordingly, the Applicant earnestly solicits a Notice of Allowance for the present application.

The Applicant believes that this response is fully responsive to the Office Action. The Examiner is encouraged to contact the undersigned to expeditiously resolve any remaining questions or concerns.

Respectfully submitted,

Dated: July 15, 2015

Electronic signature: /John J. Oskorep/  
John J. Oskorep, Reg. No. 41,234  
William Park & Associates Ltd.  
930 N. York Road, Suite 201  
Hinsdale IL 60521  
630-908-7652



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Jin Ho LEE et al.	)	Group Art Unit: 2485
	)	
U.S. Serial No.: 13/640,014	)	Examiner: Habib, Irfan
	)	
Filing Date: October 8, 2012	)	

Title: METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER

**AMENDMENT AFTER FINAL**

**Mail Stop Amendment**

The Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

Sir:

In response to the final Office Action of May 15, 2015, setting a 2-month shortened statutory period for a reply ending on July 15, 2015, the Applicant submits the following response.

- Amendment to the Abstract
- Amendment to the Specification
- Amendment to the Drawings
- Listing of the Claims**
- Remarks/Arguments**
- Appendix: # is/are attached to the last page of this paper.

Fee Transmittal: The following fee(s), when checked, are paid via credit card.

- large entity; or  **small entity**; or  micro entity status is asserted by the applicant.
- x-month extension of time is hereby requested, thereby extending the due date of the present response to \_\_\_\_\_
- # indep claims in excess of 3 (# indep cls now pending - # indep cls already pd)
- # total claims in excess of 20 (# total cls now pending - # total cls already pd).
- # terminal disclaimers (when checked, terminal disclaimer(s) are filed herewith).
- IDS fee (when checked, an IDS is filed herewith).
- RCE fee (when checked, an RCE is filed herewith).
- Others: \_\_\_\_\_

### Listing of The Claims

The listing of claims presented below replaces all prior versions and listings of claims in the present application.

1-19. (Canceled)

20. **(Currently amended)** A video decoding apparatus comprising:

a processor to determine whether to apply a first filter to a reference pixel value of a current block based on at least one of an intra prediction mode of the current block and a size of the current block, **and** to derive a prediction value of the current block using the reference pixel value derived according to whether to apply the first filter, **and to apply a second filter to the prediction value based on at least one of the intra prediction mode of the current block and the size of the current block, for thereby producing a filtered prediction value.**

21. (Canceled)

22. **(Canceled)** ~~The video decoding apparatus of claim 20, wherein the processor derives the prediction value of the current block by applying a second filter based on at least one of an intra prediction mode of the current block and a size of the current block.~~

23. **(Currently amended)** The video decoding apparatus of claim ~~22~~ **20**, wherein when the intra prediction mode of the current block is ~~one of a vertical mode, a horizontal mode and a DC mode~~, the processor ~~derives the prediction value of the current block by applying~~ **applies** the second filter to prediction pixels of the current block adjacent to a boundary of the reference pixel value.

24. (Previously presented) The video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the DC mode, the processor applies the second filter to top pixels of the current block and leftmost pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value.

25. (Previously presented) The video decoding apparatus of claim 24, wherein when the second filter is applied, the processor applies a 3-tap filter to a top leftmost pixel of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value and applies a 2-tap filter to remaining pixels among the prediction pixels of the current block adjacent to the boundary of the reference pixel value, except for the top leftmost pixel of the current block.

26. (Previously presented) The video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the vertical mode, the processor applies the second filter to leftmost pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value.

27. (Previously presented) The video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the horizontal mode, the processor applies the second filter to top pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value.

### Remarks/Arguments

This response is submitted in reply to the non-final Office Action of May 15, 2015 for the above-referenced patent application. Reconsideration is respectfully requested.

#### I. Claim Status

Claims 20 and 22-27 were pending in the present application prior to this response. In the present response, claims 20 and 23 are amended, and claim 22 is canceled; no claims are added. Thus, claims 20 and 23-27 as amended are now pending in the application.

#### II. Claim Rejections under 35 U.S.C. §102(b) / 103(a)

**Claims 20 and 22 are rejected under pre-AIA 35 U.S.C. §102(b) as being anticipated by U.S. Patent Application Publication No. US 2009/0310677 A1 to Shiodera et al.**

**Claims 23-27 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Shiodera et al. in view of WO 2010/001918 A1 (US 2011/0176614 A1) to Sato et al.**

In response, the Applicant respectfully disagrees with the claim rejections, especially in light of the clarifying amendments made herein, and submits that the claims are allowable over the relied upon art for at least the following reasons.

According to independent claim 20, a video decoding apparatus comprises a processor configured to perform particular actions. For one, the processor operates to determine whether to apply a first filter to a reference pixel value of a current block based on at least one of an intra prediction mode of the current block and a size of the current block. The processor further operates to derive a prediction value of the current block using the reference pixel value derived according to whether to apply the first filter. Finally, the processor further operates to apply a second filter to the prediction value based on at least one of the intra prediction mode of the current block and the size of the current block, for thereby producing a filtered prediction value.

Notably, independent claim 20 recites, inter alia, a “processor” which operates “to apply a second filter to the prediction value based on at least one of the intra prediction mode of the current block and the size of the current block, for thereby producing a filtered prediction value.”

In the rejection of claims 20-22, the Examiner makes reference to particular passages in Shiodera et al. In particular, the Examiner makes reference to, most notably, paragraphs [0304-0307] of Shiodera et al., as well as paragraphs [0321-0323] for alleged teachings related to the *application of a second filter*.

In response, the Applicant respectfully disagrees with the Examiner's assessment in relation to Shiodera et al.

For one, paragraphs [0304-0307] of Shiodera et al. relate to the operation of a prediction signal generator 309 in FIGs. 40-41, and not to the application of any second filter. Prediction signal generator 309 operates to select one of the prediction signals generated by unidirectional predictor 371 or bidirectional predictor 372. A prediction order switch 370 is used to switch prediction orders of the sub-blocks. There is no discussion of an application of a second filter.

In addition, paragraphs [0321-0323] of Shiodera et al. relate to a data structure of macroblock layer syntax. The discussion helps explain an equation and a table for inversely transforming a decoded index into a prediction mode. As is apparent, these further passages do not relate to the application of any second filter.

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Again, the claimed subject matter includes the application of a **first filter** to a reference pixel value, as well as the application of a **second filter** to a prediction value for producing a filtered prediction value.

Note that Sato et al. is not relied upon for and does not teach or suggest the above claimed features either.

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### **III. Conclusion**

For at least the reasons set forth above, the Applicant respectfully submits that claims 20 and 23-27 as amended are in condition for allowance. Accordingly, the Applicant earnestly solicits a Notice of Allowance for the present application.

The Applicant believes that this response is fully responsive to the Office Action. The Examiner is encouraged to contact the undersigned to expeditiously resolve any remaining questions or concerns.

Respectfully submitted,

Dated: July 15, 2015

Electronic signature: /John J. Oskorep/  
John J. Oskorep, Reg. No. 41,234  
William Park & Associates Ltd.  
930 N. York Road, Suite 201  
Hinsdale IL 60521  
630-908-7652

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit		2485	
	Examiner Name	Irfan HABIB		
	Attorney Docket Number		PA0929-0	

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	1	2007252256	JP	A	2007-10-04	AMANO MASAYUKI		<input type="checkbox"/>

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014
	Filing Date		2012-10-08
	First Named Inventor	Jin Ho LEE	
	Art Unit		2485
	Examiner Name	Irfan HABIB	
	Attorney Docket Number		PA0929-0

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**EXAMINER SIGNATURE**

Examiner Signature		Date Considered	
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.



<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014
	Filing Date	2012-10-08
	First Named Inventor	Jin Ho LEE
	Art Unit	2485
	Examiner Name	Irfan HABIB
	Attorney Docket Number	PA0929-0

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2015-07-15
Name/Print	Woochoon W. Park	Registration Number	55523

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13640014
<b>Filing Date:</b>	08-Oct-2012
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Filer:</b>	Woochoon William Park/Peter Yu
<b>Attorney Docket Number:</b>	PA0929-0

Filed as Small Entity

### Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Miscellaneous:</b>				
Submission- Information Disclosure Stmt	2806	1	90	90
<b>Total in USD (\$)</b>				<b>90</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	22929682
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Peter Yu
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	15-JUL-2015
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	17:42:26
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

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1	Response After Final Action	PA0929-0_AAF.pdf	91228	no	6
			2b616062ab7513244023e63c6dfdae30e6652453		
<b>Warnings:</b>					
<b>Information:</b>					
2	Foreign Reference	JP2007252256A.pdf	859177	no	11
			a098e5dc82cda2c61dc4c6caabc5d5bfc204f1d		
<b>Warnings:</b>					
<b>Information:</b>					
3	Information Disclosure Statement (IDS) Form (SB08)	PA0929-0_IDS_sb08a.pdf	612214	no	4
			ff2048de2b6be56727d997d8ae01a4e6f1911923		
<b>Warnings:</b>					
<b>Information:</b>					
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4	Fee Worksheet (SB06)	fee-info.pdf	30646	no	2
			4a884eef74d5628a37ce8bb6acd9c83bae262b7		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			1593265		

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**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875	Application or Docket Number <b>13/640,014</b>	Filing Date <b>10/08/2012</b>	<input type="checkbox"/> To be Mailed
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ENTITY:  LARGE  SMALL  MICRO

**APPLICATION AS FILED – PART I**

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A	
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 =	*	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

**APPLICATION AS AMENDED – PART II**

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>	<b>07/15/2015</b>	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR			
	Total <small>(37 CFR 1.16(i))</small>	* 6	Minus	** 20	= 0	X \$80 = 0
	Independent <small>(37 CFR 1.16(h))</small>	* 1	Minus	***3	= 0	X \$420 = 0
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>					
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>					
					TOTAL ADD'L FEE	<b>0</b>

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR			
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	X \$ =
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	X \$ =
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>					
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>					
					TOTAL ADD'L FEE	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".  
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE  
/BRENDA J. DENNY/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.





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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/640,014 10/08/2012 Jin Ho Lee PA0929-0 2830

96767 7590 05/15/2015
William Park & Associates LTD.
930 N. York Road, Suite 201
Hinsdale, IL 60521

Table with 1 column: EXAMINER

HABIB, IRFAN

Table with 2 columns: ART UNIT, PAPER NUMBER

2485

Table with 2 columns: NOTIFICATION DATE, DELIVERY MODE

05/15/2015

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto.actions@wpapat.com

**Office Action Summary**

**Application No.**  
13/640,014

**Applicant(s)**  
LEE ET AL.

**Examiner**  
IRFAN HABIB

**Art Unit**  
2485

**AIA (First Inventor to File)  
Status**  
No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 4/17/15.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
- 2a)  This action is **FINAL**.    2b)  This action is non-final.
- 3)  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims\***

- 5)  Claim(s) 20-27 is/are pending in the application.  
5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 6)  Claim(s) \_\_\_\_\_ is/are allowed.
- 7)  Claim(s) 20-27 is/are rejected.
- 8)  Claim(s) \_\_\_\_\_ is/are objected to.
- 9)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

- 10)  The specification is objected to by the Examiner.
- 11)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some\*\*    c)  None of the:
- Certified copies of the priority documents have been received.
  - Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1)  Notice of References Cited (PTO-892)
- 2)  Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)  
Paper No(s)/Mail Date 4/20/15.
- 3)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 4)  Other: \_\_\_\_\_.

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**Response to Amendment**

**Claim Rejections - 35 USC § 102**

1. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 20 & 22 is rejected under pre-AIA 35 U.S.C. 102b as being anticipated by Shiodera et al. US 2009/0310677 A1, for the same reason set forth in the last office action dated 11/17/2014.

Per claim 20, Shiodera discloses a video decoding apparatus (**FIG. 40-41**) comprising: a processor (**FIG. 40, e.g. prediction signal generator**) to determine whether to apply a first filter (**e.g. filter**) to a reference pixel value (**e.g. examiner interpreted the claim term/phrase as reference pixel is stored in memory, where processor determines whether or not to apply filter in fig.40 depending on its prediction modes**) of a current block (**Para: 0239, 0303**) based on at least one of an intra-prediction mode of the current block and a size of the current block (**Para: 0235, 0242-0243, FIG. 40-44, e.g. examiner interpreted the claim term/phrase as an intra-prediction**), and to derive a prediction value (**i.e. prediction value**) of the current block using the reference pixel value derived according to whether to apply the first filter (**Para: 0304-0307, FIG. 40-41 e.g. prediction order switch is controlled based on prediction value**).

Per claim 22, Shiodera discloses the video decoding apparatus of claim 20, wherein the processor derives the prediction value of the current block by applying a second filter based on

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at least one of an intra-prediction mode of the current block and a size of the current block, for thereby producing a filtered prediction value (Para: 0321-0323, FIG. 40-44).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 23-27 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Shiodera et al. in view of Sato et al. WO 2010/001918 A1 (English translation document US 2011/0176614 A1 is cited hereinafter), for the same reason set forth in the last office action dated 11/17/2014.

Per claim 23, it is noted that Shiodera discloses video encoding and decoding apparatus, but fails to explicitly teach vertical and horizontal mode. Sato et al. however in FIG. 15, in the same field of endeavor teaches the video decoding apparatus of claim 20, wherein when the intra prediction mode of the current block is one of a vertical mode, a horizontal mode and a DC mode, the processor applies the second filter to prediction pixels of the current block adjacent to a boundary of the reference pixel value (Para: 0192-0195, FIG. 4, 14-15, 18-19).

Per claim 24, in combination of both references where Sato further teaches the video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the DC mode, the processor applies the second filter to top pixels of the current block and leftmost pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value (Para: 0175-0180, FIG. 4, 14-15, 35).

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Per claim 25, in combination of both references where Sato further teaches the video decoding apparatus of claim 24, wherein when the second filter is applied, the processor applies a 3-tap filter to a top leftmost pixel of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value and applies a 2-tap filter to remaining pixels among the prediction pixels of the current block adjacent to the boundary of the reference pixel value, except for the top leftmost pixel of the current block (Para: 0074-0078, 0088, FIG. 1-3).

Per claim 26, in combination of both references where Sato further teaches the video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the vertical mode, the processor applies the second filter to leftmost pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value (Para: 0074-0078, 0088, FIG. 1-3).

Per claim 27, in combination of both references where Sato further teaches the video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the horizontal mode, the processor applies the second filter to top pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value (Para: 0022-0023, FIG. 1-3, 23-26).

### ***Response to Arguments***

5. Applicant's arguments filed 4/20/15 have been fully considered but they are not persuasive.

Applicant assert on page 5 that Shiodera et al. fails to disclose "first filter". Examiner respectfully disagrees and points to Shiodera et al., where the examiner interpreted the claim term/phrase filter as a "filter" wherein reference pixel is stored in memory, and processor determines whether or not to apply filter in fig.40 depending on its prediction modes.

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Applicant assert on page 5 that Shiodera et al. fails to disclose “processor operated by applying a first filter”. Examiner respectfully disagrees and points to Shiodera et al., where the examiner interpreted the claim term/phrase “second filter” as a prediction pixel may be calculated by using a maximum value filter, a minimum value filter, a median filter, and a weighting table having described therein weighting factors depending on an angle of directional prediction or the number of used prediction modes, where the examiner is not clear if the “second filter is same as “first filter” or second filter is different/separate form first filter.

Applicant further assert that Shiodera et al. fails to disclose “an intra-prediction mode” by incorporating claim 21 in to claim 20. However examiner respectfully disagrees and point to Shiodera et al., where a current block is based on an intra-prediction mode, para: 0239-0243.

### ***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IRFAN HABIB whose telephone number is (571)270-7325. The examiner can normally be reached on Monday-Thursday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/I. H./  
Examiner, Art Unit 2485

/RICHARD TORRENTE/  
Primary Examiner, Art Unit 2485

## EAST Search History

## EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1	13/640014.app.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2014/10/16 12:50
S2	272	H04N7/32.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2014/10/16 12:51
S3	1	13/640014.app.	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 11:48
S4	605	H04N7/32.cpc.	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 11:48
S6	2681	375/240.ccls.	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 11:49
S7	2	"20110176614"	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 12:01
S8	3	"20070253483"	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 12:05
S9	2	"20090310677"	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 17:09
S10	2	decod\$3 near3 filter\$2 near3 prediction near value near block	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 17:15
S11	2	"20040136458"	US-PGPUB; USPAT; FPRS	OR	ON	2014/10/29 17:20
S12	4	"2009141969"	US-PGPUB; USPAT; FPRS	OR	ON	2014/10/29 17:21
S13	1	"20110176614"	US-PGPUB; USPAT; FPRS	OR	ON	2014/10/29 17:21
S14	61	intra near3 prediction near filter	US-PGPUB; USPAT; FPRS	OR	ON	2014/10/30 15:45
S16	61	intra near3 prediction near filter and prediction	US-PGPUB; USPAT; FPRS	OR	ON	2014/10/30 15:45
S17	308	((("Jin Ho") near2 (Lee)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:31
S18	55	((("Hui Yong") near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S19	84	((("Se Yoon") near2 (Jeong)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S20	61	((("Suk Hee") near2 (Cho)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S21	42	((("Ha Hyun") near2 (Lee)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S22	241	((("Jong Ho") near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S23	241	((("Jong Ho") near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32

IPR2021-00827


Unified EX1012 Page 216



S24	65	((("Sung Chang") near2 (Lim)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S25	313	((("Jin Soo") near2 (Choi)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S26	393	((("Jin Woong") near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S27	65	((("Chie Teuk") near2 (Ahn)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S28	0	"20050541929"	US-PGPUB; USPAT; FPRS	OR	ON	2014/11/09 11:45
S29	1	10/541929.app.	US-PGPUB; USPAT; FPRS	OR	ON	2014/11/09 11:45
S30	1	"5621467".pn.	US-PGPUB; USPAT; FPRS	OR	ON	2014/11/09 11:47

5/ 8/ 2015 2:57:15 PM

C:\Users\ihibib\Documents\EAST\Workspaces\13640014.wsp

<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b> 13640014	<b>Applicant(s)/Patent Under Reexamination</b> LEE ET AL.
	<b>Examiner</b> IRFAN HABIB	<b>Art Unit</b> 2485

✓	<b>Rejected</b>
=	<b>Allowed</b>


-	<b>Cancelled</b>
÷	<b>Restricted</b>

N	<b>Non-Elected</b>
I	<b>Interference</b>

A	<b>Appeal</b>
O	<b>Objected</b>

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

CLAIM		DATE							
Final	Original	10/16/2014	04/29/2015						
	20	✓	✓						
	21	✓	✓						
	22	✓	✓						
	23	✓	✓						
	24	✓	✓						
	25	✓	✓						
	26	✓	✓						
	27	✓	✓						

<b>Search Notes</b>  	<b>Application/Control No.</b>  13640014	<b>Applicant(s)/Patent Under Reexamination</b>  LEE ET AL.
	<b>Examiner</b>  IRFAN HABIB	<b>Art Unit</b>  2485

CPC- SEARCHED		
Symbol	Date	Examiner
H04N7/32	10/16/14	IH

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
375	240.25	10/16/14	IH

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor Search	10/16/14	IH
EAST Search	10/16/14	IH

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit	2485		
	Examiner Name	Habib, Irfan		
	Attorney Docket Number	PA0929-0		

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number <sup>3</sup>	Country Code <sup>2</sup> j	Kind Code <sup>4</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T <sup>5</sup>
	1	101163249	CN	A	2008-04-16	BEIJING UNIVERSITY OF TECHNOLOGY		<input type="checkbox"/>
	2	2014207683	JP	A	2014-10-30	Jin Ho LEE et al.		<input type="checkbox"/>
	3	2013524681	JP	A	2013-06-17	Jin Ho LEE et al.		<input type="checkbox"/>

**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**  
( Not for submission under 37 CFR 1.99)

Application Number		13640014
Filing Date		2012-10-08
First Named Inventor	Jin Ho LEE	
Art Unit	2485	
Examiner Name	Habib, Irfan	
Attorney Docket Number	PA0929-0	

4	2014207684	JP	A	2014-10-30	Jin Ho LEE et al.	<input type="checkbox"/>
5	2014207685	JP	A	2014-10-30	Jin Ho LEE et al.	<input type="checkbox"/>

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**NON-PATENT LITERATURE DOCUMENTS**

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>5</sup>
	1	JINGLI ZHOU et al., An Interpolation Method by Predicting the Direction of Pixel Texture Changing Trend for H.264/AVC Intra Prediction, Second International Symposium on Intelligent Information Technology Application, 2008, 884-888, IEEE Computer Society, China	<input type="checkbox"/>
	2	KAZUO SUGIMOTO et al., CE6.f: Verification Report on LUT-based Adaptive Filtering on Intra Prediction Samples, Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, March 2011, Mitsubishi Electric Corporation and NHK(Japan Broadcasting Corporation), Geneva, CH	<input type="checkbox"/>
	3	KAZUO SUGIMOTO et al., LUT-based Adaptive Filtering on Intra Prediction Samples, Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, January 2011, Mitsubishi Electric Corporation and NHK(Japan Broadcasting Corporation), Daegu, KR	<input type="checkbox"/>

If you wish to add additional non-patent literature document citation information please click the Add button **Add**

**EXAMINER SIGNATURE**

Examiner Signature	/Irfan Habib/	Date Considered	04/29/2015
--------------------	---------------	-----------------	------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**  
( Not for submission under 37 CFR 1.99)

Application Number		13640014	
Filing Date		2012-10-08	
First Named Inventor	Jin Ho LEE		
Art Unit	2485		
Examiner Name	Habib, Irfan		
Attorney Docket Number	PA0929-0		

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

- See attached certification statement.
- Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2015-04-20
Name/Print	Woochoon W. Park	Registration Number	55523

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit	2485		
	Examiner Name	Habib, Irfan		
	Attorney Docket Number	PA0929-0		

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	1	101163249	CN	A	2008-04-16	BEIJING UNIVERSITY OF TECHNOLOGY		<input type="checkbox"/>
	2	2014207683	JP	A	2014-10-30	Jin Ho LEE et al.		<input type="checkbox"/>
	3	2013524681	JP	A	2013-06-17	Jin Ho LEE et al.		<input type="checkbox"/>



<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
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	Examiner Name	Habib, Irfan		
	Attorney Docket Number	PA0929-0		

	4	2014207684	JP	A	2014-10-30	Jin Ho LEE et al.		<input type="checkbox"/>
	5	2014207685	JP	A	2014-10-30	Jin Ho LEE et al.		<input type="checkbox"/>

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**NON-PATENT LITERATURE DOCUMENTS**

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>5</sup>
	1	JINGLI ZHOU et al., An Interpolation Method by Predicting the Direction of Pixel Texture Changing Trend for H.264/AVC Intra Prediction, Second International Symposium on Intelligent Information Technology Application, 2008, 884-888, IEEE Computer Society, China	<input type="checkbox"/>
	2	KAZUO SUGIMOTO et al., CE6.f: Verification Report on LUT-based Adaptive Filtering on Intra Prediction Samples, Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, March 2011, Mitsubishi Electric Corporation and NHK(Japan Broadcasting Corporation), Geneva, CH	<input type="checkbox"/>
	3	KAZUO SUGIMOTO et al., LUT-based Adaptive Filtering on Intra Prediction Samples, Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, January 2011, Mitsubishi Electric Corporation and NHK(Japan Broadcasting Corporation), Daegu, KR	<input type="checkbox"/>

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**EXAMINER SIGNATURE**

Examiner Signature	Date Considered
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014
	Filing Date	2012-10-08
	First Named Inventor	Jin Ho LEE
	Art Unit	2485
	Examiner Name	Habib, Irfan
	Attorney Docket Number	PA0929-0

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

- See attached certification statement.
- Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2015-04-20
Name/Print	Woochoon W. Park	Registration Number	55523

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## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	22104886
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Stephanie Bliss
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	20-APR-2015
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	11:42:56
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	PA0929-0_IDS_sb08a.pdf	612870 <small>f7a2fef6ca50a111761d11b0d10bd9ffe463f1aa</small>	no	4

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IPR2021-00827

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2	Non Patent Literature	An_interpolation_method_by_predicting_the_direction.pdf	334442 8e2184a2a6c6962ceb698f3d40bb33202d9383f1	no	5
<b>Warnings:</b>					
<b>Information:</b>					
3	Non Patent Literature	CE6.pdf	467284 818581aba235113373279204736db08eb81250c0	no	13
<b>Warnings:</b>					
<b>Information:</b>					
4	Foreign Reference	CN_101163249A.pdf	4044732 86c74a082043f46c68ece7e5ca2c06508d4d72a1	no	28
<b>Warnings:</b>					
<b>Information:</b>					
5	Non Patent Literature	Joint_Collaborative_Team_on_Video_Coding.pdf	195554 09b630ee334c07d77364861d52a477d0dc76ad85	no	4
<b>Warnings:</b>					
<b>Information:</b>					
6	Foreign Reference	JP_2013524681A.pdf	1954802 5347c877efbb6a668c5cd68e3b41b9e4582698bc	no	23
<b>Warnings:</b>					
<b>Information:</b>					
7	Foreign Reference	JP_2014207683A.pdf	487127 d24fb6356ea6a1df3aa1f8d7bfc4b9be23ca12ac	no	17
<b>Warnings:</b>					
<b>Information:</b>					
8	Foreign Reference	JP_2014207684A.pdf	540670 6257cba2e035bae51493d46bac762d85f1de3fcf	no	18
<b>Warnings:</b>					
<b>Information:</b>					
9	Foreign Reference	JP_2014207685A.pdf	487286 4b68b2a660cf84aedc5a7c55ed131a538968dcdbd	no	17
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			9124767	<b>IPR2021-00827</b>	

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**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor: Jin Ho LEE et al.	)	Group Art Unit: 2485
	)	
U.S. Serial No.: 13/640,014	)	Examiner: Habib, Irfan
	)	
Filing Date: October 8, 2012	)	

Title: METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER

**AMENDMENT UNDER 37 CFR 1.111**

**Mail Stop Amendment**

The Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

Sir:

In response to the non-final Office Action of November 17, 2014, setting a 3-month shortened statutory period for a reply ending on February 17, 2015, hereby extended to April 17, 2015, the Applicant submits the following response.

- Amendment to the Abstract
- Amendment to the Specification
- Amendment to the Drawings
- Listing of the Claims**
- Remarks/Arguments**
- Appendix: # is/are attached to the last page of this paper.

Fee Transmittal: The following fee(s), when checked, are paid via credit card.

- large entity; or  **small entity**; or  micro entity status is asserted by the applicant.
- 2-month extension of time is hereby requested, thereby extending the due date of the present response to April 17, 2015.**
- # indep claims in excess of 3 (# indep cls now pending - # indep cls already pd)
- # total claims in excess of 20 (# total cls now pending - # total cls already pd).
- # terminal disclaimers (when checked, terminal disclaimer(s) are filed herewith).
- IDS fee (when checked, an IDS is filed herewith).
- RCE fee (when checked, an RCE is filed herewith).
- Others: \_\_\_\_\_

### Listing of The Claims

The listing of claims presented below replaces all prior versions and listings of claims in the present application.

1-19. (Canceled)

20. **(Currently amended)** A video decoding apparatus comprising:  
a processor to determine whether to apply a first filter to a reference pixel value of a current block **based on at least one of an intra prediction mode of the current block and a size of the current block**, and to derive a prediction value of the current block using the reference pixel value derived according to whether to apply the first filter.

21. **(Canceled)**

22. **(Currently amended)** The video decoding apparatus of claim 20, wherein the processor derives the prediction value of the current block by applying a second filter based on at least one of an intra prediction mode of the current block and a size of the current block, **for thereby producing a filtered prediction value.**

23. **(Currently amended)** The video decoding apparatus of claim ~~22~~ **20**, wherein when the intra prediction mode of the current block is one of a vertical mode, a horizontal mode and a DC mode, the processor ~~derives the prediction value of the current block by applying~~ **applies** the second filter to prediction pixels of the current block adjacent to a boundary of the reference pixel value.

24. (Previously presented) The video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the DC mode, the processor applies the second filter to top pixels of the current block and leftmost pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value.

25. (Previously presented) The video decoding apparatus of claim 24, wherein when the



second filter is applied, the processor applies a 3-tap filter to a top leftmost pixel of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value and applies a 2-tap filter to remaining pixels among the prediction pixels of the current block adjacent to the boundary of the reference pixel value, except for the top leftmost pixel of the current block.

26. (Previously presented) The video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the vertical mode, the processor applies the second filter to leftmost pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value.

27. (Previously presented) The video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the horizontal mode, the processor applies the second filter to top pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value.

### Remarks/Arguments

This response is submitted in reply to the non-final Office Action of November 17, 2014 for the above-referenced patent application. Reconsideration is respectfully requested.

#### I. Claim Status

Claims 20-27 were pending in the present application prior to this response. In the present response, claims 20, 22, and 23 are amended, and claim 21 is canceled; no claims are added. Thus, claims 20 and 22-27 as amended are now pending in the application.

#### II. Claim Rejections under 35 U.S.C. §102(b) / 103(a)

**Claims 20-22 are rejected under pre-AIA 35 U.S.C. §102(b) as being anticipated by U.S. Patent Application Publication No. US 2009/0310677 A1 to Shiodera et al.**

**Claims 23-27 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Shiodera et al. in view of WO 2010/001918 A1 (US 2011/0176614 A1) to Sato et al.**

In response, the Applicant respectfully disagrees with the claim rejections, especially in light of the clarifying amendments made herein, and submits that the claims are allowable over the relied upon art for at least the following reasons.

According to independent claim 20, a video decoding apparatus comprises a processor configured to perform particular actions. The processor operates to determine whether to apply a first filter to a reference pixel value of a current block based on at least one of an intra prediction mode of the current block and a size of the current block. The processor further operates to derive a prediction value of the current block using the reference pixel value derived according to whether to apply the first filter.

In the rejection of claims 20-22, the Examiner makes reference to particular passages in Shiodera et al. In particular, the Examiner makes reference to, most notably, paragraphs [0304-0307] of Shiodera et al., as well as paragraphs [0321-0323] for alleged teachings related to the application of a second filter.

Reviewing further paragraphs [0235], [0239], [0242] and [0243] of Shiodera et al. reveal no “first filter” to be applied to a reference pixel value, and/or any determining whether to apply a “first filter to the reference pixel value of a current block based on at least one of an intra prediction mode of the current block and a size of the current block”. The filtering described in Shiodera et al. does not correspond to a first filter to be applied to a reference pixel value as claimed in the present invention. Rather, the filtering described in Shiodera et al. merely applies to a reconstructed pixel after a prediction process for a picture.

Further notably, dependent claim 20 recites, inter alia, a “processor” which operates “by applying a second filter to the prediction value based on at least one of the intra prediction mode of the current block and the size of the current block, for thereby producing a filtered prediction value.” The passages in Shiodera et al. also fail to teach or suggest a second filter of the present invention. Paragraphs [0304-0307] of Shiodera et al. relate to the operation of a prediction signal generator 309 in FIGs. 40-41, and not to the application of any second filter. Further, paragraphs [0321-0323] relate to a data structure of macroblock layer syntax. This discussion helps explain an equation and a table for inversely transforming a decoded index into a prediction mode. As is apparent, these paragraphs do not relate to the application of any second filter. On the other hand, it is noted that paragraph [0239] of Shiodera et al. does describe a filter that may be used to calculate a prediction pixel. However, this paragraph does not teach or suggest the use of a second filter which is applied to a derived prediction value, as is claimed. The claimed subject matter of dependent claim 22 includes the application of a first filter to a reference pixel value, as well as the application of a second filter to a prediction value for producing a filtered prediction value.

Note that Sato et al. is not relied upon for and does not teach or suggest the above claimed features as well.

As Shiodera et al. and other art fail to teach or suggest each and every feature in independent claim 20, the Applicant respectfully requests the Examiner to withdraw the §102(b) rejection of independent claim 20 and to allow such claim.

Dependent claims 23-27 depend ultimately from independent claim 20, which has been shown to be allowable above. Again, Sato et al. is not relied upon for and does not teach or suggest

the above claimed features as well. Thus, dependent claims 23-27 which were rejected under §103(a) are now also in condition for allowance, for at least these reasons.

**III. Conclusion**

For at least the reasons set forth above, the Applicant respectfully submits that claims 20 and 23-27 as amended are in condition for allowance. Accordingly, the Applicant earnestly solicits a Notice of Allowance for the present application.

The Applicant believes that this response is fully responsive to the Office Action. The Examiner is encouraged to contact the undersigned to expeditiously resolve any remaining questions or concerns.

Respectfully submitted,

Dated: April 17, 2015

Electronic signature: /John J. Oskorep/  
John J. Oskorep, Reg. No. 41,234  
William Park & Associates Ltd.  
930 N. York Road, Suite 201  
Hinsdale IL 60521  
630-908-7652

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13640014
<b>Filing Date:</b>	08-Oct-2012
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Filer:</b>	Woochoon William Park/Stephanie Bliss
<b>Attorney Docket Number:</b>	PA0929-0

Filed as Small Entity

### Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 2 months with \$0 paid	2252	1	300	300
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>300</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	22100327
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Stephanie Bliss
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	17-APR-2015
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	18:25:36
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$300
RAM confirmation Number	4999
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The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

IPR2021-00827

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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	PA0929-0_OAR.pdf	35263 44c535d8a5639c01d9e3050e57ecda14f4fa2209	no	6

**Warnings:**

**Information:**

2	Fee Worksheet (SB06)	fee-info.pdf	30895 d732b4e2d6aac0fffb60235fb8c75a0a9538af1	no	2
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**Warnings:**

**Information:**

<b>Total Files Size (in bytes):</b>			66158		
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**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**



Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875	Application or Docket Number <b>13/640,014</b>	Filing Date <b>10/08/2012</b>	<input type="checkbox"/> To be Mailed
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ENTITY:  LARGE  SMALL  MICRO

**APPLICATION AS FILED – PART I**

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

**APPLICATION AS AMENDED – PART II**

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	
<b>AMENDMENT</b>	<b>11/15/2013</b>	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR			
		* 8	Minus	** 20	= 0	X \$80 = 0	
		* 1	Minus	***3	= 0	X \$420 = 0	
		<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))					
		<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
					TOTAL ADD'L FEE	<b>0</b>	

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	
<b>AMENDMENT</b>	<b>04/17/2015</b>	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR			
		* 8	Minus	** 20	= 0	X \$80 = 0	
		* 1	Minus	*** 3	= 0	X \$420 = 0	
		<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))					
		<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
					TOTAL ADD'L FEE	<b>0</b>	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE  
/GLENN BURNS JR/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/640,014	10/08/2012	Jin Ho Lee	PA0929-0	2830
96767	7590	11/17/2014	EXAMINER	
William Park & Associates Patent LTD. 930 N. York Road, Suite 201 Hinsdale, IL 60521			HABIB, IRFAN	
			ART UNIT	PAPER NUMBER
			2485	
			NOTIFICATION DATE	DELIVERY MODE
			11/17/2014	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto.actions@wpapat.com

<b>Office Action Summary</b>	<b>Application No.</b> 13/640,014	<b>Applicant(s)</b> LEE ET AL.	
	<b>Examiner</b> IRFAN HABIB	<b>Art Unit</b> 2485	<b>AIA (First Inventor to File) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 10/8/12.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims\***

- 5)  Claim(s) 20-27 is/are pending in the application.  
5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 6)  Claim(s) \_\_\_\_\_ is/are allowed.
- 7)  Claim(s) 20-27 is/are rejected.
- 8)  Claim(s) \_\_\_\_\_ is/are objected to.
- 9)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

- 10)  The specification is objected to by the Examiner.
- 11)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some\*\*    c)  None of the:
1.  Certified copies of the priority documents have been received.
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1)  Notice of References Cited (PTO-892)
- 2)  Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 3)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 4)  Other: \_\_\_\_\_.

### DETAILED ACTION

1. The present application is being examined under the pre-AIA first to invent provisions.

#### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –  
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 20-22 is rejected under pre-AIA 35 U.S.C. 102b as being anticipated by Shiodera et al. US 2009/0310677 A1.

Per claim 20, Shiodera discloses a video decoding apparatus (FIG. 40-41) comprising: a processor (FIG. 40, e.g. prediction signal generator) to determine whether to apply a first filter (e.g. filter) to a reference pixel value (e.g. examiner understood that reference pixel is stored in memory, where processor determines whether or not to apply filter in fig.40 depending on its prediction modes) of a current block (Para: 0239, 0303), and to derive a prediction value (i.e. prediction value) of the current block using the reference pixel value derived according to whether to apply the first filter (Para: 0304-0307, FIG. 40-41 e.g. prediction order switch is controlled based on prediction value).

Per claim 21, Shiodera discloses the video decoding apparatus of claim 20, wherein the processor determines whether to apply the first filter based on at least one of an intra-prediction mode of the current block and a size of the current block (Para:

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0235, 0242-0243, FIG. 40-44, e.g. examiner understood the claim as an intra-prediction).

Per claim 22, Shiodera discloses the video decoding apparatus of claim 20, wherein the processor derives the prediction value of the current block by applying a second filter based on at least one of an intra-prediction mode of the current block and a size of the current block (Para: 0321-0323, FIG. 40-44).

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 23-27 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Shiodera et al. in view of Sato et al. WO 2010/001918 A1 (English translation document US 2011/0176614 A1 is cited hereinafter).

Per claim 23, it is noted that Shiodera discloses video encoding and decoding apparatus, but fails to explicitly teach vertical and horizontal mode. Sato et al. however in FIG. 15, in the same field of endeavor teaches the video decoding apparatus of claim 22, wherein when the intra prediction mode of the current block is one of a vertical mode, a horizontal mode and a DC mode, the processor derives the prediction value of the current block by applying the second filter to prediction pixels of the current block adjacent to a boundary of the reference pixel value (Para: 0192-0195, FIG. 4, 14-15, 18-19).

Per claim 24, in combination of both references where Sato further teaches the video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the DC mode, the processor applies the second filter to top pixels of the current block and leftmost pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value (Para: 0175-0180, FIG. 4, 14-15, 35).

Per claim 25, in combination of both references where Sato further teaches the video decoding apparatus of claim 24, wherein when the second filter is applied, the processor applies a 3-tap filter to a top leftmost pixel of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel

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value and applies a 2-tap filter to remaining pixels among the prediction pixels of the current block adjacent to the boundary of the reference pixel value, except for the top leftmost pixel of the current block (Para: 0074-0078, 0088, FIG. 1-3).

Per claim 26, in combination of both references where Sato further teaches the video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the vertical mode, the processor applies the second filter to leftmost pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value (Para: 0074-0078, 0088, FIG. 1-3).

Per claim 27, in combination of both references where Sato further teaches the video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the horizontal mode, the processor applies the second filter to top pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value (Para: 0022-0023, FIG. 1-3, 23-26).

Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IRFAN HABIB whose telephone number is (571)270-7325. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/I. H./  
Examiner, Art Unit 2485

/RICHARD TORRENTE/  
Primary Examiner, Art Unit 2485



<b>Notice of References Cited</b>	Application/Control No. 13/640,014	Applicant(s)/Patent Under Reexamination LEE ET AL.	
	Examiner IRFAN HABIB	Art Unit 2485	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A US-2004/0136458 A1	07-2004	Dahlhoff et al.	375/240.12
*	B US-2007/0253483 A1	11-2007	Lee et al.	375/240.12
*	C US-2008/0225952 A1	09-2008	Wang et al.	375/240.16
*	D US-2009/0310677 A1	12-2009	Shiodera et al.	375/240.15
*	E US-2011/0176614 A1	07-2011	Sato et al.	375/240.16
	F US-			
	G US-			
	H US-			
	I US-			
	J US-			
	K US-			
	L US-			
	M US-			

**FOREIGN PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N WO2010001918	01-2010	Japan	Sato	H04N
	O				
	P				
	Q				
	R				
	S				
	T				

**NON-PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)				
	U				
	V				
	W				
	X				

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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13640014 - GAI: 2485

Approved for use through 07/31/2012. OMB 0651-0031

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		PA0929-0	

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	1	2005-512419	JP	A	2005-04-28	Robert BOSCH et al.		<input type="checkbox"/>
	2	2006-229411	JP	A	2006-08-31	MATSUSHITA ELECTRONIC IND CO LTD.		<input type="checkbox"/>
	3	2009-284298	JP	A	2009-12-03	HITACHI LTD.		<input type="checkbox"/>

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	13640014 - GAU: 2485	
	Filing Date		2012-10-08		
	First Named Inventor	Jin Ho LEE			
	Art Unit				
	Examiner Name				
	Attorney Docket Number		PA0929-0		

4	2010-035137	JP	A	2010-02-12	SONY CORP.	<input type="checkbox"/>
5	2007-288785	JP	A	2007-01-11	SAMSUNG ELECTRONICS CO LTD.	<input type="checkbox"/>
6	2008-012918	WO	A1	2008-01-31	TOSHIBA CORP.	<input type="checkbox"/>

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>5</sup>
	1	YUNFEI ZHENG et al., Simplified Intra Smoothing, Joint Collaborative Team on Video Coding(JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, October 2010, 3rd Meeting: Guangzhou, CN,	<input type="checkbox"/>
	2	KAZUO SUGIMOTO et al., LUT-based adaptive filtering on intra prediction samples, Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, January 2011, 4th Meeting: Daegu, KR,	<input type="checkbox"/>

If you wish to add additional non-patent literature document citation information please click the Add button **Add**

**EXAMINER SIGNATURE**

Examiner Signature	/Irfan Habib/	Date Considered	10/16/2014
--------------------	---------------	-----------------	------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014	13640014 - GAU: 2485
	Filing Date	2012-10-08	
	First Named Inventor	Jin Ho LEE	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	PA0929-0	

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

- See attached certification statement.
- Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2013-10-23
Name/Print	Woochoon W. Park	Registration Number	55523


This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b> 13640014	<b>Applicant(s)/Patent Under Reexamination</b> LEE ET AL.
	<b>Examiner</b> IRFAN HABIB	<b>Art Unit</b> 2485

✓	<b>Rejected</b>
=	<b>Allowed</b>


-	<b>Cancelled</b>
÷	<b>Restricted</b>

N	<b>Non-Elected</b>
I	<b>Interference</b>

A	<b>Appeal</b>
O	<b>Objected</b>

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

CLAIM		DATE							
Final	Original	10/16/2014							
	20	✓							
	21	✓							
	22	✓							
	23	✓							
	24	✓							
	25	✓							
	26	✓							
	27	✓							

<b>Search Notes</b>  	<b>Application/Control No.</b>  13640014	<b>Applicant(s)/Patent Under Reexamination</b>  LEE ET AL.
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CPC- SEARCHED		
Symbol	Date	Examiner
H04N7/32	10/16/14	IH

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
375	240.25	10/16/14	IH

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor Search	10/16/14	IH
EAST Search	10/16/14	IH

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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13640014 - GAI: 2485

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		PA0929-0	

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	1	2005-512419	JP	A	2005-04-28	Robert BOSCH et al.		<input type="checkbox"/>
	2	2006-229411	JP	A	2006-08-31	MATSUSHITA ELECTRONIC IND CO LTD.		<input type="checkbox"/>
	3	2007-288785	JP	A	2007-11-01	SAMSUNG ELECTRONICS CO LTD		<input type="checkbox"/>



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	Filing Date		2012-10-08		
	First Named Inventor	Jin Ho LEE			
	Art Unit				
	Examiner Name				
	Attorney Docket Number		PA0929-0		

4	2010-035137	JP	A	2010-02-12	SONY CORP.	<input type="checkbox"/>
5	2007-288785	JP	A	2007-01-11	SAMSUNG ELECTRONICS CO LTD.	<input type="checkbox"/>
6	2008-012918	WO	A1	2008-01-31	TOSHIBA CORP.	<input type="checkbox"/>

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	1	YUNFEI ZHENG et al., Simplified Intra Smoothing, Joint Collaborative Team on Video Coding(JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, October 2010, 3rd Meeting: Guangzhou, CN,	<input type="checkbox"/>
	2	KAZUO SUGIMOTO et al., LUT-based adaptive filtering on intra prediction samples, Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, January 2011, 4th Meeting: Daegu, KR,	<input type="checkbox"/>

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- Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- None

**SIGNATURE**

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Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2013-10-23
Name/Print	Woochoon W. Park	Registration Number	55523

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## EAST Search History

## EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	308	((("Jin Ho") near2 (Lee)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:31
L3	55	((("Hui Yong") near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
L4	84	((("Se Yoon") near2 (Jeong)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
L5	61	((("Suk Hee") near2 (Cho)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
L6	42	((("Ha Hyun") near2 (Lee)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
L7	241	((("Jong Ho") near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
L8	241	((("Jong Ho") near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
L9	65	((("Sung Chang") near2 (Lim)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
L10	313	((("Jin Soo") near2 (Choi)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
L11	393	((("Jin Woong") near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
L12	65	((("Chie Teuk") near2 (Ahn)).INV.	US-PGPUB; USPAT	OR	ON	2014/11/07 12:32
S1	1	13/640014.app.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2014/10/16 12:50
S2	272	H04N7/32.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2014/10/16 12:51
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S4	605	H04N7/32.cpc.	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 11:48
S6	2681	375/240.ccls.	US-PGPUB; USPAT; FPRS; DERWENT	OR	ON	2014/10/29 11:49
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S12	4	"2009141969"	US-PGPUB; USPAT; FPRS	OR	ON	2014/10/29 17:21
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S16	61	intra near3 prediction near filter and prediction	US-PGPUB; USPAT; FPRS	OR	ON	2014/10/30 15:45

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13640014 - GAI: 2485

Doc code: IDS  
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	First Named Inventor	Jin Ho LEE	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	PA0929-0	

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	1	10-2009-0095014	KR	A	2009-09-09	SAMSUNG ELECTRONICS CO., LTD.		<input type="checkbox"/>
	2	10-2009-0079894	KR	A	2009-07-22	THOMSON LICENSING		<input type="checkbox"/>
	3	10-2005-0090451	KR	A	2005-09-13	THOMSON LICENSING		<input type="checkbox"/>

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	Attorney Docket Number		PA0929-0	

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Receipt date: 03/17/2014

13640014 - GAI: 2485

Doc code: IDS  
 Doc description: Information Disclosure Statement (IDS) Filed

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		PA0929-0	

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Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.		T <sup>5</sup>

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	13640014 - GAU: 2485	
	Filing Date		2012-10-08		
	First Named Inventor	Jin Ho LEE			
	Art Unit				
	Examiner Name				
	Attorney Docket Number		PA0929-0		

1	Jingli Zhou et al., An Interpolation Method by Predicting the Direction of Pixel Texture Changing Trend for H.264/AVC Intra Prediction, Second International Symposium on Intelligent Information Technology Application (IITA '08), IEEE, December 2008, Vol.1, pp.884-888.	<input type="checkbox"/>
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Examiner Signature	/Irfan Habib/	Date Considered	10/16/2014
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<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014	13640014 - GAU: 2485
	Filing Date	2012-10-08	
	First Named Inventor	Jin Ho LEE	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	PA0929-0	

### CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

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**OR**

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See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

None

### SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2014-03-17
Name/Print	Woochoon W. Park	Registration Number	55523

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	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		PA0929-0	

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	First Named Inventor	Jin Ho LEE		
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1		Jingli Zhou et al., An Interpolation Method by Predicting the Direction of Pixel Texture Changing Trend for H.264/AVC Intra Prediction, Second International Symposium on Intelligent Information Technology Application (IITA '08), IEEE, December 2008, Vol.1, pp.884-888.	<input type="checkbox"/>
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STATEMENT BY APPLICANT**  
( Not for submission under 37 CFR 1.99)

Application Number	13640014
Filing Date	2012-10-08
First Named Inventor	Jin Ho LEE
Art Unit	
Examiner Name	
Attorney Docket Number	PA0929-0

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## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	18499007
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Gabriel Lowe
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	17-MAR-2014
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	18:05:27
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	PA0929-0_IDS_sb08a.pdf	615487 <small>2e7b5a080ab7794ffddad0ff2eb58be1f814cb94</small>	no	4

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2	Non Patent Literature	PA0929-0_NPL_IDS.pdf	691717 cf781001d9887f2ca48d31cb4907cf14e2fa6b9b	no	6
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**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Assignee Applicant(s): Electronics and Telecommunications Research Institute	
Inventor(s): Jin Ho LEE et al.	Group Art Unit:
U.S. Serial No.: 13/640,014	Examiner:
Filing Date: October 8, 2012	
Title: METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE	

**PRELIMINARY AMENDMENT**

The Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

Sir:

Enclosed please find a listing of claims reflecting preliminary amendments. Claims 1-19 have been cancelled without prejudice, and claims 20-27 have been added. No new matter has been introduced. Please telephone the undersigned attorney to expeditiously resolve any matter to resolve, if there is any.

Respectfully submitted,

Dated: November 15, 2013

Electronic signature: /W. William Park/  
W. William Park, Reg. No. 55,523  
William Park & Associates Ltd.  
930 N. York Road, Suite 201  
Hinsdale IL 60521  
630-908-7652

**Amendments To The Claims**

The listing of claims presented below will replace all prior versions and listings of claims in the application.

**Listing of Claims:**

1-19. (cancelled)

20. (new) **A video decoding apparatus comprising:**

**a processor to determine whether to apply a first filter to a reference pixel value of a current block, and to derive a prediction value of the current block using the reference pixel value derived according to whether to apply the first filter.**

21. (new) **The video decoding apparatus of claim 20, wherein the processor determines whether to apply the first filter based on at least one of an intra prediction mode of the current block and a size of the current block.**

22. (new) **The video decoding apparatus of claim 20, wherein the processor derives the prediction value of the current block by applying a second filter based on at least one of an intra prediction mode of the current block and a size of the current block.**

23. (new) **The video decoding apparatus of claim 22, wherein when the intra prediction mode of the current block is one of a vertical mode, a horizontal mode and a DC mode, the processor derives the prediction value of the current block by applying the second filter to prediction pixels of the current block adjacent to a boundary of the reference pixel value.**

24. (new) **The video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the DC mode, the processor applies the second filter to top pixels of the current block and leftmost pixels of the current**

**block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value.**

25. (new) The video decoding apparatus of claim 24, wherein when the second filter is applied, the processor applies a 3-tap filter to a top leftmost pixel of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value and applies a 2-tap filter to remaining pixels among the prediction pixels of the current block adjacent to the boundary of the reference pixel value, except for the top leftmost pixel of the current block.

26. (new) The video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the vertical mode, the processor applies the second filter to leftmost pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value.

27. (new) The video decoding apparatus of claim 23, wherein when the intra prediction mode of the current block is the horizontal mode, the processor applies the second filter to top pixels of the current block among the prediction pixels of the current block adjacent to the boundary of the reference pixel value.

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	17411644
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Gabriel Lowe
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	15-NOV-2013
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	11:29:53
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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IPR2021-00827

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**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**



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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875	Application or Docket Number <b>13/640,014</b>	Filing Date <b>10/08/2012</b>	<input type="checkbox"/> To be Mailed
---	---	----------------------------------	---------------------------------------

ENTITY:  LARGE  SMALL  MICRO

**APPLICATION AS FILED – PART I**

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A	
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 =	*	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

**APPLICATION AS AMENDED – PART II**

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>	<b>11/15/2013</b>	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR			
	Total <small>(37 CFR 1.16(i))</small>	* 8	Minus	** 20	= 0	X \$80 = 0
	Independent <small>(37 CFR 1.16(h))</small>	* 1	Minus	***3	= 0	X \$420 = 0
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>					
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>						
					TOTAL ADD'L FEE	<b>0</b>

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR			
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	X \$ =
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	X \$ =
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>					
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>						
					TOTAL ADD'L FEE	

LDRG  
/CHERRI FITZGERALD/

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
\*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875	Application or Docket Number <b>13/640,014</b>	Filing Date <b>10/08/2012</b>	<input type="checkbox"/> To be Mailed
---	---	----------------------------------	---------------------------------------

ENTITY:  LARGE  SMALL  MICRO

**APPLICATION AS FILED – PART I**

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A	
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 =	*	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

**APPLICATION AS AMENDED – PART II**

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>	<b>11/15/2013</b>	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR			
	Total <small>(37 CFR 1.16(i))</small>	* 8	Minus	** 20	= 0	X \$80 = 0
	Independent <small>(37 CFR 1.16(h))</small>	* 1	Minus	***3	= 0	X \$420 = 0
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>					
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>						
					TOTAL ADD'L FEE	<b>0</b>

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR			
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	X \$ =
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	X \$ =
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>					
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>						
					TOTAL ADD'L FEE	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".  
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LDRG  
/CHERRI FITZGERALD/

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		PA0929-0	

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Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number <sup>3</sup>	Country Code <sup>2</sup> j	Kind Code <sup>4</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T <sup>5</sup>
	1	2005-512419	JP	A	2005-04-28	Robert BOSCH et al.		<input type="checkbox"/>
	2	2006-229411	JP	A	2006-08-31	MATSUSHITA ELECTRONIC IND CO LTD.		<input type="checkbox"/>
	3	2007-288785	JP	A	2007-11-01	SAMSUNG ELECTRONICS CO LTD		<input type="checkbox"/>

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		PA0929-0	

	4	2010-035137	JP	A	2010-02-12	SONY CORP.		<input type="checkbox"/>
	5	2007-288785	JP	A	2007-01-11	SAMSUNG ELECTRONICS CO LTD.		<input type="checkbox"/>
	6	2008-012918	WO	A1	2008-01-31	TOSHIBA CORP.		<input type="checkbox"/>

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**NON-PATENT LITERATURE DOCUMENTS**

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>5</sup>
	1	YUNFEI ZHENG et al., Simplified Intra Smoothing, Joint Collaborative Team on Video Coding(JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, October 2010, 3rd Meeting: Guangzhou, CN,	<input type="checkbox"/>
	2	KAZUO SUGIMOTO et al., LUT-based adaptive filtering on intra prediction samples, Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, January 2011, 4th Meeting: Daegu, KR,	<input type="checkbox"/>

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Examiner Signature		Date Considered	
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014
	Filing Date	2012-10-08
	First Named Inventor	Jin Ho LEE
	Art Unit	
	Examiner Name	
	Attorney Docket Number	PA0929-0

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

- See attached certification statement.
- Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2013-10-23
Name/Print	Woochoon W. Park	Registration Number	55523

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	17210847
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Ryan Whelan
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	23-OCT-2013
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	17:37:33
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	PA0929_0_IDS_sb08a.pdf	612886 <small>94f1ad9bd2abf762bf03c2f0f72cd65d24ac83d5</small>	no	4

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IPR2021-00827

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2	Foreign Reference	JP2005_512419.pdf	743349 1a4eeecb7564d686a70bf52a5cc4a47aa2743ef9	no	15
<b>Warnings:</b>					
<b>Information:</b>					
3	Foreign Reference	JP2006_229411.pdf	347430 c00aaa205b12d91dd89673a1a95a82c650d29574	no	19
<b>Warnings:</b>					
<b>Information:</b>					
4	Foreign Reference	JP2009_284298.pdf	601048 3525a0998ff9e2ef6e7111c6b87e93ca7e3d8e70	no	21
<b>Warnings:</b>					
<b>Information:</b>					
5	Non Patent Literature	PA0929_0_Zheng_nonpatent.pdf	438570 1473b4616264f2d1eb3379260bbfb03b3336fec2	no	6
<b>Warnings:</b>					
<b>Information:</b>					
6	Non Patent Literature	PA0929_0_Sugimoto_nonpatent.pdf	290359 d7f9707e834f37ad3992c4056c9b794b5c23886e	no	4
<b>Warnings:</b>					
<b>Information:</b>					
7	Foreign Reference	JP2010_035137.pdf	1522070 d0c11b4210ede9415cc69d557298730a75308934	no	61
<b>Warnings:</b>					
<b>Information:</b>					
8	Foreign Reference	JP2007_288785.pdf	738960 512ccc878cbafa886dcd59de525dc569d6b681dc	no	26
<b>Warnings:</b>					
<b>Information:</b>					
9	Foreign Reference	WO2008_012918.pdf	11377866 d45cf1492e6478be040e9b6e0299bf16a1b254	no	94
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			16672538		

IPR2021-00827



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**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

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**New International Application Filed with the USPTO as a Receiving Office**

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		PA0929-0	

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Examiner Initial*	Cite No	Foreign Document Number <sup>3</sup>	Country Code <sup>2</sup> j	Kind Code <sup>4</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T <sup>5</sup>
	1	2005-512419	JP	A	2005-04-28	Robert BOSCH et al.		<input type="checkbox"/>
	2	2006-229411	JP	A	2006-08-31	MATSUSHITA ELECTRONIC IND CO LTD.		<input type="checkbox"/>
	3	2009-284298	JP	A	2009-12-03	HITACHI LTD.		<input type="checkbox"/>

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13640014	
	Filing Date		2012-10-08	
	First Named Inventor	Jin Ho LEE		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		PA0929-0	

	4	2010-035137	JP	A	2010-02-12	SONY CORP.		<input type="checkbox"/>
	5	2007-288785	JP	A	2007-01-11	SAMSUNG ELECTRONICS CO LTD.		<input type="checkbox"/>
	6	2008-012918	WO	A1	2008-01-31	TOSHIBA CORP.		<input type="checkbox"/>

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>5</sup>
	1	YUNFEI ZHENG et al., Simplified Intra Smoothing, Joint Collaborative Team on Video Coding(JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, October 2010, 3rd Meeting: Guangzhou, CN,	<input type="checkbox"/>
	2	KAZUO SUGIMOTO et al., LUT-based adaptive filtering on intra prediction samples, Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, January 2011, 4th Meeting: Daegu, KR,	<input type="checkbox"/>

If you wish to add additional non-patent literature document citation information please click the Add button **Add**

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Examiner Signature		Date Considered	
--------------------	--	-----------------	--

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13640014
	Filing Date	2012-10-08
	First Named Inventor	Jin Ho LEE
	Art Unit	
	Examiner Name	
	Attorney Docket Number	PA0929-0

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2013-10-23
Name/Print	Woochoon W. Park	Registration Number	55523

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	17211043
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho Lee
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Ryan Whelan
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	23-OCT-2013
<b>Filing Date:</b>	08-OCT-2012
<b>Time Stamp:</b>	17:49:59
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

### Payment information:

Submitted with Payment	no
------------------------	----

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	PA0929_0_IDS_sb08a.pdf	612895 <small>89a2b57d0db6efb21ba9f91195bc7e9b6b56acf7</small>	no	4

### Warnings:

### Information:

IPR2021-00827

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**Total Files Size (in bytes):**

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**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

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Table with 4 columns: APPLICATION NUMBER (13/640,014), FILING OR 371(C) DATE (10/08/2012), FIRST NAMED APPLICANT (Jin Ho Lee), ATTY. DOCKET NO./TITLE (PA0929-0)

CONFIRMATION NO. 2830

PUBLICATION NOTICE

96767
William Park & Associates LTD.
930 N. York Road, Suite 201
Hinsdale, IL 60521



Title:METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER

Publication No.US-2013-0039421-A1
Publication Date:02/14/2013

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101





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Table with 6 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY. DOCKET NO, TOT CLAIMS, IND CLAIMS. Row 1: 13/640,014, 10/08/2012, 635, PA0929-0, 19, 3

CONFIRMATION NO. 2830

96767
William Park & Associates LTD.
930 N. York Road, Suite 201
Hinsdale, IL 60521

FILING RECEIPT



Date Mailed: 11/08/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections

Inventor(s)

- Jin Ho Lee, Daejeon-si, KOREA, REPUBLIC OF;
Hui Yong Kim, Daejeon-si, KOREA, REPUBLIC OF;
Se Yoon Jeong, Daejeon-si, KOREA, REPUBLIC OF;
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Chie Teuk Ahn, Daejeon-si, KOREA, REPUBLIC OF;

Power of Attorney: The patent practitioners associated with Customer Number 96767

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/KR11/02514 04/11/2011

**Foreign Applications** (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)

REPUBLIC OF KOREA 10-2010-0032778 04/09/2010

REPUBLIC OF KOREA 10-2011-0032766 04/08/2011

REPUBLIC OF KOREA 10-2011-0026079 03/23/2011

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

**If Required, Foreign Filing License Granted:** 11/05/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/640,014**

**Projected Publication Date:** 02/14/2013

**Non-Publication Request:** No

**Early Publication Request:** No

**Title**

METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER

**Preliminary Class**

## **PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

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For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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### **Title 37, Code of Federal Regulations, 5.11 & 5.15**

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**PATENT APPLICATION FEE DETERMINATION RECORD**

Substitute for Form PTO-875

Application or Docket Number  
13/640,014

**APPLICATION AS FILED - PART I**

(Column 1) (Column 2)

FOR	NUMBER FILED	NUMBER EXTRA
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A
TOTAL CLAIMS (37 CFR 1.16(j))	19	minus 20 = *
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 = *
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).	
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))		

**SMALL ENTITY**

RATE(\$)	FEE(\$)
N/A	
N/A	
N/A	
TOTAL	

**OR OTHER THAN SMALL ENTITY**

RATE(\$)	FEE(\$)
N/A	390
N/A	630
N/A	250
x 62 =	0.00
x 250 =	0.00
	0.00
	0.00
TOTAL	1270

\* If the difference in column 1 is less than zero, enter "0" in column 2.

**APPLICATION AS AMENDED - PART II**

(Column 1) (Column 2) (Column 3)

AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total (37 CFR 1.16(j))	*	Minus	**	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=
	Application Size Fee (37 CFR 1.16(s))				
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))				

**SMALL ENTITY**

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

**OR OTHER THAN SMALL ENTITY**

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

(Column 1) (Column 2) (Column 3)

AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total (37 CFR 1.16(j))	*	Minus	**	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=
	Application Size Fee (37 CFR 1.16(s))				
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))				

**SMALL ENTITY**

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

**OR OTHER THAN SMALL ENTITY**

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

\*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

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Table with 3 columns: U.S. APPLICATION NUMBER NO. (13/640,014), FIRST NAMED APPLICANT (Jin Ho Lee), ATTY. DOCKET NO. (PA0929-0)

96767
William Park & Associates LTD.
930 N. York Road, Suite 201
Hinsdale, IL 60521

Table with 2 columns: INTERNATIONAL APPLICATION NO. (PCT/KR11/02514), I.A. FILING DATE (04/11/2011), PRIORITY DATE (04/09/2010)

CONFIRMATION NO. 2830
371 ACCEPTANCE LETTER



Date Mailed: 11/08/2012

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as a Designated / Elected Office (37 CFR 1.495), has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

Table with 2 columns: DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS (10/08/2012), DATE OF COMPLETION OF ALL 35 U.S.C. 371 REQUIREMENTS (10/09/2012)

A Filing Receipt (PTO-103X) will be issued for the present application in due course. THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1), (c)(2) and (c)(4) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE. The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363). Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- Copy of the International Application filed on 10/08/2012
• Preliminary Amendments filed on 10/08/2012
• Information Disclosure Statements filed on 10/08/2012
• Oath or Declaration filed on 10/08/2012
• U.S. Basic National Fees filed on 10/08/2012
• Priority Documents filed on 10/08/2012
• Power of Attorney filed on 10/08/2012
• Specification filed on 10/08/2012
• Claims filed on 10/08/2012
• Abstracts filed on 10/08/2012
• Drawings filed on 10/08/2012
• Authorization to Permit Access filed on 10/08/2012

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

DEBORAH D WILLIAMS

---

Telephone: (571) 272-0466

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number			
	Filing Date			
	First Named Inventor	Jin Ho LEE		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		PA0929-0	

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	1	10-2009-0095014	KR	A	2009-09-09	SAMSUNG ELECTRONICS CO., LTD.		<input type="checkbox"/>
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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		
	Filing Date		
	First Named Inventor	Jin Ho LEE	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	PA0929-0	

	4	10-1992-0008629	KR		1992-05-28	VICTOR CO OF JAPAN LTD		<input type="checkbox"/>
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**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**  
( Not for submission under 37 CFR 1.99)

Application Number		
Filing Date		
First Named Inventor	Jin Ho LEE	
Art Unit		
Examiner Name		
Attorney Docket Number	PA0929-0	

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Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Woochoon W. Park/	Date (YYYY-MM-DD)	2012-10-08
Name/Print	Woochoon W. Park	Registration Number	55523

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<b>Application Number:</b>	
<b>Filing Date:</b>	
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho LEE
<b>Filer:</b>	Woochoon William Park/Christopher Cha
<b>Attorney Docket Number:</b>	PA0929-0

Filed as Small Entity

### U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
Basic National Stage Fee	2631	1	195	195
Natl Stage Search Fee - all other cases	2632	1	315	315
Natl Stage Exam Fee - all other cases	2633	1	125	125

**Pages:**

**Claims:**

**Miscellaneous-Filing:**

**Petition:**

**Patent-Appeals-and-Interference:**

IPR2021-00827

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>635</b>

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<b>EFS ID:</b>	13933228
<b>Application Number:</b>	13640014
<b>International Application Number:</b>	PCT/KR11/02514
<b>Confirmation Number:</b>	2830
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER
<b>First Named Inventor/Applicant Name:</b>	Jin Ho LEE
<b>Customer Number:</b>	96767
<b>Filer:</b>	Woochoon William Park/Christopher Cha
<b>Filer Authorized By:</b>	Woochoon William Park
<b>Attorney Docket Number:</b>	PA0929-0
<b>Receipt Date:</b>	08-OCT-2012
<b>Filing Date:</b>	
<b>Time Stamp:</b>	17:49:52
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

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1	Specification	PA0929-0_Specification.pdf	122270 4f8bc29aa9d69622b0a6cb822c4b4c1e95e de019	no	35
<b>Warnings:</b>					
<b>Information:</b>					
2	Drawings-only black and white line drawings	PA0929-0_Drawings.pdf	32556 47b483aca0782e9696f3f5afae33246d7bef 92d7	no	9
<b>Warnings:</b>					
<b>Information:</b>					
3	Application Data Sheet	PA0929-0_US_ADS_sb14.pdf	1031502 baf4252cb83a23923436a217e99f4999604c b142	no	7
<b>Warnings:</b>					
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4	Oath or Declaration filed	PA0929-0_Declaration_POA.pdf	1150481 35f2bea5c24c0cad4f135dd193b2913d55f5 5163	no	8
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5	Request for USPTO to retrieve priority docs	PA0929-0_RFP_sb38.pdf	111057 9a1015272e4f28d63055e3b2cb8f2913a98 8fc78	no	2
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6	Information Disclosure Statement (IDS) Form (SB08)	PA0929-0_IDS_sb08a.pdf	612410 8a5880f942e0721635ecf7b34618d77b329 a9528	no	4
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7	Foreign Reference	KR10-1992-0008629A.pdf	113186 afaf8436f07a660d23095d25116cd1504b5f 4328	no	5
<b>Warnings:</b>					
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8	Foreign Reference	KR10-2005-0090451A.pdf	474363 0e54010d3a60a555583a9e36918d78a6f3ff 229c	no	14
<b>Warnings:</b>					
<b>Information:</b>					

9	Foreign Reference	KR10-2009-0079894A.pdf	977591	no	26
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<b>Information:</b>					
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<b>Information:</b>					
11	Fee Worksheet (SB06)	fee-info.pdf	33050	no	2
			63e9f9561c88954005aceefeda15a692fae9af93		
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**【DESCRIPTION】**

**【Invention Title】**

METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER

**【Technical Field】**

The present invention relates to video coding, and more particularly, to a method and apparatus for performing intra-prediction by applying an adaptive filter to the surrounding pixel values of a block to be predicted or the predicted pixel values of a current block.

**【Background Art】**

With the recent advent of digital TV, etc., technology in the broadcasting TV and home entertainment fields are abruptly being developed. Technology of the fields is being commercialized by the standardization of video compression technology. For video compression, an ITU-T (International Telecommunications Union-Telecommunication) H. 263 standard is being widely used. MPEG-4 which is the next standard of MPEG (Motion Picture Experts Group) is being used for Internet-based video applications.

After the H. 263 standard was completed, ITU-T VCEG (Video Coding Experts Group) has devoted itself to achieve a short-term target for adding additional characteristics to the H. 263 standard and a long-term target for



developing a new standard for visual communication of a low bit rate. In the year of 2001, JVT (Joint Video Team) consisting of the experts of MPEG and VCEG was constructed, and the JVT has performed a standardization task of ITU-T H. 264/MPEG-4 part 10 which is a new standard for the coding of video. The H. 264 standard may also be called AVC (Advanced Video Coding). The technological target of the H. 264/AVC is for the significant improvement of coding efficiency, coding technology robust to loss and error, network-friendly coding technology, low latency capability, accurate match decoding, and so on.

Most of surrounding pixels within video have similar values. The same principle applies to  $4 \times 4$  blocks or  $16 \times 16$  blocks which are a minimum block size of the H. 264/AVC standard. Prediction for the video may be performed using the likeness between inter-block values as described above, and a difference between the video and an original video can be encoded. This is called intra-prediction. The efficiency of video coding can be increased by intra-prediction.

Furthermore, in performs intra-prediction, a filter may be applied before the intra-prediction is performed. In typical cases, when intra-prediction is performed in the H. 264/AVC standard, a filter is applied to reference pixel values, and the values to which the filter has been applied

are used for the intra-prediction. However, the performance of video coding may be increased when the intra-prediction is performed without applying the filter rather than when the intra-prediction is performed after the filter is applied, according to circumstances.

Accordingly, there may be proposed a method of determining whether to apply a filter when performing intra-prediction.

**【Summary of Invention】**

**【Technical Problem】**

An object of the present invention is to provide a method and apparatus for performing intra-prediction by applying an adaptive filter to surrounding pixel values of a block to be predicted or the predicted pixel values of a current block in video encoding. More particularly, after an adaptive filter (i.e., a pre-filter) is applied to reference pixel values of a current block for performing intra-prediction, prediction is performed. Furthermore, a residual signal is calculated after applying an adaptive filter (i.e., a post-filter) to the pixel values of a predicted current block.

**【Technical Solution】**

In an aspect, there is provided a method of performing intra-prediction. The method of performing intra-prediction includes determining whether to apply a first filter to a reference pixel value based on information about

surrounding blocks of a current block, if, as a result of the determination, the first filter is determined to be applied, applying the first filter to the reference pixel values, performing intra-prediction for the current block based on the reference pixel value, determining whether to apply a second filter to a prediction value for each prediction mode of the current block, predicted by performing the intra-prediction based on the information about the surrounding blocks, and if, as a result of the determination, the second filter is determined to be applied, applying the second filter to the prediction values for each prediction mode.

Whether to apply the first filter may be determined based on the prediction mode of the current block determined based on the information about the surrounding blocks.

Whether to apply the first filter may be determined based on the size of the current block.

Whether to apply the first filter may be previously designated based on the prediction mode of the current block and the size of the current block.

Whether to apply the first filter may be determined based on whether the surrounding blocks have been subjected to intra-frame coding or inter-frame coding.

The first filter may be at least any one of a 3-tap filter and a 2-tap

filter.

Whether to apply the second filter may be determined based on the prediction mode of the current block determined based on the information about the surrounding blocks.

Whether to apply the second filter may be determined based on the size of the current block.

Whether to apply the second filter may be determined based on whether the surrounding blocks have been subjected to intra-frame encoding or inter-frame encoding.

The second filter may be applied to prediction values of pixels adjacent to the boundary of the reference pixel value.

The second filter may be at least any one of a 3-tap filter and a 2-tap filter.

In another aspect, there is a provided encoder. The encoder includes a processor and memory connected to the processor and configured to store pieces of information for driving the processor. The processor is configured to determine whether to apply a first filter to a reference pixel value based on information about surrounding blocks of a current block, if, as a result of the determination, the first filter is determined to be applied, apply the first filter to the reference pixel value, perform intra-prediction for the

current block based on the reference pixel value, determine whether to apply a second filter to a prediction value for each prediction mode of the current block, predicted by performing the intra-prediction based on the information about the surrounding blocks, and if, as a result of the determination, the second filter is determined to be applied, apply the second filter to the prediction value for each prediction mode.

In yet another aspect, there is a provided decoder. The decoder includes a processor and memory connected to the processor and configured to store pieces of information for driving the processor. The processor is configured to determine whether to apply a first filter to a reference pixel value based on information about surrounding blocks of a current block, if, as a result of the determination, the first filter is determined to be applied, apply the first filter to the reference pixel value, perform intra-prediction for the current block based on the reference pixel value, determine whether to apply a second filter to a prediction value for each prediction mode of the current block, predicted by performing the intra-prediction based on the information about the surrounding blocks, and if, as a result of the determination, the second filter is determined to be applied, apply the second filter to the prediction value for each prediction mode.

**【Advantageous Effects】**

The performance of coding is improved by effectively predicting a luminance or chrominance signal block to be encoded.

**【Description of Drawings】**

FIG. 1 is a block diagram of an encoder according to the H. 264/AVC (Advanced Video Coding) standard.

FIG. 2 is a block diagram of a decoder according to the H. 264/AVC standard.

FIG. 3 is a diagram showing an example of labeled prediction samples in a  $4 \times 4$  luma prediction mode.

FIG. 4 is a diagram showing 9 kinds of prediction modes within the  $4 \times 4$  luma prediction mode.

FIG. 5 is a diagram showing an example of a method of applying a filter before intra-prediction is performed.

FIG. 6 is a diagram showing an embodiment of a proposed method of performing intra-prediction using an adaptive filter.

FIG. 7 is a diagram showing an example in which a filter is applied to a prediction value according to the proposed method of performing intra-prediction using the adaptive filter.

FIG. 8 is a block diagram of an encoder and a decoder in which the embodiments of the present invention are implemented.

**【Mode for Invention】**

Hereinafter, embodiments of the present invention are described in detail with reference to the accompanying drawings in order for those skilled in the art to be able to readily implement the present invention. However, the present invention may be implemented in various different ways and are not limited to the following embodiments. In order to clarify a description of the present invention, parts not related to the description are omitted, and similar reference numbers are used throughout the drawings to refer to similar parts. Furthermore, a description of parts which can be readily understood by those skilled in the art is omitted.

Furthermore, when it is said that any part "includes (or comprises)" any element, it means that the corresponding part may further include other elements unless otherwise described without excluding the elements.

FIG. 1 is a block diagram of an encoder according to the H. 264/AVC (Advanced Video Coding) standard.

Referring to FIG. 1, the encoder includes two kinds of data flow paths. One of them is a forward path, and the other thereof is a reconstruction path.

First, the forward path is described. Encoding is performed for an input frame  $F_n$  for each macroblock. The macroblock has the size of  $16 \times 16$  pixels in an original video. Intra-prediction or inter-prediction is

performed for each input frame. In the intra-prediction, prediction is performed using a likeness between inter-block values within the frame, and a difference between the original video and a relevant video is encoded. In the inter-prediction, prediction is performed using a likeness between inter-block values between frames, and a difference between the original video and a relevant video is encoded. At the time of the intra-prediction or the inter-prediction, P (i.e., a prediction macroblock) is formed on the basis of the reconstructed frame. At the time of the intra-prediction, the prediction macroblock P may be formed from samples within a previously encoded current frame, a decoded current frame, or a reconstructed current frame  $uF_n'$ . When the prediction macroblock P is formed from the reconstructed current frame, unfiltered samples may be used. At the time of the inter-prediction, the prediction macroblock P may be formed from one or more reference frames through motion compensation or motion prediction. In FIG. 1, it is assumed that the reference frame is a previously encoded frame  $F_{n-1}'$ . However, the present invention is not limited thereto, and each prediction macroblock may be formed from a previous 1 frame or previous 2 frames already encoded or reconstructed, or a subsequent frame or subsequent 2 frames.

P is subtracted from the current macroblock in order to generate a residual or different macroblock  $D_n$ . The macroblock  $D_n$  is transformed (T)



using a block transform and quantized ( $Q$ ), thus generating  $X$ .  $X$  is a set of encoded coefficients. The encoded coefficients are reordered and then subjected to entropy coding. The entropy-coded coefficients form a compressed bit stream, along with information necessary to decode the macroblock. The compressed bit stream is sent to a Network Abstraction Layer (NAL) for transmission or storage.

The reconstruction path is described below. The quantized macroblock coefficients  $X$  are decoded in order to generate a reconstructed frame which is used to encode other macroblocks.  $X$  are inverse quantized ( $Q^{-1}$ ) and then inverse transformed ( $T^{-1}$ ), thus generating a macroblock  $D_n'$ . The difference macroblock  $D_n'$  generated in the reconstruction path is not the same as the difference macroblock  $D_n$  generated in the forward path. Loss is generated because of the quantization, and thus the macroblock  $D_n'$  may have a distorted form of  $D_n$ . The prediction macroblock  $P$  is added to the macroblock  $D_n'$ , and a reconstruction macroblock  $uF_n'$  is generated. The reconstruction macroblock  $uF_n'$  may also have a distorted form of the original macroblock  $F_n$ . In order to reduce blocking distortion for the reconstruction macroblock  $uF_n'$ , a filter may be applied. A reconstructed frame may be formed from a plurality of reconstruction macroblocks to which the filter has been applied.

FIG. 2 is a block diagram of a decoder according to the H. 264/AVC

standard.

Referring to FIG. 2, the decoder receives a compressed bit stream from an NAL. The received data is subjected to entropy decoding in order to generate a set of quantized coefficients  $X$  and then reordered. Inverse quantization and inverse transform are performed for the quantized coefficients  $X$ , thereby generating  $D_n'$ . The decoder generates the same prediction macroblock  $P$  as a prediction macroblock, generated at an encoder, using header information decoded from the bit stream.  $uF_n'$  is generated by adding  $D_n'$  to  $P$ , and  $uF_n'$  may experience a filter, thereby generating a decoded macroblock  $F_n'$ .

Intra-prediction is described below.

When the intra-prediction is performed for a block (or a macroblock), a prediction block (or a macroblock)  $P$  may be formed on the basis of encoded blocks (or macroblocks) or reconstructed blocks (or macroblocks).  $P$  is subtracted from an original video, and a difference from which  $P$  has been subtracted is encoded and then transmitted. The intra-prediction may be performed according to a luma prediction mode or a chroma prediction mode. In the luma prediction mode, the intra-prediction may be performed in the unit of a  $4 \times 4$  sub-block size or a  $16 \times 16$  macroblock size. A total of 9 additional prediction modes exist in the  $4 \times 4$  luma prediction mode, and a

total of 4 additional prediction modes exist in the  $16 \times 16$  luma prediction mode. The unit in which the intra-prediction is performed is not limited to the sub-block or the macroblock, but may be performed using various sizes as the unit. The unit of a pixel in which the intra-prediction is performed may be called a Coding Unit (CU) or a Prediction Unit (PU). The size of the CU or the PU may be the same as the size of a sub-block or a macroblock as described above.

FIG. 3 is a diagram showing an example of labeled prediction samples in the  $4 \times 4$  luma prediction mode. Referring to FIG. 3, a prediction block P is A to H or I to L and is calculated on the basis of labeled samples.

FIG. 4 is a diagram showing 9 kinds of prediction modes within the  $4 \times 4$  luma prediction mode.

An encoder may select any one of the 9 prediction modes for each block in order to minimize a difference between a prediction block P and a block to be encoded. The 9 prediction modes are as follows.

1) mode 0 (vertical): A to D which are upper samples of the prediction block are vertically extrapolated.

2) mode 1 (horizontal): I to L which are left samples of the prediction block are horizontally extrapolated.

3) mode 2 (DC); all the samples A to D and I to L within the prediction

block P are predicted by average.

4) mode 3 (diagonal down-left): samples within the prediction block P are interpolated at an angle of  $45^\circ$  between a left down and a right up.

5) mode 4 (diagonal down-right): samples within the prediction block P are extrapolated right downward at an angle of  $45^\circ$ .

6) mode 5 (vertical-right): samples within the prediction block P are extrapolated or interpolated to the right at an angle of about  $26.6^\circ$  in a vertical axis.

7) mode 6 (horizontal-down): samples within the prediction block P are extrapolated downward at an angle of about  $26.6^\circ$  in a horizontal axis.

8) mode 7 (vertical-left): samples within the prediction block P are extrapolated to the left at an angle of about  $26.6^\circ$  in the vertical axis.

9) mode 8 (horizontal-up): samples within the prediction block P are interpolated upward at an angle of about  $26.6^\circ$  in the horizontal axis.

In FIG. 4, the arrow indicates a direction in which prediction is performed within each mode. Meanwhile, in relation to the mode 3 to the mode 8, the samples within the prediction block P are formed from a weighted average of the prediction samples A to H or I to L. For example, in the mode 4, a sample d placed on the right upper side of the prediction block P may be predicted as  $\text{round}(B/4+C/2+D/4)$ . The encoder calculates the Sum of Absolute

Errors (SAE) for a prediction block generated by each of the prediction modes and performs intra-prediction based on the prediction mode having the smallest SAE.

FIG. 5 is a diagram showing an example of a method of applying a filter before intra-prediction is performed.

In general, a filter is applied to samples used in the H. 264/AVC standard, and intra-prediction is then performed. The samples may also be called reference pixel values. In the example of FIG. 5, it is assumed that a filter is a low-pass filter and is applied to only an 8×8 block.

Equation 1 is an example of Equation showing a 3-tap filter applied to a reference pixel value.

<Equation 1>

$$h[Z] = (A + 2 \times Z + Q) / 4$$

$$h[A] = (Z + 2 \times A + B) / 4$$

...

$$h[P] = (O + 3 \times P) / 4$$

$$h[Q] = (Z + 2 \times Q + R) / 4$$

...

$$h[X] = (W + 3 \times X) / 4$$

$h[Z]$  indicates a value calculated by applying the filter to  $Z$ .

Referring to Equation 1, filtering for the reference pixel value is performed by applying filter coefficients (1,2,1), and intra-prediction according to the 9 prediction modes is performed on the basis of reference pixel values  $h[A] \sim h[Z]$  that has been filtered. Like in the encoding process, the filter may be applied even in a decoding process.

In performing filtering before intra-prediction is performed, the performance of encoding may be improved when the filtering is not performed. Accordingly, a method of performing intra-prediction by adaptively applying the filter may be proposed.

FIG. 6 is a diagram showing an embodiment of the proposed method of performing intra-prediction using an adaptive filter.

Referring to FIG. 6, at step S201, an encoder determines whether to apply the adaptive filter to a reference pixel value. When determining whether to apply the adaptive filter, the encoder may determine whether to apply the adaptive filter on the basis of information about a surrounding block or according to a Rate-Distortion Optimization (RDO) method.

When determining whether to apply the adaptive filter to the reference pixel value based on the information about a surrounding block, a prediction mode of a current block may be determined based on prediction mode information (i.e., a Most Probable Mode (MPM) about the surrounding block,

and whether to apply the adaptive filter to the reference pixel value may be determined according to the determined prediction mode of the current block. For example, assuming that a current block is 'C' , an upper block is 'A' , and a left block is 'B' , when a prediction mode of the current block is the same as a prediction mode of the upper block 'A' , the prediction mode of the upper block 'A' may be determined as the prediction mode of the current block. When the prediction mode of the current block is the same as a prediction mode of the left block 'B' , the prediction mode of the left block 'B' may be determined as the prediction mode of the current block. Alternatively, when the prediction mode of the current block is a prediction mode other than the prediction mode of the upper block 'A' or the prediction mode of the left block 'B' , a relevant prediction mode is encoded and transmitted. Whether to apply the adaptive filter to the reference pixel value may be determined according to the prediction mode of the current block determined as described above. Even when the current block, the upper block, and the left block have different sizes, the prediction mode of a current block may be determined based on the prediction mode of a surrounding block.

Alternatively, in determining whether to apply the adaptive filter to the reference pixel value based on the information about a surrounding block,

whether to apply the adaptive filter may be determined on the basis of a shift in the surrounding reference pixel value. For example, assuming that a reference pixel value to which the filter will be applied is  $p[n]$ , a difference between  $p[n-1]$  and  $p[n+1]$  (i.e., surrounding reference pixel values) may be calculated, and whether to apply the filter may be determined by comparing the difference with a specific threshold.

Alternatively, whether to apply the filter to the reference pixel value may be determined based on the size of a current block other than a prediction mode of the current block. Here, whether to apply the filter is previously designated based on the prediction mode of the current block and the size of the current block, and whether to apply the filter is adaptively determined according to the relevant prediction mode or the relevant size.

Table 1 indicates whether to apply the filter according to the prediction mode of a current block and the size of the current block.

**【Table 1】**

PREDICTION MODE OF CURRENT BLOCK	SIZE OF CURRENT BLOCK			
	4×4	8×8	16×16	32×32
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	1	1	1	1
4	0	1	1	1
...	...	...	...	...

Referring to Table 1, '0' indicates that the filter is not applied, and '1' indicates that the filter is applied. For example, when the size



of the current block is  $4 \times 4$ , if the prediction mode of the current block is 1, the filter may not be applied. If the prediction mode of the current block is 3, the filter may be applied.

Furthermore, whether to apply the filter to the reference pixel value may be determined according to whether surrounding blocks have been subjected to intra-frame encoding or inter-frame encoding. For example, when constrained intra-prediction is performed, a value subjected to the inter-frame encoding is filled with the value of a surrounding block subjected to intra-frame encoding when the surrounding block is subjected to the inter-frame encoding. Here, filter may not be applied.

If, as a result of the determination, the filter is determined to be applied to the reference pixel value, the encoder applies the filter to the reference pixel value at step S202. The applied filter may be a common filter. For example, the 3-tap filter of Equation 1 may be used, or a 2-tap filter may be used. When the 2-tap filter is used, various filter coefficients, such as  $(1/8, 7/8)$ ,  $(2/8, 6/8)$ , and  $(3/8, 5/8)$ , may be used. The reference pixel value to which the filter has been applied may be used when the filter is applied to other reference pixel values. Furthermore, when the filter is applied to the reference pixel value, the filter may be applied to all reference pixel values or only some of the reference pixel

values.

At step S203, the encoder performs intra-prediction on the basis of the reference pixel value to which the filter has been applied or to which the filter has not been applied.

At step S204, the encoder determines whether to apply the filter to a prediction value for each prediction mode, predicted by performing the intra-prediction, in order to encode a current block. Here, each prediction mode may be each of the 9 prediction modes in the  $4 \times 4$  luma prediction mode. When determining whether to apply the filter to a prediction value for each prediction mode, whether to apply the filter may be determined based on information about a surrounding block or according to the RDO method.

When determining whether to apply the filter to the prediction value based on the information about a surrounding block, a prediction mode of the current block may be determined based on prediction mode information (MPM) about the surrounding block, and whether to apply the filter to the prediction value may be determined based on the determined prediction mode of the current block. For example, assuming that a current block is 'C', an upper block is 'A', and a left block is 'B', when a prediction mode of the current block is the same as a prediction mode of the upper block 'A', the prediction mode of the upper block 'A' may be determined as the

prediction mode of the current block. When the prediction mode of the current block is same as a prediction mode of the left block 'B', the prediction mode of the left block 'B' may be determined as the prediction mode of the current block. Alternatively, when the prediction mode of the current block is a prediction mode other than the prediction mode of the upper block 'A' or the prediction mode of the left block 'B', a relevant prediction mode is encoded and transmitted. Here, when the prediction mode of the current block is a specific prediction mode (DC or planar), a difference between a reference pixel value and a prediction value may be relatively greater than that of other prediction modes. For example, a difference between a reference pixel value and a prediction value in the planar prediction mode may be relatively greater than that of other prediction modes. The prediction value in the planar prediction mode may be calculated by averaging a first prediction value, obtained by horizontally performing linear interpolation for each row, and a second prediction value obtained by vertically performing linear interpolation for each column. When the linear interpolation is horizontally performed, a right value is the same as a value placed at a right upward position (i.e., D in FIG. 3), from among the reference pixel values. When the linear interpolation is vertically performed, a downward value is the same as a value placed at a left downward

position (i.e., L in FIG. 3), from among the reference pixel values. Since the prediction value is not directly obtained from the reference pixel value, a difference between the reference pixel value and the prediction value may be relatively great. In this case, intra-prediction efficiency may be increased by applying the filter to the prediction value. Whether to apply the filter to the prediction value may be determined according to the prediction mode of the current block determined as described above. Even when a current block, an upper block, and a left block have different sizes, a prediction mode of the current block may be determined according to the prediction mode of a surrounding block.

Alternatively, whether to apply the filter to the prediction value may be determined according to the size of a current block besides the prediction mode of a current block. Here, whether to apply the filter according to the prediction mode of the current block and the size of the current block is previously designated, and whether to apply the filter is adaptively determined according to the relevant prediction mode or the relevant size. Alternatively, whether to apply the filter to the prediction value may be determined according to whether surrounding blocks have been subjected to intra-frame encoding or inter-frame encoding.

If, as a result of the determination, the filter is determined to have

been applied to the prediction value, the encoder applies the filter to the prediction value at step S205. Accordingly, the prediction of the current block is completed, and the encoder calculates a residual signal and performs entropy coding.

FIG. 7 is a diagram showing an example in which the filter is applied to the prediction value according to the proposed method of performing intra-prediction using the adaptive filter.

Referring to FIG. 7, in the case where the prediction mode of a current block is a non-directional mode, a difference between a reference pixel value and a prediction value may become relatively greater than that of other prediction modes. Accordingly, the filter may be applied to only the prediction values of pixels adjacent to the boundary with surrounding restored reference pixel values. For example, filtering may be performed for prediction values corresponding to a1~a8, and b1, c1, d1, e1, f1, g1, and h1 corresponding to the pixels of one line which is placed at the boundary in FIG. 7. Alternatively, filtering may be performed for prediction values corresponding to a1~a8, b1~b8, and c1~c2, d1~d2, e1~e2, f1~f2, g1~g2, and h1~h2 corresponding to the pixels of two lines which are placed at the boundary in FIG. 7. Here, the applied filter may be a common filter. For example, the 3-tap filter of Equation 1 may be used or a 2-tap filter may be

used. When the 2-tap filter is used, various filter coefficients, such as (1/8, 7/8), (2/8, 6/8), and (3/8, 5/8), may be used. Alternatively, any one of the 2-tap filter and the 3-tap filter may be selected and used according to the positions of pixels.

In the case where the prediction mode of a current block is a prediction mode using the reference pixel values corresponding to A~P as in the mode 0, the mode 3, or the mode 7 in this way, the filter may be applied to prediction values which correspond to a1~a8 having a relatively great difference between the reference pixel value and the prediction value. Furthermore, in the case where the prediction mode of a current block is a prediction mode using the reference pixel values corresponding to Q~X as in the mode 1 or the mode 8, the filter may be applied to prediction values which correspond to a1, b1, c1, d1, e1, f1, g1, and h1 having a relatively great difference between the reference pixel value and the prediction value

Equation 2 is an example of Equation, indicating the filter applied to prediction values when the 2-tap filter or the 3-tap filter is selected and used according to the positions of pixels.

<Equation 2>

$$f[a1] = (2 \times A + 4 \times a1 + 2 \times Q) / 8$$

$$f[b1] = (2 \times B + 6 \times b1) / 8$$

$$f[c1] = (2 \times C + 6 \times c1) / 8$$

...

$$f[a2] = (2 \times R + 6 \times a2) / 8$$

$$f[a3] = (2 \times S + 6 \times a3) / 8$$

...

In Equation 2,  $f[a1]$  is a value in which the filter is applied to the prediction value  $a1$ , and  $A$  and  $Q$  indicate the reference pixel values. From Equation 2, it can be seen that the 3-tap filter is applied to the prediction value of a pixel where the prediction value  $a1$  is placed, and the 2-tap filter is applied to the prediction values of remaining pixels.

Equation 3 is another example of Equation, indicating the filter applied to prediction values when the filter is applied to the prediction values according to the proposed method of performing intra-prediction using the adaptive filter.

<Equation 3>

1. Vertical low-pass filter

$$v[a1] = (A + 2 \times a1 + a2) / 4$$

$$v[a2] = (v[a1] + 2 \times a2 + a3) / 4$$

...

$$v[a8] = (v[a7] + 3 \times a8) / 4$$

$$v[b1] = (B + 2 \times b1 + b2)/4$$

...

2. Horizontal low-pass filter

$$h[a1] = (Q + 2 \times v[a1] + v[b1])/4$$

$$h[b1] = (h[a1] + 2 \times v[b1] + v[c1])/4$$

...

$$h[h1] = (h[g1] + 3 \times v[h1])/4$$

$$h[a2] = (R + 2 \times v[a2] + v[b2])/4$$

...

In Equation 3, the filter may be used when the adaptive filter is applied according to the method using information about surrounding blocks or the RDO method for each of the prediction modes. Referring to Equation 3, a low-pass filter having filter coefficients (1, 2, 1) is sequentially applied to two vertical and horizontal directions. First, the filter is applied to the vertical direction, and the filter is applied to the horizontal direction based on a prediction value to which the filter has been applied. The prediction value to which the filter has been applied may be used when the filter is applied to other prediction values.

Meanwhile, when the RDO method is used, the method of performing intra-prediction described with reference to FIG. 6 may be repeatedly performed.



FIG. 8 is a block diagram of an encoder and a decoder in which the embodiments of the present invention are implemented.

The encoder 800 includes a processor 810 and memory 820. The processor 810 implements the proposed functions, processes, and/or methods. The processor 810 is configured to determine whether to apply a first filter to reference pixel values based on information about surrounding blocks of a current block, apply the first filter to the reference pixel values if, as a result of the determination, the first filter is determined to be applied, perform intra-prediction for the current block on the basis of the reference pixel values, determine whether to apply a second filter to a prediction value for each prediction mode of the current block which has been predicted by performing the intra-prediction based on the information about surrounding blocks, and apply the second filter to the prediction value for each prediction mode of the current block if, as a result of the determination, the second filter is determined to be applied. The memory 820 is connected to the processor 810 and is configured to store various pieces of information for driving the processor 810.

The decoder 900 includes a processor 910 and memory 920. The processor 910 implements the proposed functions, processes, and/or methods. The processor 910 is configured to determine whether to apply a first filter to

reference pixel values based on information about surrounding blocks of a current block, apply the first filter to the reference pixel values if, as a result of the determination, the first filter is determined to be applied, perform intra-prediction for the current block on the basis of the reference pixel values, determine whether to apply a second filter to a prediction value for each prediction mode of the current block which has been predicted by performing the intra-prediction based on the information about surrounding blocks, and apply the second filter to the prediction value for each prediction mode of the current block if, as a result of the determination, the second filter is determined to be applied. The memory 920 is connected to the processor 910 and is configured to store various pieces of information for driving the processor 910.

The processor 810, 910 may include Application-Specific Integrated Circuits (ASICs), other chipsets, logic circuits, and/or data processors. The memory 820, 920 may include Read-Only Memory (ROM), Random Access Memory (RAM), flash memory, a memory card, a storage medium, and/or other storage devices. When the above embodiments are implemented in software, the above schemes may be implemented using a module (or a process or function) for performing the above functions. The module may be stored in the memory 820, 920 and may be executed by the processor 810, 910. The memory 820, 920 may

be internal or external to the processor 810, 910 and may be coupled to the processor 810, 910 using a variety of well-known means.

In the above-described exemplary systems, although the methods have been described on the basis of the flowcharts using a series of steps or blocks, the present invention is not limited to the sequence of the steps, and some of the steps may be performed at different sequences from the remaining steps or may be performed simultaneously with the remaining steps. Furthermore, those skilled in the art will understand that the steps shown in the flowcharts are not exclusive and other steps may be included or one or more steps of the flowcharts may be deleted without affecting the scope of the present invention.

The above-described embodiments include various aspects of illustrations. Although all kinds of possible combinations for representing the various aspects may not be described, a person having ordinary skill in the art will understand that other possible combinations are possible. Accordingly, the present invention may be said to include all other replacements, modifications, and changes belonging to the accompanying claims.

**【CLAIMS】**

**【Claim 1】**

A method of performing intra-prediction, comprising:

determining whether to apply a first filter to a reference pixel value based on information about surrounding blocks of a current block;

if, as a result of the determination, the first filter is determined to be applied, applying the first filter to the reference pixel value;

performing intra-prediction for the current block based on the reference pixel value;

determining whether to apply a second filter to a prediction value for each prediction mode of the current block, predicted by performing the intra-prediction based on the information about the surrounding blocks; and

if, as a result of the determination, the second filter is determined to be applied, applying the second filter to the prediction value for each prediction mode.

**【Claim 2】**

The method of claim 1, wherein whether to apply the first filter is determined based on the prediction mode of the current block determined based on the information about the surrounding blocks.

**【Claim 3】**

The method of claim 2, wherein whether to apply the first filter is determined based on a size of the current block.

**【Claim 4】**

The method of claim 3, wherein whether to apply the first filter is previously designated based on the prediction mode of the current block and the size of the current block.

**【Claim 5】**

The method of claim 1, wherein whether to apply the first filter is determined based on whether the surrounding blocks have been subjected to intra-frame encoding or inter-frame encoding.

**【Claim 6】**

The method of claim 1, wherein the first filter is at least any one of a 3-tap filter and a 2-tap filter.

**【Claim 7】**

The method of claim 1, wherein whether to apply the second filter is determined based on the prediction mode of the current block determined based on the information about the surrounding blocks.

**【Claim 8】**

The method of claim 7, wherein whether to apply the second filter is determined based on a size of the current block.

**【Claim 9】**

The method of claim 1, wherein whether to apply the second filter is determined based on whether the surrounding blocks have been subjected to intra-frame encoding or inter-frame encoding.

**【Claim 10】**

The method of claim 1, wherein the second filter is applied to prediction values of pixels adjacent to a boundary of the reference pixel value.

**【Claim 11】**

The method of claim 1, wherein the second filter is at least any one of a 3-tap filter and a 2-tap filter.

**【Claim 12】**

An encoder, comprising:  
a processor; and  
memory connected to the processor and configured to store pieces of information for driving the processor,  
wherein the processor is configured to:  
determine whether to apply a first filter to a reference pixel value based on information about surrounding blocks of a current block;  
if, as a result of the determination, the first filter is determined to

be applied, apply the first filter to the reference pixel value;

perform intra-prediction for the current block based on the reference pixel value;

determine whether to apply a second filter to a prediction value for each prediction mode of the current block, predicted by performing the intra-prediction based on the information about the surrounding blocks; and

if, as a result of the determination, the second filter is determined to be applied, apply the second filter to the prediction value for each prediction mode.

**【Claim 13】**

The encoder of claim 12, wherein whether to apply the first filter is determined based on the prediction mode of the current block determined based on the information about the surrounding blocks.

**【Claim 14】**

The encoder of claim 13, wherein whether to apply the first filter is determined based on a size of the current block.

**【Claim 15】**

The encoder of claim 14, wherein whether to apply the first filter is previously designated based on the prediction mode of the current block and the size of the current block.

**【Claim 16】**

A decoder, comprising:

- a processor; and
- memory connected to the processor and configured to store pieces of information for driving the processor,

wherein the processor is configured to:

- determine whether to apply a first filter to a reference pixel value based on information about surrounding blocks of a current block;
- if, as a result of the determination, the first filter is determined to be applied, apply the first filter to the reference pixel value;
- perform intra-prediction for the current block based on the reference pixel value;
- determine whether to apply a second filter to a prediction value for each prediction mode of the current block, predicted by performing the intra-prediction based on the information about the surrounding blocks; and
- if, as a result of the determination, the second filter is determined to be applied, apply the second filter to the prediction value for each prediction mode.

**【Claim 17】**

The decoder of claim 16, wherein whether to apply the first filter is



determined based on the prediction mode of the current block determined based on the information about the surrounding blocks.

**【Claim 18】**

The decoder of claim 17, wherein whether to apply the first filter is determined based on a size of the current block.

**【Claim 19】**

The decoder of claim 18, wherein whether to apply the first filter is previously designated based on the prediction mode of the current block and the size of the current block.

**【ABSTRACT】**

Provided is a method and apparatus for performing intra-prediction using an adaptive filter. The method for performing intra-prediction comprises the steps of: determining whether or not to apply a first filter for a reference pixel value on the basis of information of a neighboring block of a current block; applying the first filter for the reference pixel value when it is determined to apply the first filter; performing intra-prediction on the current block on the basis of the reference pixel value; determining whether or not to apply a second filter for a prediction value according to each prediction mode of the current block, which is predicted by the intra-prediction performance on the basis of the information of the neighboring block; and applying the second filter for the prediction value according to each prediction mode of the current block when it is determined to apply the second filter.

FIG. 1

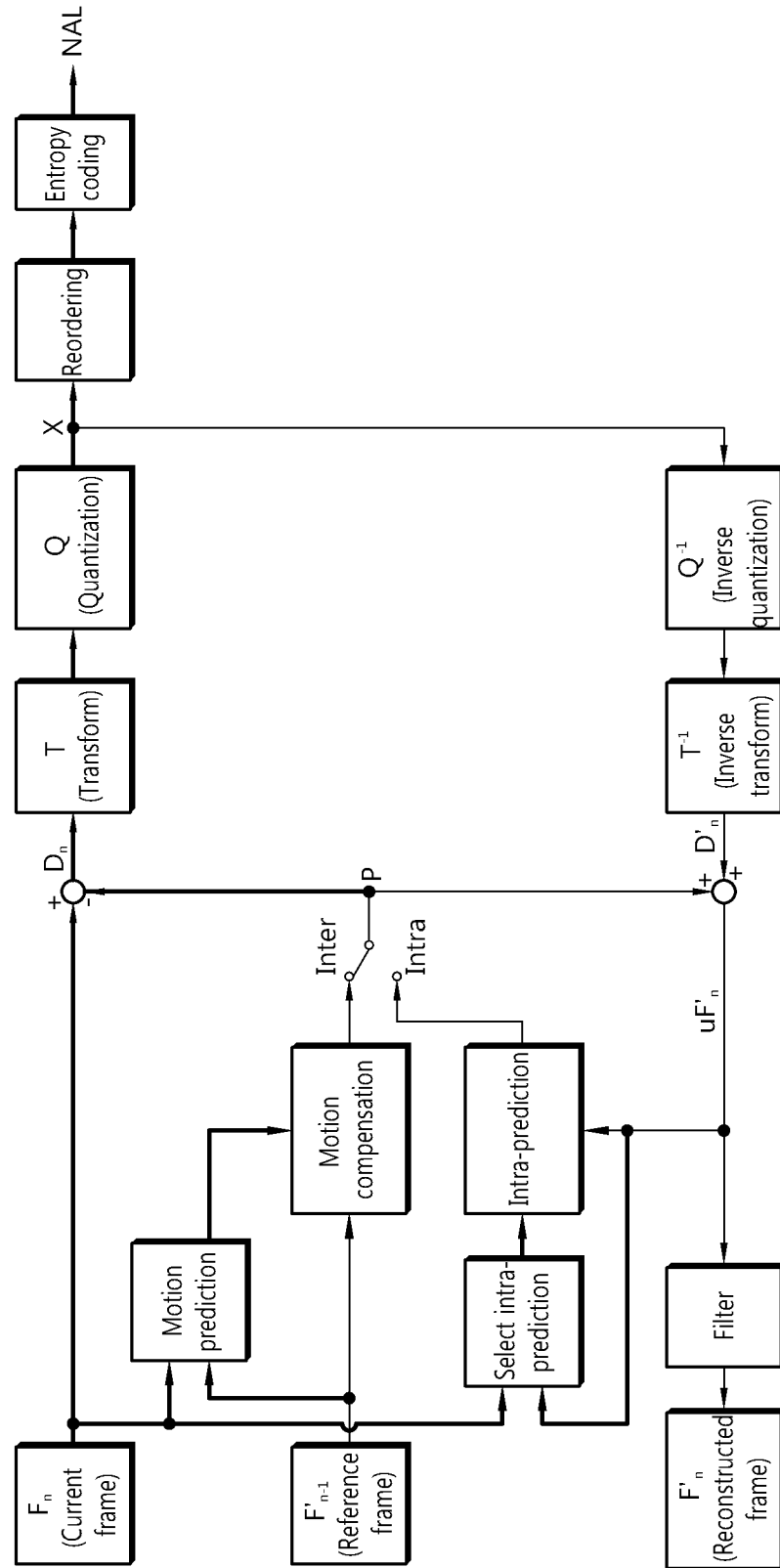


FIG. 2

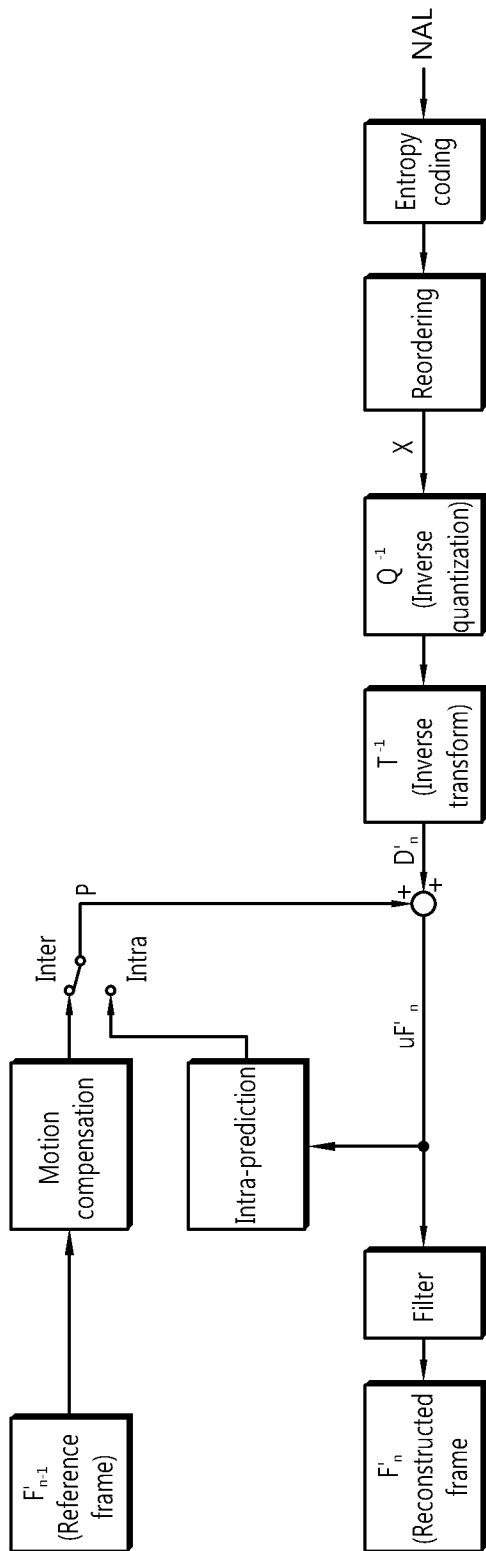


FIG. 3

M	A	B	C	D	E	F	G	H
I	a	b	c	d				
J	e	f	g	h				
K	i	j	k	l				
L	m	n	o	p				

FIG. 4

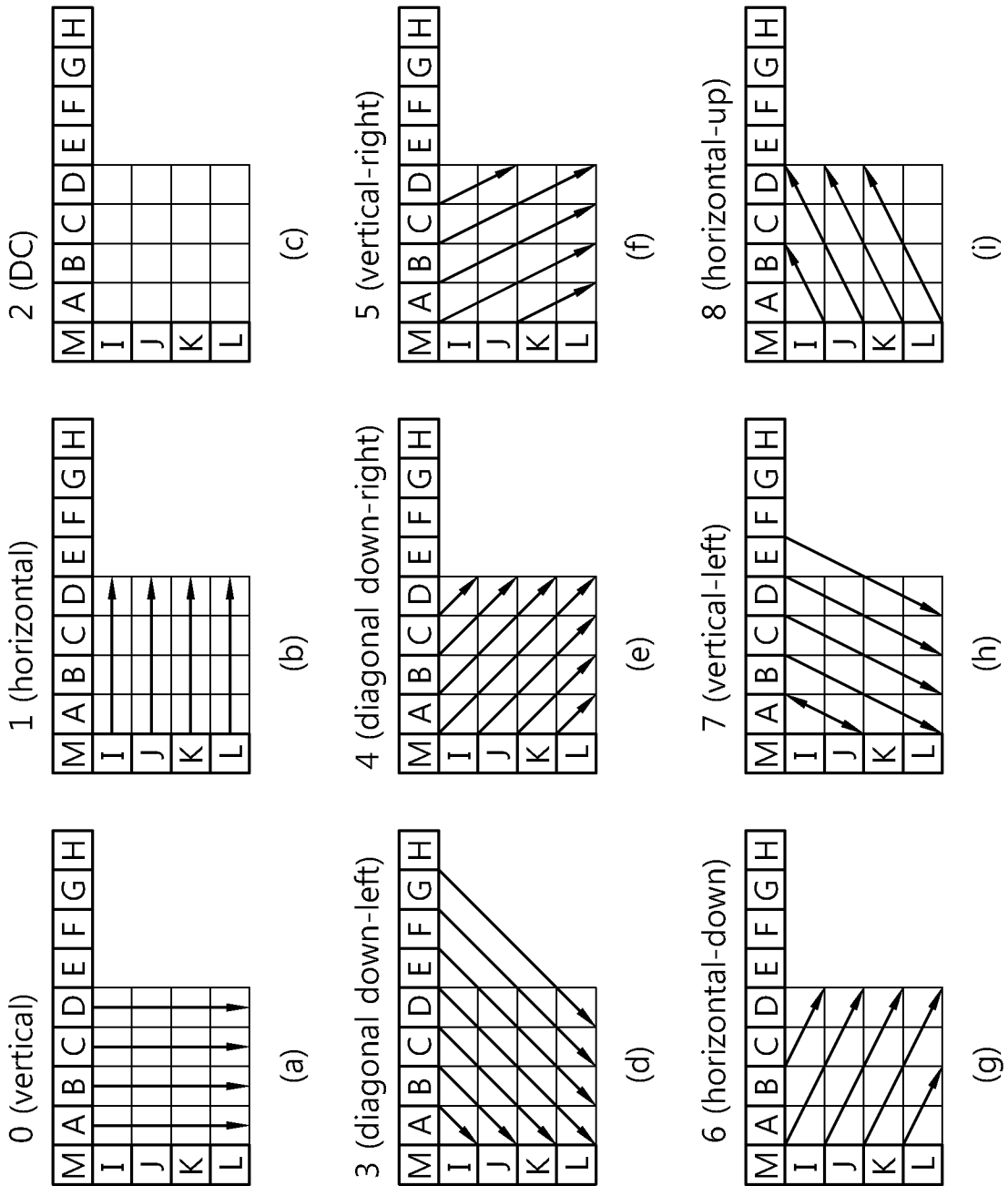


FIG. 5

Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Q																
R																
S																
T																
U																
V																
W																
X																

FIG. 6

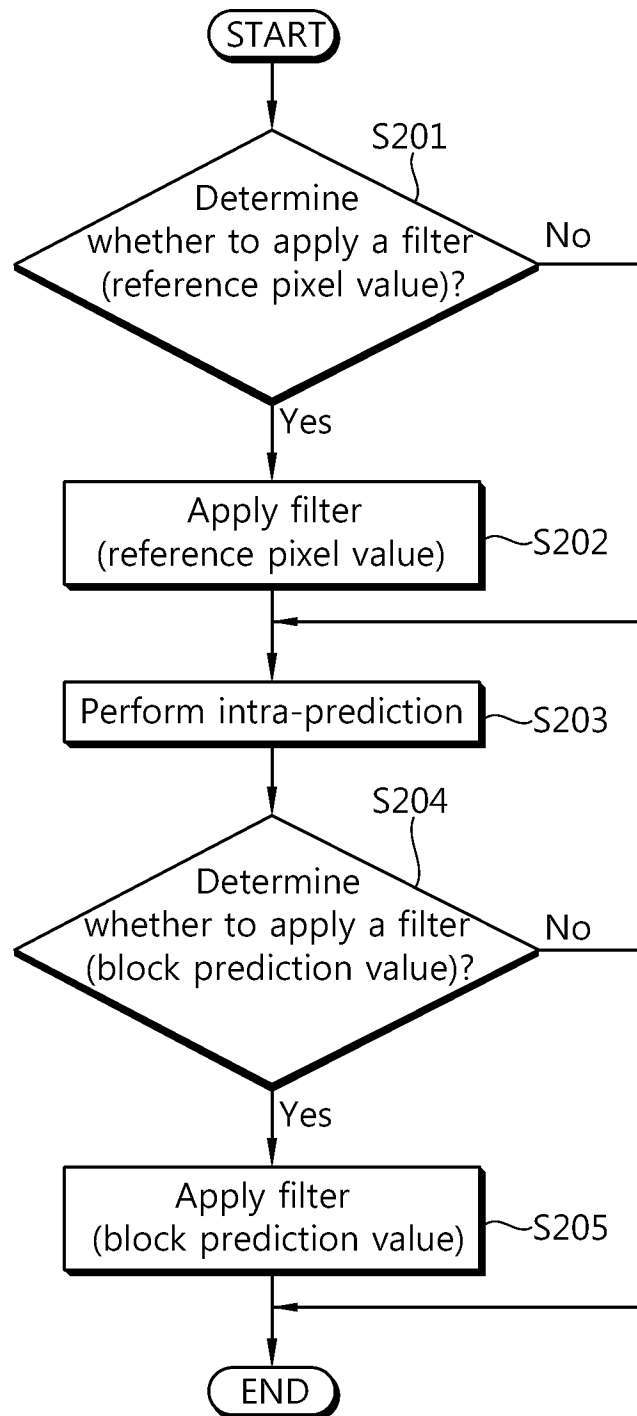




FIG. 7

Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Q	a1	b1	c1	d1	e1	f1	g1	h1								
R	a2	b2	c2	d2	e2	f2	g2	h2								
S	a3	b3	...	...	...	...	...	...								
T	a4	b4	...	...	...	...	...	...								
U	a5	b5	...	...	...	...	...	...								
V	a6	b6	...	...	...	f6	g6	h6								
W	a7	b7	...	...	...	f7	g7	h7								
X	a8	b8	...	...	...	f8	g8	h8								

FIG. 8

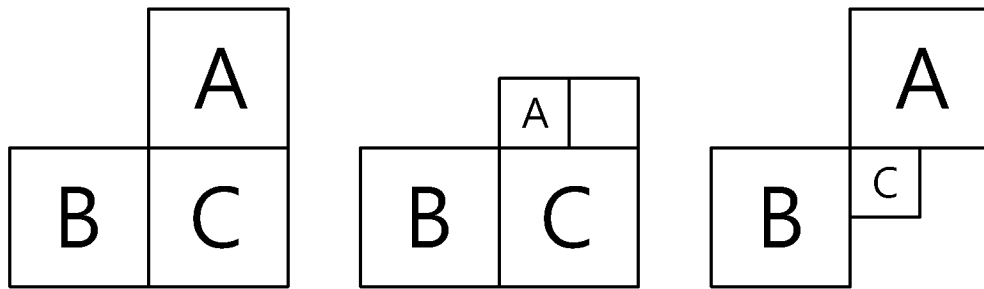
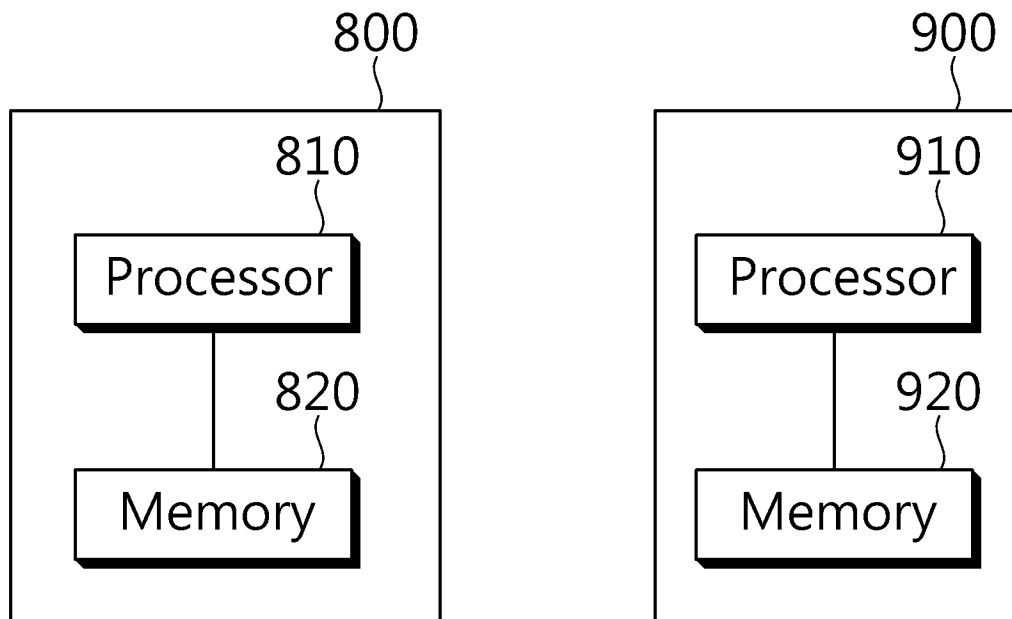


FIG. 9



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<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	PA0929-0
		Application Number	
Title of Invention	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER		
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<b>Mailing Address of Applicant:</b>					
<b>Address 1</b>		601-201 Yeolmaemaoul Apt., Jijok-dong, Yuseong-gu			
<b>Address 2</b>					
<b>City</b>	Daejeon-si	<b>State/Province</b>			
<b>Postal Code</b>		<b>Country<sup>i</sup></b>	KR		
<b>Applicant 3</b>					<input type="button" value="Remove"/>
<b>Applicant Authority</b> <input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117		<input type="radio"/> Party of Interest under 35 U.S.C. 118	
<b>Prefix</b>	<b>Given Name</b>	<b>Middle Name</b>	<b>Family Name</b>	<b>Suffix</b>	
	Se Yoon		JEONG		
<b>Residence Information (Select One)</b> <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
<b>City</b>	Daejeon-si	<b>Country Of Residence<sup>i</sup></b>	KR		

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<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	PA0929-0	
		Application Number		
Title of Invention	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER			
Citizenship under 37 CFR 1.41(b) i	KR			
<b>Mailing Address of Applicant:</b>				
Address 1	101-1203 Geumseong Baekjo Apt., Birae-dong,			
Address 2	Daedeok-gu			
City	Daejeon-si	State/Province		
Postal Code		Country <sup>i</sup>	KR	
<b>Applicant 4</b>				<a href="#">Remove</a>
Applicant Authority	<input checked="" type="radio"/> Inventor	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix
	Suk Hee		CHO	
<b>Residence Information (Select One)</b> <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Daejeon-si	Country Of Residence <sup>i</sup>	KR	
Citizenship under 37 CFR 1.41(b) i	KR			
<b>Mailing Address of Applicant:</b>				
Address 1	103-802 Humansia Apt., Bongsan-dong, Yuseong-gu			
Address 2				
City	Daejeon-si	State/Province		
Postal Code		Country <sup>i</sup>	KR	
<b>Applicant 5</b>				<a href="#">Remove</a>
Applicant Authority	<input checked="" type="radio"/> Inventor	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix
	Ha Hyun		LEE	
<b>Residence Information (Select One)</b> <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Seoul	Country Of Residence <sup>i</sup>	KR	
Citizenship under 37 CFR 1.41(b) i	KR			
<b>Mailing Address of Applicant:</b>				
Address 1	136-5 Myeonmok 2-dong, Jungnang-gu			
Address 2				
City	Seoul	State/Province		
Postal Code		Country <sup>i</sup>	KR	
<b>Applicant 6</b>				<a href="#">Remove</a>
Applicant Authority	<input checked="" type="radio"/> Inventor	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix
	Jong Ho		KIM	
<b>Residence Information (Select One)</b> <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Daejeon-si	Country Of Residence <sup>i</sup>	KR	
Citizenship under 37 CFR 1.41(b) i	KR			

IPR2021-00827

Unified EX1012 Page 357

<b>Application Data Sheet 37 CFR 1.76</b>	Attorney Docket Number	PA0929-0
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER	

<b>Mailing Address of Applicant:</b>				
Address 1	Rm. 205 Finehouse, 146-8 Sinseong-dong,			
Address 2	Yuseong-gu			
City	Daejeon-si	State/Province		
Postal Code		Country <sup>i</sup>	KR	
Applicant <sup>7</sup>				<a href="#">Remove</a>
Applicant Authority	<input checked="" type="radio"/> Inventor	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix
	Sung Chang		LIM	
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Daejeon-si	Country Of Residence <sup>i</sup>	KR	
Citizenship under 37 CFR 1.41(b) <sup>i</sup>		KR		

<b>Mailing Address of Applicant:</b>				
Address 1	Rm. 201 Sejongvilla, 254-8 Sinseong-dong,			
Address 2	Yuseong-gu			
City	Daejeon-si	State/Province		
Postal Code		Country <sup>i</sup>	KR	
Applicant <sup>8</sup>				<a href="#">Remove</a>
Applicant Authority	<input checked="" type="radio"/> Inventor	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix
	Jin Soo		CHOI	
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Daejeon-si	Country Of Residence <sup>i</sup>	KR	
Citizenship under 37 CFR 1.41(b) <sup>i</sup>		KR		

<b>Mailing Address of Applicant:</b>				
Address 1	609-1605 Banseokmaeul 6 Danji Apt., 613			
Address 2	Banseok-dong, Yuseong-gu			
City	Daejeon-si	State/Province		
Postal Code		Country <sup>i</sup>		
Applicant <sup>9</sup>				<a href="#">Remove</a>
Applicant Authority	<input checked="" type="radio"/> Inventor	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix
	Jin Woong		KIM	
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Daejeon-si	Country Of Residence <sup>i</sup>	KR	
Citizenship under 37 CFR 1.41(b) <sup>i</sup>		KR		

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	PA0929-0
		Application Number	
Title of Invention	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER		

<b>Mailing Address of Applicant:</b>				
Address 1	305-1603 Expo Apt., Jeonmin-dong, Yuseong-gu			
Address 2				
City	Daejeon-si	State/Province		
Postal Code		Country <sup>i</sup>	KR	
Applicant 10				Remove
Applicant Authority	<input checked="" type="radio"/> Inventor	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix
	Chie Teuk		AHN	
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Daejeon-si	Country Of Residence <sup>i</sup>	KR	
Citizenship under 37 CFR 1.41(b) <sup>i</sup>		KR		
<b>Mailing Address of Applicant:</b>				
Address 1	2-504 KAIST Apt., Doryong-dong, Yuseong-gu			
Address 2				
City	Daejeon-si	State/Province		
Postal Code		Country <sup>i</sup>	KR	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.				Add

**Correspondence Information:**

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
<input type="checkbox"/> An Address is being provided for the correspondence Information of this application.			
Customer Number	96767		
Email Address	uspto.actions@wwplaw.com	Add Email	Remove Email

**Application Information:**

Title of the Invention	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER		
Attorney Docket Number	PA0929-0	Small Entity Status Claimed	<input checked="" type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	9	Suggested Figure for Publication (if any)	

<b>Application Data Sheet 37 CFR 1.76</b>	Attorney Docket Number	PA0929-0
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER	

**Publication Information:**

<input type="checkbox"/>	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
<input type="checkbox"/>	<b>Request Not to Publish.</b> I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application <b>has not and will not</b> be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

**Representative Information:**

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.			
Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	96767		

**Domestic Benefit/National Stage Information:**

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.			
Prior Application Status	Pending	<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	a 371 of international	PCT/KR2011/002514	2011-04-11
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the <b>Add</b> button.			<input type="button" value="Add"/>

**Foreign Priority Information:**

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).			
<input type="button" value="Remove"/>			
Application Number	Country <sup>i</sup>	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
10-2010-0032778	KR	2010-04-09	<input checked="" type="radio"/> Yes <input type="radio"/> No
<input type="button" value="Remove"/>			
Application Number	Country <sup>i</sup>	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
10-2011-0026079	KR	2011-03-23	<input checked="" type="radio"/> Yes <input type="radio"/> No
<input type="button" value="Remove"/>			
Application Number	Country <sup>i</sup>	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
10-2011-0032766	KR	2011-04-08	<input checked="" type="radio"/> Yes <input type="radio"/> No

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<b>Application Data Sheet 37 CFR 1.76</b>	Attorney Docket Number	PA0929-0
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Add

## Assignee Information:

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.

**Assignee 1**

Remove

If the Assignee is an Organization check here.

Organization Name      Electronics and Telecommunications Research Institute

### Mailing Address Information:

Address 1      161 Gajeong-dong, Yuseong-gu

Address 2

City      Daejeon

State/Province

Country <sup>i</sup>      KR

Postal Code

Phone Number

Fax Number

Email Address

Additional Assignee Data may be generated within this form by selecting the **Add** button.

Add

## Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

<b>Signature</b>	/Woochoon W. Park/			Date (YYYY-MM-DD)	2012-10-08
First Name	Woochoon W.	Last Name	Park	Registration Number	55523

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

**COMBINED DECLARATION AND POWER OF ATTORNEY**

I as a below named inventor hereby declare that:

- (1) My residence, mailing address, and citizenship are stated below next to my name; and
- (2) I believe I am the original and first inventor of the subject matter which is claimed and for which a patent is sought on the invention titled:

**METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER**

the application of which is attached hereto, unless the application was filed on **04/11/2011** as United Stated Application Number **###/###/###** or PCT International Number **PCT/KR2011/002514** and was amended under PCT Article 19 on **MM/DD/YYYY** (if applicable).

**Declaration**

I hereby state that I have reviewed and understand the contents of the above identified application, including the claims, as amended by any amendment specifically referred to above. I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

**Claim of Foreign Priority Benefits**

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number	Country	Foreign Filing Date (MM/DD/YYYY)	Priority NOT Claimed?	Certified Copy	
				Attached	Not attached
10-2010-0032778	Rep. of Korea	04/09/2010	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10-2011-0026079	Rep. of Korea	03/23/2011	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10-2011-0032766	Rep. of Korea	04/08/2011	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Claim of Domestic Priority Benefits / National Stage Information**

I hereby claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application listed below. I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including material information which became available between the filing date of the prior application and the national or PCT international filing date of this application

Application Serial Number	Filing Date (MM/DD/YYYY)	Status (patented, pending, abandoned)

**Authorization to Permit Access to Application by Participating Offices**

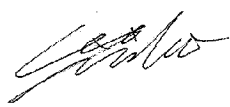
If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the above-identified patent application is filed access to the above-

identified patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the above-identified patent application is filed to have access to the above-identified patent application. In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the above-identified patent application with respect to: 1) the above-identified patent application-as-filed; 2) any foreign application to which the above-identified patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the above-identified patent application; and 3) any U.S. application-as-filed from which benefit is sought in the above-identified patent application. In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing the Authorization to Permit Access to Application by Participating Offices.

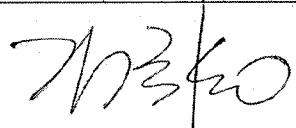
**Power of Attorney**

I hereby appoint practitioner(s) of William Park and Associates Ltd. associated with the **Customer Number 96767** as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

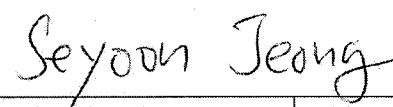
**Signatures**

<b>Sole or First Inventor</b>	Given Name (first and Middle [if any])	Jin Ho	Family Name or Surname	LEE
Inventor Signature			Date	Sep. 24. 2012
Residence	Daejeon-si, Republic of Korea	Citizenship	Republic of Korea	
Mailing Address	313-1102 Youngbangmaeul Apt., Yongun-dong, Dong-gu Daejeon-si 300-787, Republic of Korea			


\*\*\*

<b>Second Inventor</b>	Given Name (first and Middle [if any])	Hui Yong	Family Name or Surname	KIM
Inventor Signature			Date	Sep. 24. 2012
Residence	Daejeon-si, Republic of Korea	Citizenship	Republic of Korea	
Mailing Address	601-201 Yeolmaemaoul Apt., Jijok-dong, Yuseong-gu Daejeon-si 305-770, Republic of Korea			


\*\*\*

<b>Third Inventor</b>	Given Name (first and Middle [if any])	Se Yoon	Family Name or Surname	JEONG
Inventor Signature			Date	Sep. 24. 2012.
Residence	Daejeon-si, Republic of Korea	Citizenship	Republic of Korea	
Mailing Address	101-1203 Geumseong Baekjo Apt., Birae-dong, Daedeok-gu Daejeon-si 306-769, Republic of Korea			

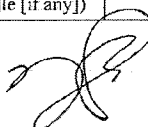
\*\*\*

<b>Fourth Inventor</b>	Given Name (first and Middle [if any])	Suk Hee	Family Name or Surname	CHO
Inventor Signature			Date	Sep. 24. 2012
Residence	Daejeon-si, Republic of Korea	Citizenship	Republic of Korea	
Mailing Address	103-802 Humansia Apt., Bongsan-dong, Yuseong-gu, Daejeon-si 305-763, Republic of Korea			


\*\*\*

<b>Fifth Inventor</b>	Given Name (first and Middle [if any])	Ha Hyun	Family Name or Surname	LEE
Inventor Signature			Date	Sep. 24. 2012
Residence	Seoul, Republic of Korea	Citizenship	Republic of Korea	
Mailing Address	136-5 Myeonmok 2-dong, Jungnang-gu, Seoul 131-819, Republic of Korea			


\*\*\*

<b>Sixth Inventor</b>	Given Name (first and Middle [if any])	Jong Ho	Family Name or Surname	KIM
Inventor Signature			Date	Sep. 24. 2012
Residence	Daejeon-si, Republic of Korea	Citizenship	Republic of Korea	
Mailing Address	Rm. 205 Finehouse, 146-8 Sinseong-dong, Yuseong-gu Daejeon-si 305-804, Republic of Korea			


\*\*\*

<b>Seventh Inventor</b>	Given Name (first and Middle [if any])	Sung Chang	Family Name or Surname	LIM
Inventor Signature			Date	Sep. 24, 2012
Residence	Daejeon-si, Republic of Korea	Citizenship	Republic of Korea	
Mailing Address	Rm. 201 Sejongvilla, 254-8 Sinseong-dong, Yuseong-gu, Daejeon-si 305-750, Republic of Korea			

\*\*\*

<b>Eighth Inventor</b>	Given Name (first and Middle [if any])	Jin Soo	Family Name or Surname	CHOI
Inventor Signature			Date	Sep. 24, 2012
Residence	Daejeon-si, Republic of Korea	Citizenship	Republic of Korea	
Mailing Address	609-1605 Banseokmaeul 6 Danji Apt., 613 Banseok-dong, Yuseong-gu, Daejeon-si 305-750, Republic of Korea			

\*\*\*

<b>Ninth Inventor</b>	Given Name (first and Middle [if any])	Jin Woong	Family Name or Surname	KIM
Inventor Signature			Date	Sep. 24, 2012
Residence	Daejeon-si, Republic of Korea		Citizenship	Republic of Korea
Mailing Address	305-1603 Expo Apt., Jeonmin-dong, Yuseong-gu, Daejeon-si 305-761, Republic of Korea			

\*\*\*

<b>Tenth Inventor</b>	Given Name (first and Middle [if any])	Chie Teuk	Family Name or Surname	AHN
Inventor Signature			Date	
Residence	Daejeon-si, Republic of Korea		Citizenship	Republic of Korea
Mailing Address	2-504 KAIST Apt., Doryong-dong, Yseong-gu, Daejeon-si 305-340, Republic of Korea			

**COMBINED DECLARATION AND POWER OF ATTORNEY**

I as a below named inventor hereby declare that:

- (1) My residence, mailing address, and citizenship are stated below next to my name; and
- (2) I believe I am the original and first inventor of the subject matter which is claimed and for which a patent is sought on the invention titled:

**METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER**

the application of which is attached hereto, unless the application was filed on **04/11/2011** as United Stated Application Number **###/###/###** or PCT International Number **PCT/KR2011/002514** and was amended under PCT Article 19 on **MM/DD/YYYY** (if applicable).

**Declaration**

I hereby state that I have reviewed and understand the contents of the above identified application, including the claims, as amended by any amendment specifically referred to above. I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

**Claim of Foreign Priority Benefits**

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number	Country	Foreign Filing Date (MM/DD/YYYY)	Priority NOT Claimed?	Certified Copy	
				Attached	Not attached
10-2010-0032778	Rep. of Korea	04/09/2010	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10-2011-0026079	Rep. of Korea	03/23/2011	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10-2011-0032766	Rep. of Korea	04/08/2011	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Claim of Domestic Priority Benefits / National Stage Information**

I hereby claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application listed below. I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including material information which became available between the filing date of the prior application and the national or PCT international filing date of this application

Application Serial Number	Filing Date (MM/DD/YYYY)	Status (patented, pending, abandoned)

**Authorization to Permit Access to Application by Participating Offices**

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the above-identified patent application is filed access to the above-

identified patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the above-identified patent application is filed to have access to the above-identified patent application. In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the above-identified patent application with respect to: 1) the above-identified patent application-as-filed; 2) any foreign application to which the above-identified patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the above-identified patent application; and 3) any U.S. application-as-filed from which benefit is sought in the above-identified patent application. In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing the Authorization to Permit Access to Application by Participating Offices.

**Power of Attorney**

I hereby appoint practitioner(s) of William Park and Associates Ltd. associated with the **Customer Number 96767** as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

**Signatures**

<b>Sole or First Inventor</b>	Given Name (first and Middle [if any])	Jin Ho	Family Name or Surname	LEE
Inventor Signature			Date	
Residence	Daejeon-si, Republic of Korea	Citizenship	Republic of Korea	
Mailing Address	313-1102 Youngbangmaeul Apt., Yongun-dong, Dong-gu Daejeon-si 300-787, Republic of Korea			

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<b>Second Inventor</b>	Given Name (first and Middle [if any])	Hui Yong	Family Name or Surname	KIM
Inventor Signature			Date	
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<b>Third Inventor</b>	Given Name (first and Middle [if any])	Se Yoon	Family Name or Surname	JEONG
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<b>Fourth Inventor</b>	Given Name (first and Middle [if any])	Suk Hee	Family Name or Surname	CHO
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<b>Fifth Inventor</b>	Given Name (first and Middle [if any])	Ha Hyun	Family Name or Surname	LEE
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<b>Sixth Inventor</b>	Given Name (first and Middle [if any])	Jong Ho	Family Name or Surname	KIM
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<b>Seventh Inventor</b>	Given Name (first and Middle [if any])	Sung Chang	Family Name or Surname	LIM
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<b>Eighth Inventor</b>	Given Name (first and Middle [if any])	Jin Soo	Family Name or Surname	CHOI
Inventor Signature			Date	
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Mailing Address	609-1605 Banseokmaeul 6 Danji Apt., 613 Banseok-dong, Yuseong-gu, Daejeon-si 305-750, Republic of Korea			


\*\*\*

Docket:  
IP20100265A

PATENT

<b>Ninth Inventor</b>	Given Name (first and Middle [if any])	Jin Woong	Family Name or Surname	KIM
Inventor Signature			Date	
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Mailing Address	305-1603 Expo Apt., Jeonmin-dong, Yuseong-gu, Daejeon-si 305-761, Republic of Korea			

\*\*\*

<b>Tenth Inventor</b>	Given Name (first and Middle [if any])	Chie Teuk	Family Name or Surname	AHN
Inventor Signature			Date	Sep. 26. 2012
Residence	Daejeon-si, Republic of Korea	Citizenship	Republic of Korea	
Mailing Address	2-504 KAIST Apt., Doryong-dong, Yseong-gu, Daejeon-si 305-340, Republic of Korea			

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

# Request to Retrieve Electronic Priority Application(s)

COMPLETE IF KNOWN

Application Number	
Filing Date	
First Named Inventor	Jin Ho LEE
Art Unit	
Examiner Name	
Attorney Docket Number	PA0929-0

Send completed form to: Commissioner for Patents  
P.O. Box 1450, Alexandria, VA 22313-1450

The undersigned hereby requests the USPTO retrieve an electronic copy of each of the following foreign applications for which priority has been claimed under 35 U.S.C. 119(a)-(d) from a foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement:

**Please retrieve (check all that apply)**

- From EPO, JPO, or KIPO (participating foreign intellectual property office) a priority application
  - Column A.** Participating office where application was originally filed
  - Column B.** Application number and filing date of the application
- From WIPO (participating foreign intellectual property office) a DAS registered priority application
  - Column A.** DAS Depositing Office where application was originally filed
  - Column B.** Application number and filing date of the application
- Copy of certified copy of non-participating office priority document from within a participating foreign intellectual property office application (EPO or JPO)
  - Column A.** Participating office where certified copy of priority document is located
  - Column B.** Application number and filing date of the EPO/JPO application
  - Column C.** Two letter country code and application number of the non-EPO/JPO priority document

	A	B		C	
	Participating Office (e.g., EPO, JPO, KIPO) or DAS Depositing Office (e.g., IB)	Application to be retrieved or application containing the non-participating priority application		Non-participating priority application to be retrieved	
		App. No.	Filing Date	Country Code	App. No.
1	KIPO	10-2010-0032778	2010-04-09		
2	KIPO	10-2011-0026079	2011-03-23		
3	KIPO	10-2011-0032766	2011-04-08		
4					
5					
6					

This Request to Retrieve Electronic Priority Application(s) (Request) should be filed within the later of four months from the date of filing of the above-identified U.S. application claiming foreign priority, or sixteen months from the filing date of the foreign application to which priority is claimed.

This Request should be submitted concurrently with the claim for priority, or thereafter. The USPTO will not attempt to retrieve the identified priority application(s) until applicant indicates the identified priority application(s) on the oath or declaration or an application data sheet in compliance with 37 CFR 1.63(c).

Applicants are advised to consult Private PAIR (accessed through www.uspto.gov) to assure that the retrieval has been successful. The applicant remains ultimately responsible for the submission of the certified copy of the foreign application(s) within the period set forth in 37 CFR 1.55(a) (before the U.S. application issues as a patent) if the USPTO does not timely retrieve the identified priority application(s).

**I hereby declare that I have the authority to grant access to the above-identified foreign application(s).**

**/WOOCHOON W. PARK/**

Signature

**WOOCHOON W. PARK**

Printed or Typed Name

**Attorney at Law**

Title

**October 8, 2012**

Date

**630.908.7652**

Telephone Number

**55523**

Registration Number, if applicable

This collection of information is required by 37 CFR 1.55(d). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process an application). Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 8 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

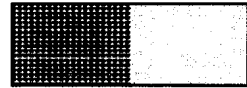
*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



별첨 사본은 아래 출원의 원본과 동일함을 증명함.

This is to certify that the following application annexed hereto is a true copy from the records of the Korean Intellectual Property Office

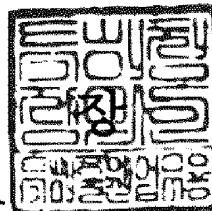
출원번호 : 10-2010-0032778  
Application Number

출원년월일 : 2010년 04월 09일  
Filing Date APR 09, 2010

출원인 : 한국전자통신연구원  
Applicant(s) Electronics and Telecommunications Research Institute

2011년 05월 02일

특허청  
COMMISSIONER



## 【서지사항】

**【서류명】** 특허출원서  
**【출원구분】** 특허출원  
**【출원인】**  
**【명칭】** 한국전자통신연구원  
**【출원인코드】** 3-1998-007763-8  
**【대리인】**  
**【명칭】** 특허법인 무한  
**【대리인코드】** 9-2007-100061-4  
**【지정된변리사】** 구기완  
**【포괄위임등록번호】** 2007-052305-1  
**【발명의 국문명칭】** 적응적인 필터를 이용한 인트라 예측 부호화/복호화 방법 및 그 장치  
**【발명의 영문명칭】** Method and apparatus for intra prediction encoding and decoding using adaptive filter  
**【발명자】**  
**【성명】** 김종호  
**【성명의 영문표기】** KIM Jongho  
**【주민등록번호】** 810410-1XXXXXX  
**【우편번호】** 305-804  
**【주소】** 대전광역시 유성구 신성동 146-8 파인하우스 205호  
**【국적】** KR  
**【발명자】**  
**【성명】** 김휘용  
**【성명의 영문표기】** KIM Hui Yong  
**【주민등록번호】** 720508-1XXXXXX

**【우편번호】** 305-330  
**【주소】** 대전광역시 유성구 지족동 열매마을 601-201  
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**【발명자】**  
**【성명】** 이진호  
**【성명의 영문표기】** LEE Jinho  
**【주민등록번호】** 800422-1XXXXXX  
**【우편번호】** 300-220  
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**【주민등록번호】** 750619-1XXXXXX  
**【우편번호】** 131-819  
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**【발명자】**  
**【성명】** 임성창  
**【성명의 영문표기】** LIM Sung-Chang  
**【주민등록번호】** 830131-1XXXXXX  
**【우편번호】** 305-350  
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**【발명자】**

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**【발명자】**

**【성명】** 조속희  
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**【주민등록번호】** 701116-2XXXXXX  
**【우편번호】** 305-744  
**【주소】** 대전광역시 유성구 관평동 쌍용스윗닷홈 405동 1604호  
**【국적】** KR

**【발명자】**

**【성명】** 최진수  
**【성명의 영문표기】** CH01 Jin Soo  
**【주민등록번호】** 681015-1XXXXXX  
**【우편번호】** 305-150  
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**【발명자】**

**【성명】** 김진웅  
**【성명의 영문표기】** KIM Jinwoong  
**【주민등록번호】** 591223-1XXXXXX  
**【우편번호】** 305-761



【주소】 대전광역시 유성구 전민동 엑스포아파트 501동 1404호

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【발명자】

【성명】 안치득

【성명의 영문표기】 AHN Chieteuk

【주민등록번호】 560815-1XXXXXX

【우편번호】 305-340

【주소】 대전광역시 유성구 도룡동 과기원아파트 2동 504호

【국적】 KR

【취지】 위와 같이 특허청장에게 제출합니다.

대리인 특허법인 무한

(서명 또는 인)

【수수료】

【출원료】 0 면 38,000 원

【가산출원료】 10 면 0 원

【우선권주장료】 0 건 0 원

【심사청구료】 0 항 0 원

【합계】 38,000 원

【감면사유】 정부출연연구기관

【감면후 수수료】 19,000 원

## 【명세서】

## 【발명의 명칭】

적응적인 필터를 이용한 인트라 예측 부호화/복호화 방법 및 그 장치{  
Method and apparatus for intra prediction encoding and decoding using  
adaptive filter}

## 【기술분야】

<1> 본 발명은 동영상 혹은 정지영상을 부호화함에 있어서, 예측하려 하는 블록의 주변 화소값 또는 현재 블록의 예측된 화소값에 적응적인 필터를 적용함으로써 visible artifacts를 줄이고 잔차신호를 줄여서 부호화 효율을 높이는 방법 및 그 장치이다. 보다 상세하게는 인트라 예측을 수행하기 위한 현재 블록의 참조 화소값들에 적응적인 필터(pre-filter)를 적용한 후 예측을 수행하고, 또한 예측된 현재 블록의 화소값들에도 적응적인 필터(post-filter)를 적용한 후 잔차신호를 구하는데 사용한다. 상기 방법으로써 부호화 하려는 휘도 또는 색차 신호 블록을 효과적으로 예측하여 부호화 효율을 향상 시킨다.

## 【배경기술】

<2> 통상, H.264/AVC에서는 인트라 예측시 사용되는 참조 화소값들에 필터를 적용한 후 그 값들을 예측에 사용한다. 여기서 필터는 간단한 Low-pass 필터를 사용하며 Intra\_8x8 블록에 한해서만 적용한다. 필터를 적용하는 방법은 하기 [도 1]에서와 같다.

<3> [수식 1]

<4>  $h[Z] = (A + 2*Z + Q)/4$

<5>  $h[A] = (Z + 2*A + B)/4$

<6> ~

<7>  $h[P] = (O + 3*P)/4$

<8>  $h[Q] = (Z + 2*Q + R)/4$

<9> ~

<10>  $h[X] = (W + 3*X)/4$

<11> 상세히 설명하면  $h[Z]$ 를  $Z$ 에 필터를 적용하여 나온 값이라고 가정할 때 [수식 1]과 같이 구해진다. 즉, (1, 2, 1)의 필터 계수를 통하여 참조(주변) 화소값들에 필터링 과정을 수행하고, 필터링을 거친 참조 화소값( $h[A\sim Z]$ )으로 현재 블록에 대한 9개의 방향 모드별 예측을 수행한다.

<12> 복호화 과정에서 역시 부호화 과정과 같은 방법으로 필터를 적용한다.

**【발명의 내용】**

**【해결하려는 과제】**

<13> 본 발명은 전술한 종래기술의 고정적인 필터 적용을 하지 않고, 적응적으로 필터를 적용하여 보다 효과적인 예측 블록을 만든다. 또한 참조 화소값뿐만 아니라

현재 예측 블록에도 적응적으로 필터를 적용하여 잔차신호의 양을 줄이고 부호화 효율을 향상시키는데 그 목적이 있다.

**【과제의 해결 수단】**

<14> 하기에서 상세히 설명하기로 한다.

**【발명의 효과】**

<15> 본 발명은 현재 블록을 예측하기 위해 사용되는 참조 화소값 또는 현재 블록의 예측값들에 필터를 적용함으로써 visible artifacts를 줄이고 결론적으로 원본 영상과의 잔차신호를 줄여서 부호화 효율을 향상시킨다. 이는 종래기술이 참조 화소값에 고정적인 필터를 적용 하는 것에 반해 적응적으로 필터를 적용하고, 나아가 현재 블록의 예측값에도 적응적인 필터를 적용하여 보다 효율적으로 인트라 예측을 수행한다. 따라서 본 발명은 종래 부호화/복호화 장치 및 방법을 개선함으로써 압축률을 높이는 효과가 있다.

**【도면의 간단한 설명】**

<16> 도 1은 종래기술을, 도 2 내지 도 3은 본 발명을 설명하기 위한 도면이다.

**【발명을 실시하기 위한 구체적인 내용】**

<17> 이하, 본 발명의 실시예를 첨부된 도면을 참조하여 상세하게 설명한다.

<18> 본 발명은 인트라 예측을 수행함에 있어 예측 전에 참조 화소값들에 대한 적응적인 필터 적용 및 현재 블록의 예측된 값에 대한 적응적인 필터 적용하는 장치

및 그 방법에 관한 것이다. 보다 상세하게는 [도 2]에서와 같이 종래기술의 필터를 적용하기 전에 "필터 적용 판별부(201)"를 거치게 된다. 필터를 적용한 후 예측을 하는 것이 항상 좋은 것은 아니기 때문에 "필터 적용 판별부"에서는 주변 블록의 정보를 이용한 적응적인 방법 또는 율-왜곡 최적화(RDO: Rate-Distortion Optimization) 방법 등 중에서 적어도 하나의 방법을 사용하여 필터 적용 여부를 결정한다. 결정된 필터를 "필터 적용부(202)"에서 적용하며, 또한 필터링을 수행하는 과정에서 필터링된 화소값이 다음 화소값의 필터링 작업을 위해 사용될 수도 있고, 필터는 종래기술에서 사용한 필터를 포함한 다수의 필터 중 하나를 사용한다.

<19>            상기 방식의 참조 화소값들에 대한 필터링 과정을 거친 후 "인트라 예측 수행부(203)"를 통한 부호화는 효율을 향상시키는 결과를 가져왔다. 따라서 참조 화소값들 뿐만아니라 현재 블록의 예측값에도 필터를 적용하여 부호화 성능을 높일 수 있다.

<20>            "필터 적용 판별부(204)"는 현재 블록의 부호화를 위해 예측된 9가지 모드별 예측값에 필터를 적용하는 여부를 결정한다. 여기서도 (201)과 같이 주변 블록의 정보 또는 율-왜곡 최적화 방법을 사용하게 된다. 필터를 적용하기로 결정이 되면 "필터 적용부(205)"를 통하여 현재 블록의 예측값에 필터링 과정을 수행한다. 이로써 현재 블록의 예측이 완료되고 잔차신호를 구한 후 엔트로피 부호화를 수행한다. RDO 방법을 사용할 경우 [도 2]의 과정을 여러 번 반복하여 최적의 모드를 결정한다.

<21>            하기 [도 3]과 [수식 2]는 본 발명의 실시예로서, 현재 블록의 예측값에 필

터를 적용하는 방법을 나타낸다. H.264에는 방향에 따른 9가지 모드에 대해 예측을 수행한다. 본 실시예는 예측된 각 모드에 대해 RDO 기반으로 적응적인 필터를 적용할 시 사용된다. 사용되는 필터는 필터계수 (1, 2, 1)을 가지는 low-pass 필터이고 수평과 수직의 두 방향에 대해 순차적으로 수행한다.

<22> 여기서, 현재 필터링을 거친 화소값이 다음 화소값의 필터링을 위한 값으로 사용될 수 있고 안 될 수도 있는데, [수식 2]에서는 사용하는 것으로 한다. 따라서 수직 방향으로 필터를 적용하고, 적용되어진 값들을 가지고 수평 방향으로 다시 한번 필터를 적용한다.

<23> [수식 2]

<24> 1. Vertical low-pass filter

<25>  $v[a1] = (A + 2*a1 + a2)/4$   $v[a2] = (v[a1] + 2*a2 + a3)/4$

<26> ~

<27>  $v[a8] = (v[a7] + 3*a8)/4$

<28>  $v[b1] = (B + 2*b1 + b2)/4$

<29> ~

<30> 2. Horizontal low-pass filter

<31>  $h[a1] = (Q + 2* v[a1] + v[b1])/4$   $h[b1] = (h[a1] + 2* v[b1] + v[c1])/4$

<32> ~

<33>  $h[h1] = (h[g1] + 3* v[h1])/4$

<34> 
$$h[a2] = (R + 2* v[a2] + v[b2])/4$$

<35> 이상과 같이 본 발명은 비록 한정된 실시예와 도면에 의해 설명되었으나, 본 발명은 상기의 실시예에 한정되는 것은 아니며, 본 발명이 속하는 분야에서 통상의 지식을 가진 자라면 이러한 기재로부터 다양한 수정 및 변형이 가능하다.

<36> 그러므로, 본 발명의 범위는 설명된 실시예에 국한되어 정해져서는 아니 되며, 후술하는 특허청구범위뿐 아니라 이 특허청구범위와 균등한 것들에 의해 정해져야 한다.

**【특허청구범위】**

**【청구항 1】**

적응적인 필터를 이용한 인트라 예측 부호화/복호화 방법 및 그 장치.



**【요약서】****【요약】**

본 발명은 동영상 혹은 정지영상을 부호화함에 있어서, 예측하려 하는 블록의 주변 화소값 또는 현재 블록의 예측된 화소값에 적응적인 필터를 적용함으로써 visible artifacts를 줄이고 잔차신호를 줄여서 부호화 효율을 높이는 방법 및 그 장치이다. 보다 상세하게는 인트라 예측을 수행하기 위한 현재 블록의 참조 화소값들에 적응적인 필터(pre-filter)를 적용한 후 예측을 수행하고, 또한 예측된 현재 블록의 화소값들에도 적응적인 필터(post-filter)를 적용한 후 잔차신호를 구하는데 사용한다. 상기 방법으로써 부호화 하려는 휘도 또는 색차 신호 블록을 효과적으로 예측하여 부호화 효율을 향상 시킨다.

**【대표도】**

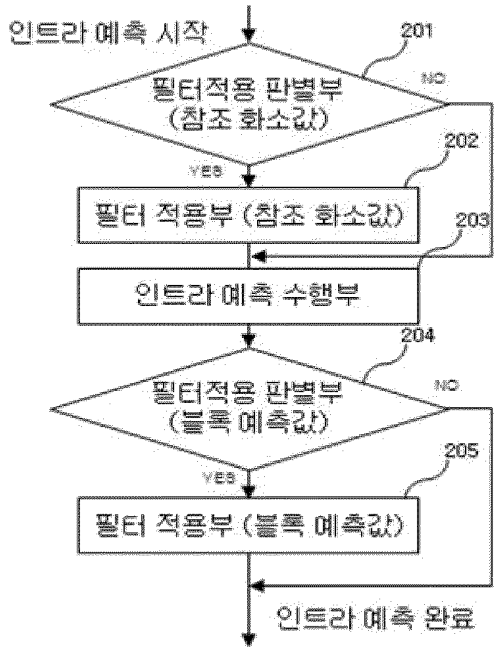
도 2

【도면】

【도 1】

Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Q																
R																
S																
T																
U																
V																
W																
X																

【도 2】



【도 3】

Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Q	a1	b1	c1	d1	e1	f1	g1	h1								
R	a2	b2	c2	d2	e2	f2	g2	h2								
S	a3	b3	...	...	...	...	...	...								
T	a4	b4	...	...	...	...	...	...								
U	a5	b5	...	...	...	...	...	...								
V	a6	b6	...	...	...	f6	g6	h6								
W	a7	b7	...	...	...	f7	g7	h7								
X	a8	b8	...	...	...	f8	g8	h8								

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## PCT 출원서

출력(전자적 형태가 원본)

<b>0</b>	수리관청 전용	
<b>0-1</b>	국제출원번호	<b>PCT/KR2011/002514</b>
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<b>0-4</b>	서식 <b>PCT/RO/101 - PCT 출원서</b>	
0-4-1	우측에 기재된 바와 같이 작성되었다.	<b>PCT-SAFE</b> <b>버전 3.51.045.221 MT/FOP 20100401/0.20.5.18</b>
<b>0-5</b>	신청 아래 서명인은 본 국제 출원서가 특허협력조약에 의해 처리될 것을 청구합니다.	
<b>0-6</b>	출원인이 지정한 수리관청	<b>대한민국 특허청 (RO/KR)</b>
<b>0-7</b>	출원인 또는 대리인의 서류참조기호	<b>BPP2011-0098</b>
<b>I</b>	발명의 명칭	<b>적응적 필터를 이용한 인트라 예측 수행 방법 및 장치</b>
<b>II</b>	출원인	
II-1	이 사람은	<b>오직 출원인</b>
II-2	우측 지정국에 관한 출원인	<b>미국을 제외한 모든 지정국</b>
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II-7	거주국	<b>대한민국 KR</b>
II-8	전화번호	<b>82-42-860-6114</b>
II-11	출원인 코드	<b>3-1998-007763-8</b>

## PCT 출원서

출력(전자적 형태가 원본)

<b>III-1</b> III-1-1 III-1-2 III-1-4ko III-1-4en III-1-5ko	출원인 및/또는 발명자 이 사람은 우측 지정국에 관한 출원인 성명 Name (LAST, First): 주소	출원인 겸 발명자 오직 미국만 이진호 <b>LEE, Jin Ho</b> 대전시 동구 용운동 용방마을 아파트 313동 1102호 <b>300-787</b> 대한민국
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III-1-7	거주국	대한민국 KR 대한민국 KR
<b>III-2</b> III-2-1 III-2-2 III-2-4ko III-2-4en III-2-5ko	출원인 및/또는 발명자 이 사람은 우측 지정국에 관한 출원인 성명 Name (LAST, First): 주소	출원인 겸 발명자 오직 미국만 김휘용 <b>KIM, Hui Yong</b> 대전시 유성구 지족동 열매마을 아파트 601동 201호 <b>305-770</b> 대한민국
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III-2-7	거주국	대한민국 KR 대한민국 KR
<b>III-3</b> III-3-1 III-3-2 III-3-4ko III-3-4en III-3-5ko	출원인 및/또는 발명자 이 사람은 우측 지정국에 관한 출원인 성명 Name (LAST, First): 주소	출원인 겸 발명자 오직 미국만 정세윤 <b>JEONG, Se Yoon</b> 대전시 대덕구 비래동 금성백조 아파트 101동 1203호 <b>306-769</b> 대한민국
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III-3-6	국적	<b>Daedeok-gu</b>
III-3-7	거주국	<b>Daejeon-si 306-769</b> <b>Republic of Korea</b> 대한민국 KR 대한민국 KR

## PCT 출원서

출력(전자적 형태가 원본)

III-4	출원인 및/또는 발명자	
III-4-1	이 사람은	출원인 겸 발명자
III-4-2	우측 지정국에 관한 출원인	오직 미국만
III-4-4ko	성명	조숙희
III-4-4en	Name (LAST, First):	<b>CHO, Suk Hee</b>
III-4-5ko	주소	대전시
III-4-5en	Address:	유성구 봉산동 휴먼시아 아파트103동 802호
III-4-6	국적	<b>305-763</b>
III-4-7	거주국	대한민국
III-4-6	국적	<b>103-802 Humansia Apt., Bongsan-dong, Yuseong-gu</b>
III-4-7	거주국	<b>Daejeon-si 305-763</b>
III-4-6	국적	<b>Republic of Korea</b>
III-4-7	거주국	<b>대한민국 KR</b>
III-4-6	국적	<b>대한민국 KR</b>
III-4-7	거주국	<b>대한민국 KR</b>
III-4-6	국적	<b>대한민국 KR</b>
III-4-7	거주국	<b>대한민국 KR</b>
III-5	출원인 및/또는 발명자	
III-5-1	이 사람은	출원인 겸 발명자
III-5-2	우측 지정국에 관한 출원인	오직 미국만
III-5-4ko	성명	이하현
III-5-4en	Name (LAST, First):	<b>LEE, Ha Hyun</b>
III-5-5ko	주소	서울시
III-5-5en	Address:	중랑구 면목2동 136-5
III-5-6	국적	<b>131-819</b>
III-5-7	거주국	대한민국
III-5-6	국적	<b>136-5 Myeonmok 2-dong, Jungnang-gu</b>
III-5-7	거주국	<b>Seoul 131-819</b>
III-5-6	국적	<b>Republic of Korea</b>
III-5-7	거주국	<b>대한민국 KR</b>
III-5-6	국적	<b>대한민국 KR</b>
III-5-7	거주국	<b>대한민국 KR</b>
III-5-6	국적	<b>대한민국 KR</b>
III-5-7	거주국	<b>대한민국 KR</b>
III-5-6	국적	<b>대한민국 KR</b>
III-5-7	거주국	<b>대한민국 KR</b>
III-6	출원인 및/또는 발명자	
III-6-1	이 사람은	출원인 겸 발명자
III-6-2	우측 지정국에 관한 출원인	오직 미국만
III-6-4ko	성명	김종호
III-6-4en	Name (LAST, First):	<b>KIM, Jong Ho</b>
III-6-5ko	주소	대전시
III-6-5en	Address:	유성구 신성동 146-8 파인하우스 205호
III-6-6	국적	<b>305-804</b>
III-6-7	거주국	대한민국
III-6-6	국적	<b>Rm. 205 Finehouse, 146-8 Sinseong-dong, Yuseong-gu</b>
III-6-7	거주국	<b>Daejeon-si 305-804</b>
III-6-6	국적	<b>Republic of Korea</b>
III-6-7	거주국	<b>대한민국 KR</b>
III-6-6	국적	<b>대한민국 KR</b>
III-6-7	거주국	<b>대한민국 KR</b>
III-6-6	국적	<b>대한민국 KR</b>
III-6-7	거주국	<b>대한민국 KR</b>

## PCT 출원서

출력(전자적 형태가 원본)

III-7 III-7-1	출원인 및/또는 발명자 이 사람은	출원인 겸 발명자
III-7-2	우측 지정국에 관한 출원인	오직 미국만
III-7-4ko	성명	임성창
III-7-4en	Name (LAST, First):	<b>LIM, Sung Chang</b>
III-7-5ko	주소	대전시 유성구 신성동 254-8번지 세종빌라 201호 <b>305-750</b> 대한민국
III-7-5en	Address:	<b>Rm. 201 Sejongvilla, 254-8 Sinseong-dong, Yuseong-gu Daejeon-si 305-750 Republic of Korea</b>
III-7-6	국적	대한민국 KR
III-7-7	거주국	대한민국 KR
III-8 III-8-1	출원인 및/또는 발명자 이 사람은	출원인 겸 발명자
III-8-2	우측 지정국에 관한 출원인	오직 미국만
III-8-4ko	성명	최진수
III-8-4en	Name (LAST, First):	<b>CHOI, Jin Soo</b>
III-8-5ko	주소	대전시 유성구 반석동 613번지 반석마을 6단지 아파트 609동 <b>1605호</b> <b>305-750</b> 대한민국
III-8-5en	Address:	<b>609-1605 Banseokmaeul 6 Danji Apt., 613 Banseok- dong, Yuseong-gu Daejeon-si 305-750 Republic of Korea</b>
III-8-6	국적	대한민국 KR
III-8-7	거주국	대한민국 KR
III-9 III-9-1	출원인 및/또는 발명자 이 사람은	출원인 겸 발명자
III-9-2	우측 지정국에 관한 출원인	오직 미국만
III-9-4ko	성명	김진웅
III-9-4en	Name (LAST, First):	<b>KIM, Jin Woong</b>
III-9-5ko	주소	대전시 유성구 전민동 엑스포 아파트 305동 1603호 <b>305-761</b> 대한민국
III-9-5en	Address:	<b>305-1603 Expo Apt., Jeonmin-dong, Yuseong-gu Daejeon-si 305-761 Republic of Korea</b>
III-9-6	국적	대한민국 KR
III-9-7	거주국	대한민국 KR



PCT 출원서

출력(전자적 형태가 원본)

III-10	출원인 및/또는 발명자	
III-10-1	이 사람은	출원인 겸 발명자
III-10-2	우측 지정국에 관한 출원인	오직 미국만
III-10-4k	성명	안치득
o		
III-10-4e	Name (LAST, First):	<b>AHN, Chie Teuk</b>
n		
III-10-5k	주소	대전시
o		유성구 도룡동 과기원 아파트 2동 504호
		<b>305-340</b>
		대한민국
III-10-5e	Address:	<b>2-504 KAIST Apt., Doryong-dong, Yseong-gu</b>
n		<b>Daejeon-si 305-340</b>
		<b>Republic of Korea</b>
III-10-6	국적	대한민국 KR
III-10-7	거주국	대한민국 KR
IV-1	대리인 또는 대표자	
	아래에 기재된 자는 관할 국제기관에	대리인 (agent)
	대하여 우측에 표시된 자격으로 출원인을	대리하는 것으로 선임되었다.
IV-1-1ko	성명	양문옥
IV-1-1en	Name (LAST, First):	<b>YANG, Moon Ock</b>
IV-1-2ko	주소	서울
		강남구 역삼동 735-10 삼흥역삼빌딩 2층
		에센트허법률사무소
		<b>135-080</b>
		대한민국
IV-1-2en	Address:	<b>Essen Patent &amp; Law Firm</b>
		<b>2F. Samheung Yeoksam Bldg.</b>
		<b>735-10 Yeoksam-dong, Gangnam-gu</b>
		<b>Seoul 135-080</b>
		<b>Republic of Korea</b>
IV-1-3	전화번호	<b>82-2-598-1620</b>
IV-1-4	팩스번호	<b>82-2-598-1630</b>
IV-1-5	이메일 주소	<b>essen@essenip.com</b>
IV-1-5(a)	이메일 사용동의	오직 전자적 형태의 통지서만 송부 (서면 통지서는
	수리관청, 국제조사기관, 국제사무국,	미발송)
	국제예비심사기관이 필요 시 이 이메일	
	주소를 사용하여 이 국제 출원과	
	관련하여 발행된 통지서를 송부할 것에	
	동의한다.	
IV-1-6	대리인 코드	<b>9-2002-000146-3</b>

PCT 출원서

출력(전자적 형태가 원본)

<b>V</b>	지정국	
<b>V-1</b>	본 출원서의 제출로, 규칙 4.9(a)에 따라, 부여될 수 있는 모든 종류의 권리 보호를 위하여, 그리고 해당하는 경우 지역특허 및 국내특허 모두를 위하여 당해 국제출원일에 PCT에 기속되는 모든 계약국이 지정된다.	
<b>V-2</b>	V-2란은 출원서 제출시 또는 규칙 26의2.1에 의해 그 이후 출원서 제6기재란에 위 특정 관련 계약국의 국내 선출원에 대한 우선권주장이 포함되어 있을 경우 당해 계약국의 국내법에 의해 해당 국내 선출원의 효력이 상실되는 것을 방지하기 위한 목적으로 당해 계약국의 지정을 제외하는 데에만 사용될 수 있다 (지정 제외시 이의 취소 불가능).	<b>KR</b>
<b>VI-1</b>	선국내출원에 대한 우선권 주장	
VI-1-1	출원일	<b>2010년 04월 09일 (09.04.2010)</b>
VI-1-2	출원번호	<b>10-2010-0032778</b>
VI-1-3	국가	<b>KR</b>
<b>VI-2</b>	선국내출원에 대한 우선권 주장	
VI-2-1	출원일	<b>2011년 03월 23일 (23.03.2011)</b>
VI-2-2	출원번호	<b>10-2011-0026079</b>
VI-2-3	국가	<b>KR</b>
<b>VI-3</b>	선국내출원에 대한 우선권 주장	
VI-3-1	출원일	<b>2011년 04월 08일 (08.04.2011)</b>
VI-3-2	출원번호	<b>10-2011-0032766</b>
VI-3-3	국가	<b>KR</b>
<b>VI-4</b>	우선권 주장 요청 수리관청에 대하여 위에 명시된 선출원의 인증등본을 준비하여 국제사무국에 송부하여 줄 것을 신청한다.	<b>VI-1, VI-2, VI-3</b>
<b>VI-5</b>	인용에 의한 보완 조약 제11조(1)(iii)(d) 또는 (e)에서 규정하는 국제출원의 요소, 또는 규칙 20.5(a)에서 규정하는 명세서, 청구 범위 또는 도면의 일부가 본 국제출원에는 포함되어 있지 않지만 조약 제11조(1)(iii) 규정의 요소 중 하나 이상이 수리관청에 최초로 접수된 날에 우선권주장의 기초가 된 선출원에 완전히 포함되어 있는 경우, 그 요소 또는 부분은 규칙 20.6 규정에 의한 확인을 조건으로, 규칙 20.6의 규정과 관련하여 본 국제출원에 있어서 인용에 의해 보완된다.	
<b>VII-1</b>	국제조사기관(ISA) 선택	<b>대한민국 특허청 (ISA/KR)</b>
<b>VIII</b>	선언서	선언서 개수
VIII-1	발명자의 동일성에 관한 선언	-
VIII-2	국제출원일에 특허출원 및 특허를 받을 수 있는 출원인의 자격에 관한 선언	-
VIII-3	국제출원일에 선출원의 우선권을 주장할 수 있는 출원인의 자격에 관한 선언	-
VIII-4	발명자 선언(미국에 대한 지정의 경우에 한함)	-
VIII-5	신규성을 해치지 아니하는 개시 또는 신규성 상실의 예외에 관한 선언	-

PCT 출원서

출력(전자적 형태가 원본)

IX	체크 리스트	용지 수	전자적 파일 첨부
IX-1	출원서(선언서 포함)	8	✓
IX-2	명세서	12	✓
IX-3	청구범위	3	✓
IX-4	요약서	1	✓
IX-5	도면	7	✓
IX-7	용지매수 소개	31	
	<b>첨부 항목</b>	<b>서면 첨부</b>	<b>전자적 파일 첨부</b>
IX-8	수수료 계산 용지	-	✓
IX-11	포괄위임장 사본	-	포괄위임장 번호 <b>6-1-2011-0004500-99</b>
IX-11	포괄위임장 사본	-	포괄위임장 번호 <b>6-1-2011-0014078-01</b>
IX-11	포괄위임장 사본	-	포괄위임장 번호 <b>6-1-2011-0014098-14</b>
IX-11	포괄위임장 사본	-	포괄위임장 번호 <b>6-1-2011-0014102-10</b>
IX-11	포괄위임장 사본	-	포괄위임장 번호 <b>6-1-2011-0014086-66</b>
IX-11	포괄위임장 사본	-	포괄위임장 번호 <b>6-1-2011-0014090-49</b>
IX-11	포괄위임장 사본	-	포괄위임장 번호 <b>6-1-2011-0014100-18</b>
IX-11	포괄위임장 사본	-	포괄위임장 번호 <b>6-1-2011-0014089-03</b>
IX-11	포괄위임장 사본	-	포괄위임장 번호 <b>6-1-2011-0014082-84</b>
IX-11	포괄위임장 사본	-	포괄위임장 번호 <b>6-1-2011-0013850-64</b>
IX-11	포괄위임장 사본	-	포괄위임장 번호 <b>6-1-2011-0014107-37</b>
IX-18	PCT-SAFE 전자출원 매체	-	-
IX-20	요약서에 수반되어야 할 도면 번호	6	
IX-21	국제출원의 출원 언어	한국어	
X-1	출원인, 대리인 또는 대표자의 서명 또는 날인	(PKCS7 전자서명)	
X-1-1	성명	양 문옥	
X-1-2	서명인의 성명		
X-1-3	권한		

PCT 출원서

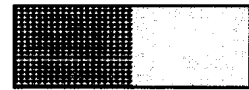
출력(전자적 형태가 원본)

수리판청 전용

10-1	국제출원으로 제출된 서류의 실제 접수일	2011년 04월 11일 (11.04.2011)
10-2	도면	
10-2-1	접수	
10-2-2	미접수	
10-3	국제출원으로 제출된 서류를 완성하는 서류 또는 도면의 추후 기간내 제출에 따른 정정된 실제 접수일	
10-4	PCT 제11조(2)에 따라 제출이 요구된 보완서로서 기간내 제출된 보완서의 접수일	
10-5	국제조사기관(ISA)	ISA/KR
10-6	조사료 납부시까지 지연된 조사용 사본의 송부	

국제 사무국 전용

11-1	국제 사무국의 기록원본 접수일	
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별첨 사본은 아래 출원의 원본과 동일함을 증명함.

This is to certify that the following application annexed hereto is a true copy from the records of the Korean Intellectual Property Office

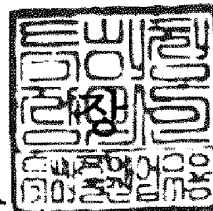
출원 번호 : 10-2011-0032766  
Application Number

출원 년 월 일 : 2011년 04월 08일  
Filing Date APR 08, 2011

출원인 : 한국전자통신연구원  
Applicant(s) Electronics and Telecommunications Research Institute

2011년 05월 03일

특허청  
COMMISSIONER



## 【서지사항】

**【서류명】** 특허출원서  
**【참조번호】** 0216  
**【출원구분】** 특허출원  
**【출원인】**  
**【명칭】** 한국전자통신연구원  
**【출원인코드】** 3-1998-007763-8  
**【대리인】**  
**【성명】** 양문옥  
**【대리인코드】** 9-2002-000146-3  
**【포괄위임등록번호】** 2009-070456-3  
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**【발명의 영문명칭】** METHOD AND APPARATUS OF PERFORMING INTRA PREDICTION USING ADAPTIVE FILTER  
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대리인 양문옥

(서명 또는 인)

【수수료】

【출원료】	0 면	38,000 원
【가산출원료】	38 면	0 원
【우선권주장료】	2 건	40,000 원
【심사청구료】	0 항	0 원
【합계】		78,000 원
【감면사유】	정부출연연구기관	
【감면후 수수료】		59,000 원

## 【명세서】

## 【발명의 명칭】

적응적 필터를 이용한 인트라 예측 수행 방법 및 장치 {METHOD AND APPARATUS OF PERFORMING INTRA PREDICTION USING ADAPTIVE FILTER}

## 【기술분야】

<1> 본 발명은 영상 코딩(video coding)에 관한 것으로, 보다 상세하게는 예측하려는 블록(block)의 주변 화소값 또는 현재 블록의 예측된 화소값에 적응적 필터를 적용하여 인트라 예측(intra-prediction)을 수행하는 방법 및 장치에 관한 것이다.

## 【배경기술】

<2> 최근 디지털 TV 등의 도래로 인해 방송 텔레비전 및 홈 엔터테인먼트(home entertainment) 분야의 기술이 급격하게 발전하고 있다. 이러한 분야의 기술은 비디오 압축(video compression) 기술의 표준화(standardization)에 의해서 상용화되고 있다. 비디오 압축을 위하여 ITU-T(International Telecommunications Union - Telecommunication) H.263 표준이 광범위하게 사용되고 있으며, MPEG(Motion Picture Experts Group)의 다음 표준인 MPEG-4가 인터넷 기반(internet-based) 비디오 어플리케이션을 위하여 사용되고 있다.

<3> H.263 표준 완성 이후, ITU-T VCEG (Video Coding Experts Group)는 H.263 표준에 부가적인 특징을 추가하기 위한 단기적 목표와 낮은 비트율(bitrate)의 시각 통신(visual communication)을 위한 새로운 표준을 개발하기 위한 장기적 목표

를 경주하여 왔다. 2001년, MPEG와 VCEG의 전문가들로 이루어진 JVT(Joint Video Team)이 구성되었고, JVT에 의해서 비디오 영상의 코딩을 위한 새로운 표준인 ITU-T H.264/MPEG-4 part 10의 표준화 작업이 진행되어 왔다. H.264 표준은 AVC(Advanced Video Coding)로 불릴 수도 있다. H.264/AVC의 기술적 목표는 코딩 효율(coding efficiency)의 현저한 향상, 손실 및 에러에 강인(robust)한 코딩 기술, 네트워크 친화적(network friendliness)인 코딩 기술, 낮은 지연 용량(latency capability) 및 정확한 매치 디코딩(match decoding) 등이다.

<4> 영상 내에서 주변 화소들은 대부분 비슷한 값을 가지며, 이는 H.264/AVC 표준의 최소 블록(block) 크기인  $4 \times 4$  블록 또는  $16 \times 16$  블록에 대해서도 마찬가지이다. 이와 같이 블록 간 값들의 유사성을 이용하여 영상에 대한 예측을 수행하고, 원본 영상과의 차이를 인코딩할 수 있다. 이를 인트라 예측(intra-prediction)이라 하며, 인트라 예측에 의해서 영상 코딩의 효율을 높일 수 있다.

<5> 또한, 인트라 예측을 수행함에 있어서 인트라 예측 수행 이전에 필터가 적용될 수 있다. 통상적으로 H.264/AVC 표준에서 인트라 예측을 수행할 때 참조 화소값들에 필터를 적용한 후 필터가 적용된 값들을 인트라 예측에 사용한다. 그러나 경우에 따라서 필터를 적용한 후 인트라 예측을 수행하는 것보다 필터를 적용하지 않고 인트라 예측을 수행할 때 영상 코딩의 성능이 더 높을 수 있다.

<6> 이에 따라, 인트라 예측 수행시 필터 적용 여부를 결정하는 방법이 제안될 수 있다.

**【발명의 내용】**

**【해결하려는 과제】**

<7> 본 발명의 기술적 과제는 영상 인코딩에서 예측하려는 블록(block)의 주변 화소값 또는 현재 블록의 예측된 화소값에 적응적 필터를 적용하여 인트라 예측(intra-prediction)을 수행하는 방법 및 장치를 제공하는 데에 있다. 보다 상세하게는 인트라 예측을 수행하기 위한 현재 블록의 참조 화소값들에 적응적인 필터(pre-filter)를 적용한 후 예측을 수행하고, 또한 예측된 현재 블록의 화소값들에 적응적인 필터(post-filter)를 적용하여 잔차 신호(residual signal)를 계산한다.

**【과제의 해결 수단】**

<8> 일 양태에 있어서, 인트라 예측(intra-prediction) 수행 방법이 제공된다. 상기 인트라 예측 수행 방법은 현재 블록(current block)의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하는 단계, 상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하는 단계, 상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측을 수행하는 단계, 상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드(prediction mode) 별 예측값에 대한 제2 필터의 적용 여부를 결정하는 단계, 및 상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제2 필터를 적용하는 단계를 포함

한다.

- <9>            상기 제1 필터의 적용 여부는 상기 주변 블록의 정보를 기반으로 결정된 상기 현재 블록의 예측 모드를 기반으로 결정될 수 있다.
- <10>           상기 제1 필터의 적용 여부는 현재 블록의 크기를 기반으로 결정될 수 있다.
- <11>           상기 제1 필터의 적용 여부는 상기 현재 블록의 예측 모드 및 상기 현재 블록의 크기를 기반으로 미리 지정될 수 있다.
- <12>           상기 제1 필터의 적용 여부는 상기 주변 블록이 화면내(intra-frame) 부호화되었는지 또는 화면간(inter-frame) 부호화되었는지 여부를 기반으로 결정될 수 있다.
- <13>           상기 제1 필터는 3-tap 필터 또는 2-tap 필터 중 적어도 어느 하나를 사용할 수 있다.
- <14>           상기 제2 필터의 적용 여부는 상기 주변 블록의 정보를 기반으로 결정된 상기 현재 블록의 예측 모드를 기반으로 결정될 수 있다.
- <15>           상기 제2 필터의 적용 여부는 현재 블록의 크기를 기반으로 결정될 수 있다.
- <16>           상기 제2 필터의 적용 여부는 상기 주변 블록이 화면내 부호화되었는지 또는 화면간 부호화되었는지 여부를 기반으로 결정될 수 있다.
- <17>           상기 제2 필터는 상기 참조 화소값의 경계에 인접한 화소의 예측값에 대해서 적용될 수 있다.
- <18>           상기 제2 필터는 3-tap 필터 또는 2-tap 필터 중 적어도 어느 하나를 사용할

수 있다.

<19>

다른 양태에 있어서, 인코더(encoder)가 제공된다. 상기 인코더는 프로세서(processor), 및 상기 프로세서와 연결되며 상기 프로세서를 구동하기 위한 정보를 저장하는 메모리(memory)를 포함하되, 상기 프로세서는 현재 블록의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하고, 상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하고, 상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측을 수행하고, 상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드 별 예측값에 대한 제2 필터의 적용 여부를 결정하고, 상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제2 필터를 적용하도록 구성된다.

<20>

또 다른 양태에 있어서, 디코더(decoder)가 제공된다. 상기 디코더는 프로세서, 및 상기 프로세서와 연결되며 상기 프로세서를 구동하기 위한 정보를 저장하는 메모리를 포함하되, 상기 프로세서는 현재 블록의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하고, 상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하고, 상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측을 수행하고, 상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드 별 예측값에 대한 제2 필터의 적용 여부를 결정하고, 상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기

제2 필터를 적용하도록 구성된다.

**【발명의 효과】**

<21> 부호화하려는 휘도 또는 색차 신호 블록을 효과적으로 예측하여 부호화 성능을 향상시킨다.

**【도면의 간단한 설명】**

<22> 도 1은 H.264/AVC(Advanced Video Coding) 표준의 인코더의 블록도이다.

도 2는 H.264/AVC 표준의 디코더의 블록도이다.

도 3은 4×4 루마 예측 모드에서 예측 샘플(prediction sample)을 라벨링(labeling)한 예를 나타낸다.

도 4는 4×4 루마 예측 모드 내의 9가지 예측 모드를 나타낸다.

도 5는 인트라 예측 수행 이전에 필터를 적용하는 방법의 일 예를 나타낸다.

도 6은 제안된 적응적 필터를 이용한 인트라 예측 수행 방법의 일 실시예를 나타낸다.

도 7은 제안된 적응적 필터를 이용한 인트라 예측 수행 방법에 따라 예측값에 필터가 적용되는 경우를 나타낸다.

도 8은 본 발명의 실시예가 구현되는 인코더 및 디코더의 블록도이다.

**【발명을 실시하기 위한 구체적인 내용】**

<23> 아래에서는 첨부한 도면을 참고로 하여 본 발명의 실시예에 대하여 본 발명이 속하는 기술 분야에서 통상의 지식을 가진 자가 용이하게 실시할 수 있도록 상



세히 설명한다. 그러나, 본 발명은 여러 가지 상이한 형태로 구현될 수 있으며 여기에서 설명하는 실시예에 한정되지 않는다. 그리고 도면에서 본 발명을 명확하게 설명하기 위해서 설명과 관계없는 부분은 생략하였으며, 명세서 전체를 통하여 유사한 부분에 대해서는 유사한 도면 부호를 붙였다. 또한 상세한 설명을 생략하여도 본 기술분야의 당업자가 쉽게 이해할 수 있는 부분의 설명은 생략하였다.

<24> 명세서 및 청구범위 전체에서, 어떤 부분이 어떤 구성 요소를 “포함” 한다고 할 때, 이는 특별히 반대되는 기재가 없는 한 다른 구성 요소를 제외하는 것이 아니라 다른 구성 요소를 더 포함할 수 있는 것을 의미한다.

<25> 도 1은 H.264/AVC(Advanced Video Coding) 표준의 인코더의 블록도이다.

<26> 도 1을 참조하면, 인코더는 2가지 경로의 데이터 흐름을 포함한다. 하나는 전진 경로(forward path)이며, 나머지 하나는 재구성 경로(reconstruction path)이다.

<27> 먼저 전진 경로를 설명한다. 입력 프레임  $F_n$ 에 대하여 매크로블록(macro block) 단위로 인코딩이 수행된다. 매크로블록은 원본 이미지에서  $16 \times 16$  픽셀의 크기를 가진다. 각 입력 프레임에 대해서 인트라 예측(intra-prediction) 또는 인터 예측(inter-prediction)이 수행된다. 인트라 예측은 프레임 내에서 블록 간 값들의 유사성을 이용하여 예측을 수행하고 원본 영상과의 차이를 인코딩하며, 인터 예측은 프레임 간 블록 간 값들의 유사성을 이용하여 예측을 수행하고 원본 영상과의 차이를 인코딩한다. 인트라 예측 또는 인터 예측시에 예측 매크로블록

(prediction macroblock)인 P가 재구성 프레임(reconstructed frame)을 기반으로 형성된다. 인트라 예측 시에, P는 이전에 인코딩된 현재 프레임, 디코딩된 현재 프레임 또는 재구성된 현재 프레임( $uF_n'$ ) 내의 샘플로부터 형성될 수 있다. P가 재구성된 현재 프레임으로부터 형성될 때 필터링되지 않은(unfiltered) 샘플이 사용될 수 있다. 인터 예측 시에, P는 하나 이상의 참조 프레임(reference frame)으로부터 움직임 보상(motion compensation) 또는 움직임 예측(motion prediction)이 수행되어 형성될 수 있다. 도 1에서 참조 프레임은 이전에 인코딩된 프레임인  $F_{n-1}'$  인 것으로 가정한다. 그러나 이에 제한되지 않으며, 각 예측 매크로블록은 이미 인코딩되거나 재구성된 이전 1 프레임 또는 2 프레임 또는 이후 1 프레임 또는 2 프레임으로부터 형성될 수 있다.

&lt;28&gt;

P는 잔차(residual) 또는 차이(difference) 매크로블록  $D_n$ 을 생성하기 위하여 현재 매크로블록으로부터 빼진다.  $D_n$ 은 블록 변환(block transform)을 이용하여 변환(T, transformed)되고, 양자화(Q, quantized)되어 X를 생성한다. X는 인코딩된 계수(coefficient)들의 집합이다. 인코딩된 계수들은 재배열(reorder)되고 엔트로피 코딩(entropy coding)되며, 엔트로피 코딩된 계수들은 매크로블록을 디코딩하기 위하여 필요한 정보와 함께 압축된 비트열(compressed bitstream)을 형성한다. 압축된 비트열은 전송 또는 저장을 위하여 NAL(Network Abstraction Layer)로 보내진다.

<29> 이제 재구성 경로에 대해서 설명한다. 양자화된 매크로블록 계수인  $X$ 는 다른 매크로블록들의 인코딩을 위하여 사용되는 재구성 프레임을 생성하기 위하여 디코딩된다.  $X$ 는 역양자화( $Q^{-1}$ )되고, 역변환( $T^{-1}$ , Inverse Transformed)되어 차이 매크로블록  $D_n'$ 을 생성한다. 재구성 경로에서 생성된 차이 매크로블록  $D_n'$ 은 전진 경로에서 생성된 차이 매크로블록인  $D_n$ 과 동일하지 않다. 양자화에 의해서 손실이 발생하며, 이에 따라  $D_n'$ 은  $D_n$ 의 왜곡된 형태일 수 있다. 예측 매크로블록  $P$ 가  $D_n'$ 에 더해지고, 재구성 매크로블록  $uF_n'$ 이 생성된다. 재구성 매크로블록  $uF_n'$ 도 원래 매크로블록  $F_n$ 의 왜곡된 형태일 수 있다.  $uF_n'$ 에 대하여 블록킹 왜곡(blocking distortion)을 줄이기 위하여 필터가 적용될 수 있고, 재구성 프레임은 필터가 적용된 복수의 재구성 매크로블록으로부터 형성될 수 있다.

<30> 도 2는 H.264/AVC 표준의 디코더의 블록도이다.

<31> 도 2를 참조하면, 디코더는 NAL로부터 압축된 비트열을 수신한다. 수신된 데이터는 양자화된 계수들의 집합인  $X$ 를 생성하기 위하여 엔트로피 디코딩(entropy decoded)되고, 재배열된다.  $X$ 에 역양자화 및 역변환이 수행되어  $D_n'$ 이 생성되며, 디코더는 비트열에서 디코딩된 헤더 정보(header information)를 이용하여 인코더에서 생성된 예측 매크로블록과 동일한 예측 매크로블록  $P$ 을 생성한다.  $P$ 에  $D_n'$ 이 더해져  $uF_n'$ 이 생성되며,  $uF_n'$ 이 필터를 거쳐 디코딩된 매크로블록  $F_n'$ 이 생성될

수 있다.

<32> 이하, 인트라 예측에 대해서 설명한다.

<33> 블록(또는 매크로블록)에 대하여 인트라 예측이 수행될 때, 예측 블록(또는 매크로블록) P가 인코딩된 블록(또는 매크로블록)들 또는 재구성된 블록(또는 매크로블록)들을 기반으로 형성될 수 있다. P는 원본 영상으로부터 빼지고, P가 빼진 차이값이 인코딩되어 전송된다. 인트라 예측은 루마 예측 모드(luma prediction mode) 또는 크로마 예측 모드(chroma prediction mode)에 의해서 수행될 수 있다. 루마 예측 모드에서  $4 \times 4$  크기의 서브블록(sub-block) 또는  $16 \times 16$  크기의 매크로블록 단위로 인트라 예측이 수행될 수 있으며,  $4 \times 4$  루마 예측 모드에서는 총 9개의 추가적인 예측 모드가,  $16 \times 16$  루마 예측 모드에서는 총 4개의 추가적인 예측 모드가 존재한다. 인트라 예측이 수행되는 단위는 서브블록 또는 매크로블록에 제한되지 않으며, 다양한 크기의 유닛을 단위로 하여 수행될 수 있다. 인트라 예측이 수행되는 화소의 단위를 코딩 유닛(CU; Coding Unit) 또는 예측 유닛(PU; Prediction Unit) 등으로 부를 수 있으며, CU 또는 PU의 크기가 앞서 설명한 바와 같이 서브블록 또는 매크로블록의 크기와 같을 수도 있다.

<34> 도 3은  $4 \times 4$  루마 예측 모드에서 예측 샘플(prediction sample)을 라벨링(labeling)한 예를 나타낸다. 도 3을 참조하면, 예측 블록 P는 A 내지 H 또는 I 내지 L로 라벨링된 샘플을 기반으로 계산된다.

<35> 도 4는  $4 \times 4$  루마 예측 모드 내의 9가지 예측 모드를 나타낸다.

- <36> 인코더는 예측 블록 P와 인코딩될 블록 사이의 차이를 최소화하기 위하여 각 블록에 대하여 9가지 예측 모드 중 어느 하나를 선택할 수 있다. 9가지 예측 모드는 다음과 같다.
- <37> 1) 모드 0(vertical): 예측 블록의 상위 샘플들인 A 내지 D가 수직적으로 외삽(extrapolate)된다.
- <38> 2) 모드 1(horizontal): 예측 블록의 왼쪽 샘플들인 I 내지 L이 수평적으로 외삽된다.
- <39> 3) 모드 2(DC): P 내의 모든 샘플이 A 내지 D 및 I 내지 L이 평균에 의해서 예측된다.
- <40> 4) 모드 3(Diagonal Down-Left): P 내의 샘플들은 아래-왼쪽과 위-오른쪽 사이에서 45도 각도로 보간(interpolate)된다.
- <41> 5) 모드 4(Diagonal Down-Right): P 내의 샘플들은 우하향 45도 각도로 외삽된다.
- <42> 6) 모드 5(Vertical-Right): P 내의 샘플들은 수직축에서 오른쪽으로 약 26.6도의 각도로 외삽 또는 보간된다.
- <43> 7) 모드 6(Horizontal-Down): P 내의 샘플들은 수평축에서 아래쪽으로 약 26.6도의 각도로 외삽된다.
- <44> 8) 모드 7(Vertical-Left): P 내의 샘플들은 수직축에서 왼쪽으로 약 26.6도의 각도로 외삽된다.

<45> 9) 모드 8(Horizontal-Up): P 내의 샘플들은 수평축에서 위쪽으로 약 26.6도의 각도로 보간된다.

<46> 도 4에서 화살표는 각 모드 내에서 예측이 수행되는 방향을 지시한다. 한편, 모드 3 내지 모드 8에 대하여, 예측 블록 내의 샘플들은 예측 샘플 A 내지 H 또는 I 내지 L의 가중 평균(weighted average)으로부터 형성된다. 예를 들어 모드 4에서, 예측 블록의 오른쪽 상위에 위치하는 샘플  $d = \text{round}(B/4 + C/2 + D/4)$ 로 예측될 수 있다. 인코더는 각 예측 모드에 의해서 생성된 예측 블록에 대하여 절대 에러의 합(SAE; Sum of Absolute Errors)을 각각 계산하고, SAE가 가장 작은 예측 모드에 의해서 인트라 예측을 수행한다.

<47> 도 5는 인트라 예측 수행 이전에 필터를 적용하는 방법의 일 예를 나타낸다.

<48> 일반적으로 H.264/AVC 표준에서 사용되는 샘플들에 필터를 적용한 후에 인트라 예측이 수행된다. 샘플은 참조(reference) 화소값으로 불릴 수도 있다. 도 5의 예에서는 필터가 저대역 필터(low-pass filter)이며,  $8 \times 8$  블록에 한해서 필터가 적용되는 것을 가정한다.

<49> 수학적 식 1은 참조 화소값에 적용되는 3-tap 필터를 나타내는 수학적 식의 일 예이다.

<50> <수학적 식 1>

<51> 
$$h[Z] = (A + 2 \times Z + Q)/4$$

<52> 
$$h[A] = (Z + 2 \times A + B)/4$$

<53> ...

<54>  $h[P] = (O + 3 \times P)/4$

<55>  $h[Q] = (Z + 2 \times Q + R)/4$

<56> ...

<57>  $h[X] = (W + 3 \times X)/4$

<58>  $h[Z]$ 는  $Z$ 에 필터를 적용하여 계산한 값을 나타낸다. 수학식 1을 참조하면, 필터 계수 (1,2,1)이 적용되어 참조 화소값에 대한 필터링이 수행되고, 필터링을 거친 참조 화소값( $h[A] \sim h[Z]$ )을 기반으로 9개의 예측 모드에 의한 인트라 예측이 수행된다. 복호화 과정에서도 부호화 과정과 마찬가지로 필터가 적용될 수 있다.

<59> 인트라 예측 수행 이전에 필터링을 수행함에 있어서, 필터링을 수행하지 않을 때 인코딩의 성능이 향상되는 경우가 있을 수 있다. 이에 따라 적응적으로 필터를 적용하여 인트라 예측을 수행하는 방법이 제안될 수 있다.

<60> 도 6은 제안된 적응적 필터를 이용한 인트라 예측 수행 방법의 일 실시예를 나타낸다.

<61> 도 6을 참조하면, 단계 S201에서 인코더는 참조 화소값에 대한 필터 적용 여부를 결정한다. 인코더는 필터 적용 여부를 결정할 때, 주변 블록의 정보를 이용하거나 율-왜곡 최적화(RDO; Rate-Distortion Optimization) 방법에 의하여 필터 적용 여부를 결정할 수 있다.

<62> 주변 블록의 정보를 이용하여 참조 화소값에 대한 필터 적용 여부를 결정할

때, 주변 블록의 예측 모드 정보(MPM; Most Probable Mode)를 기반으로 현재 블록의 예측 모드를 결정하고, 결정된 현재 블록의 예측 모드에 따라 참조 화소값에 대한 필터 적용 여부를 결정할 수 있다. 예를 들어 현재 블록이 'C' 이고 상위 블록이 'A' , 왼쪽 블록이 'B' 이라 가정하면, 현재 블록의 예측 모드가 'A' 의 예측 모드와 같을 경우 'A' 의 예측 모드를 현재 블록의 예측 모드로 결정하며, 현재 블록의 예측 모드가 'B' 의 예측 모드와 같을 경우 'B' 의 예측 모드를 현재 블록의 예측 모드로 결정할 수 있다. 또는, 현재 블록의 예측 모드가 'A' 의 예측 모드 또는 'B' 의 예측 모드를 제외한 다른 예측 모드일 경우, 해당 예측 모드를 부호화하여 전송한다. 이와 같이 결정된 현재 블록의 예측 모드에 따라 참조 화소값에 대한 필터 적용 여부가 결정될 수 있다. 현재 블록과 상위 블록 또는 왼쪽 블록의 크기가 다른 경우에도 주변 블록의 예측 모드에 따라 현재 블록의 예측 모드를 결정할 수 있다.

<63>           또는, 주변 블록의 정보를 이용하여 참조 화소값에 대한 필터 적용 여부를 결정할 때, 주변 참조 화소값의 변화량을 기반으로 필터 적용 여부를 결정할 수 있다. 예를 들어 필터를 적용하려는 참조 화소값을  $p[n]$ 이라 하면, 주변 참조 화소값인  $p[n-1]$  및  $p[n+1]$ 의 차이값을 계산하고 이를 특정 문턱값(threshold)과 비교하여 필터 적용 여부를 결정할 수 있다.

<64>           또는, 현재 블록의 예측 모드 이외에 현재 블록의 크기에 따라 참조 화소값에 대한 필터 적용 여부를 결정할 수 있다. 이때 현재 블록의 예측 모드 및 현재 블록의 크기에 따른 필터 적용 여부를 미리 지정하고, 해당 예측 모드 또는 해당



크기에 따라 적응적으로 필터 적용 여부를 결정한다.

<65> 표 1은 현재 블록의 예측 모드 및 현재 블록의 크기에 따른 필터 적용 여부를 지정한 표이다.

<66> 【표 1】

현재 블록의 예측 모드	현재 블록 크기			
	4×4	8×8	16×16	32×32
0	0	0	0	0
1	0	0	0	0
2	1	1	1	1
3	0	1	1	1
4	0	1	1	1
...	...	...	...	...

<67> 표 1을 참조하면, ‘0’ 은 필터가 적용되지 않는 것을 의미하며, ‘1’ 은 필터가 적용되는 것을 의미한다. 예를 들어 현재 블록의 크기가 4×4일 때, 현재 블록의 예측 모드가 1이면 필터가 적용되지 않으며, 현재 블록의 예측 모드가 3이면 필터가 적용될 수 있다.

<68> 또한, 주변 블록의 화면내(intra-frame) 부호화 또는 화면간(inter-frame) 부호화 여부에 따라 참조 화소값에 대한 필터 적용 여부가 결정될 수 있다. 예를 들어 제한된 인트라 예측(constrained intra-prediction) 수행의 경우, 주변 블록이 화면간 부호화되었을 때 화면내로 부호화된 주변 블록의 값들을 이용하여 상기 화면간으로 부호화된 값을 채우게 되며, 이때에는 필터링을 적용하지 않을 수 있다.

<69> 참조 화소값에 대하여 필터를 적용하기로 결정된 경우 단계 S202에서 인코더

는 참조 화소값에 대하여 필터를 적용한다. 적용되는 필터를 일반적으로 사용되는 필터일 수 있다. 예를 들어 수학적 1의 3-tap가 사용될 수 있으며, 또는 2-tap 필터가 사용될 수도 있다. 2-tap 필터가 사용될 때 (1/8, 7/8), (2/8, 6/8), (3/8, 5/8) 등의 다양한 필터 계수가 사용될 수 있다. 필터가 적용된 참조 화소값이 다른 참조 화소값에 필터를 적용할 때 사용될 수 있다. 또한, 참조 화소값에 필터를 적용하는 경우 모든 참조 화소값에 대하여 필터를 적용할 수도 있고, 일부 참조 화소값에 대해서만 필터를 적용할 수도 있다.

<70> 단계 S203에서 인코더는 필터가 적용된 또는 필터가 적용되지 않은 참조 화소값을 기반으로 인트라 예측을 수행한다.

<71> 단계 S204에서 인코더는 현재 블록의 부호화를 위해 상기 인트라 예측 수행에 의해서 예측된 각 예측 모드별 예측값에 대한 필터 적용 여부를 결정한다. 여기서 각 예측 모드는 4×4 루마 예측 모드의 9개의 예측 모드일 수 있다. 각 예측 모드별 예측값에 대하여 필터 적용 여부를 결정할 때에도 주변 블록의 정보를 이용하거나 RDO 방법에 의하여 필터 적용 여부를 결정할 수 있다.

<72> 주변 블록의 정보를 이용하여 예측값에 대한 필터 적용 여부를 결정할 때, 주변 블록의 예측 모드 정보(MPM)를 기반으로 현재 블록의 예측 모드를 결정하고, 결정된 현재 블록의 예측 모드에 따라 예측값에 대한 필터 적용 여부를 결정할 수 있다. 예를 들어 현재 블록이 'C' 이고 상위 블록이 'A' , 왼쪽 블록이 'B' 이라 가정하면, 현재 블록의 예측 모드가 'A' 의 예측 모드와 같을 경우 'A' 의 예측 모드를 현재 블록의 예측 모드로 결정하며, 현재 블록의 예측 모드가 'B' 의

예측 모드와 같을 경우 'B'의 예측 모드를 현재 블록의 예측 모드로 결정할 수 있다. 또는, 현재 블록의 예측 모드가 'A'의 예측 모드 또는 'B'의 예측 모드를 제외한 다른 예측 모드일 경우, 해당 예측 모드를 부호화하여 전송한다. 이때 현재 블록의 예측 모드가 특정 예측 모드(DC 또는 planar)인 경우, 참조 화소값과 예측값 간의 차이가 다른 예측 모드에 비해서 상대적으로 커질 수 있다. 예를 들어 planar 예측 모드에서의 참조 화소값과 예측값과의 차이가 다른 예측 모드에 비해서 비교적 클 수 있다. planar 예측 모드에서의 예측값은 각 행을 수평적으로 선형 보간(linear interpolation)하여 얻어진 제1 예측값과 각 열을 수직적으로 선형 보간하여 얻어진 제2 예측값의 평균으로 계산될 수 있다. 수평적으로 선형 보간할 때 오른쪽 값은 참조 화소값 중 우상향에 위치한 값(즉, 도 3에서 H)과 동일하며, 수직적으로 선형 보간할 때 아래쪽 값은 참조 화소값 중 좌하향에 위치한 값(즉, 도 3에서 1)과 동일하다. 예측값이 참조 화소값으로부터 바로 구해지는 것이 아니므로 참조 화소값과 예측값의 차이가 비교적 클 수 있다. 이와 같은 경우 예측값에 대하여 필터를 적용하여 인트라 예측의 효율성을 높일 수 있다. 이와 같이 결정된 현재 블록의 예측 모드에 따라 예측값에 대한 필터 적용 여부가 결정될 수 있다. 현재 블록과 상위 블록 또는 왼쪽 블록의 크기가 다른 경우에도 주변 블록의 예측 모드에 따라 현재 블록의 예측 모드를 결정할 수 있다.

&lt;73&gt;

또는, 현재 블록의 예측 모드 이외에 현재 블록의 크기에 따라 예측값에 대한 필터 적용 여부를 결정할 수 있다. 이때 현재 블록의 예측 모드 및 현재 블록의 크기에 따른 필터 적용 여부를 미리 지정하고, 해당 예측 모드 또는 해당 크기에

따라 적응적으로 필터 적용 여부를 결정한다. 또는, 주변 블록의 화면내 부호화 또는 화면간 부호화 여부에 따라 예측값에 대한 필터 적용 여부가 결정될 수 있다.

<74>           예측값에 대하여 필터를 적용하기로 결정된 경우 단계 S205에서 인코더는 예측값에 대하여 필터를 적용한다. 이에 따라 현재 블록의 예측이 완료되며, 인코더는 잔차 신호를 계산하고 엔트로피 부호화를 수행한다.

<75>           도 7은 제안된 적응적 필터를 이용한 인트라 예측 수행 방법에 따라 예측값에 필터가 적용되는 경우를 나타낸다.

<76>           도 7을 참조하면, 현재 블록의 예측 모드가 비방향성 모드인 경우, 참조 화소값과 예측값 간의 차이가 다른 예측 모드에 비해서 상대적으로 커질 수 있으므로, 주변의 복원된 참조 화소값과의 경계에 인접한 화소의 예측값에 대해서만 필터를 적용할 수 있다. 예를 들어 도 3에서 경계에 위치한 한 줄의 화소인 a1~a8 및 b1, c1, d1, e1, f1, g1, h1에 해당하는 예측값에 대하여 필터링을 수행할 수 있다. 또는, 경계에 위치한 두 줄의 화소인 a1~a8, b1~b8 및 c1~c2, d1~d2, e1~e2, f1~f2, g1~g2, h1~h2에 해당하는 예측값에 대하여 필터를 적용할 수 있다. 이때 적용되는 필터를 일반적으로 사용되는 필터일 수 있다. 예를 들어 수학적 식 1의 3-tap가 사용될 수 있으며, 또는 2-tap 필터가 사용될 수도 있다. 2-tap 필터가 사용될 때 (1/8, 7/8), (2/8, 6/8), (3/8, 5/8) 등의 다양한 필터 계수가 사용될 수 있다. 또는, 화소의 위치에 따라 2-tap 필터 또는 3-tap 필터 중 어느 하나를 선택하여 사용할 수도 있다.

<77>           같은 방법으로, 현재 블록의 예측 모드가 모드 0, 모드 3 또는 모드 7과 같

이 A~P에 해당하는 참조 화소값을 이용하는 예측 모드인 경우, 참조 화소값과 예측값 간의 차이가 비교적 큰 a1~a8에 해당하는 예측값에 대하여 필터를 적용할 수 있다. 또한, 현재 블록의 예측 모드가 모드 1 또는 모드 8과 같이 Q~X에 해당하는 참조 화소값을 이용하는 예측 모드인 경우, 참조 화소값과 예측값 간의 차이가 비교적 큰 a1, b1, c1, d1, e1, f1, g1 및 h1에 해당하는 예측값에 대하여 필터를 적용할 수 있다.

<78> 수학식 2는 화소의 위치에 따라 2-tap 필터 또는 3-tap 필터를 선택하여 사용하는 경우, 예측값에 적용되는 필터를 나타내는 수학식의 일 예이다.

<79> <수학식 2>

<80> 
$$f[a1] = (2 \times A + 4 \times a1 + 2 \times Q) / 8$$

<81> 
$$f[b1] = (2 \times B + 6 \times b1) / 8$$

<82> 
$$f[c1] = (2 \times C + 6 \times c1) / 8$$

<83> ...

<84> 
$$f[a2] = (2 \times R + 6 \times a2) / 8$$

<85> 
$$f[a3] = (2 \times S + 6 \times a3) / 8$$

<86> ...

<87> 수학식 2에서 f[a1]은 예측값 a1에 필터를 적용한 값이며, A와 Q는 참조 화소값을 나타낸다. 수학식 2를 참조하면, a1에 위치한 화소의 예측값에 대하여 3-tap 필터가 적용되고, 나머지 화소의 예측값에 대하여는 2-tap 필터가 적용됨을 알

수 있다.

<88> 수학식 3은 제안된 적응적 필터를 이용한 인트라 예측 수행 방법에 따라 예측값에 필터가 적용되는 경우, 예측값에 적용되는 필터를 나타내는 수학식의 또 다른 예이다.

<89> <수학식 3>

<90> 1. Vertical low-pass filter

<91> 
$$v[a1] = (A + 2 \times a1 + a2)/4$$

<92> 
$$v[a2] = (v[a1] + 2 \times a2 + a3)/4$$

<93> ...

<94> 
$$v[a8] = (v[a7] + 3 \times a8)/4$$

<95> 
$$v[b1] = (B + 2 \times b1 + b2)/4$$

<96> ...

<97> 2. Horizontal low-pass filter

<98> 
$$h[a1] = (Q + 2 \times v[a1] + v[b1])/4$$

<99> 
$$h[b1] = (h[a1] + 2 \times v[b1] + v[c1])/4$$

<100> ...

<101> 
$$h[h1] = (h[g1] + 3 \times v[h1])/4$$

<102> 
$$h[a2] = (R + 2 \times v[a2] + v[b2])/4$$

<103> ...

<104> 수학식 3의 필터는 각 예측 모드에 대하여 주변 블록의 정보를 이용하는 방법 또는 RDO 방법을 기반으로 하여 적응적인 필터를 적용할 때에 사용될 수 있다. 수학식 3을 참조하면, 필터 계수가 (1,2,1)인 저대역 필터가 수직과 수평의 두 방향에 대해 순차적으로 수행된다. 먼저 수직 방향으로 필터가 적용되며, 필터가 적용된 값을 기반으로 다시 수평 방향으로 필터가 적용된다. 필터가 적용된 예측값이 다른 예측값에 필터를 적용할 때 사용될 수 있다.

<105> 한편, RDO 방법이 적용되는 경우, 도 6에서 설명된 인트라 예측 수행 방법이 반복되어 수행될 수 있다.

<106> 도 8은 본 발명의 실시예가 구현되는 인코더 및 디코더의 블록도이다.

<107> 인코더(800)는 프로세서(810; processor) 및 메모리(820; memory)를 포함한다. 프로세서(810)는 제안된 기능, 과정 및/또는 방법을 구현한다. 프로세서(810)는 현재 블록의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하고, 상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하고, 상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측을 수행하고, 상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드 별 예측값에 대한 제2 필터의 적용 여부를 결정하고, 상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제2 필터를 적용하도록 구성된다. 메모리(820)는 프로세서(810)와 연결되어, 프로세서(810)를 구동하기 위한 다양한 정보를 저장한다.

&lt;108&gt;

디코더(900)는 프로세서(910) 및 메모리(920)를 포함한다. 프로세서(910)는 제안된 기능, 과정 및/또는 방법을 구현한다. 프로세서(910)는 현재 블록의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하고, 상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하고, 상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측을 수행하고, 상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드 별 예측값에 대한 제2 필터의 적용 여부를 결정하고, 상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드 별 예측값에 대하여 상기 제2 필터를 적용하도록 구성된다. 메모리(920)는 프로세서(910)와 연결되어, 프로세서(910)를 구동하기 위한 다양한 정보를 저장한다.

&lt;109&gt;

프로세서(810, 910)은 ASIC(application-specific integrated circuit), 다른 칩셋, 논리 회로 및/또는 데이터 처리 장치를 포함할 수 있다. 메모리(820, 920)는 ROM(read-only memory), RAM(random access memory), 플래쉬 메모리, 메모리 카드, 저장 매체 및/또는 다른 저장 장치를 포함할 수 있다. 실시예가 소프트웨어로 구현될 때, 상술한 기법은 상술한 기능을 수행하는 모듈(과정, 기능 등)로 구현될 수 있다. 모듈은 메모리(820, 920)에 저장되고, 프로세서(810, 910)에 의해 실행될 수 있다. 메모리(820, 920)는 프로세서(810, 910) 내부 또는 외부에 있을 수 있고, 잘 알려진 다양한 수단으로 프로세서(810, 910)와 연결될 수 있다.

&lt;110&gt;

상술한 예시적인 시스템에서, 방법들은 일련의 단계 또는 블록으로써 순서도를 기초로 설명되고 있지만, 본 발명은 단계들의 순서에 한정되는 것은 아니며, 어



떤 단계는 상술한 바와 다른 단계와 다른 순서로 또는 동시에 발생할 수 있다. 또한, 당업자라면 순서도에 나타낸 단계들이 배타적이지 않고, 다른 단계가 포함되거나 순서도의 하나 또는 그 이상의 단계가 본 발명의 범위에 영향을 미치지 않고 삭제될 수 있음을 이해할 수 있을 것이다.

&lt;111&gt;

상술한 실시예들은 다양한 양태의 예시들을 포함한다. 다양한 양태들을 나타내기 위한 모든 가능한 조합을 기술할 수는 없지만, 해당 기술 분야의 통상의 지식을 가진 자는 다른 조합이 가능함을 인식할 수 있을 것이다. 따라서, 본 발명은 이하의 특허청구범위 내에 속하는 모든 다른 교체, 수정 및 변경을 포함한다고 할 것이다.

## 【특허청구범위】

## 【청구항 1】

현재 블록(current block)의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하는 단계;

상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하는 단계;

상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측(intra-prediction)을 수행하는 단계;

상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드(prediction mode) 별 예측값에 대한 제2 필터의 적용 여부를 결정하는 단계; 및

상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제2 필터를 적용하는 단계를 포함하는 인트라 예측 수행 방법.

## 【청구항 2】

제 1 항에 있어서,

상기 제1 필터의 적용 여부는 상기 주변 블록의 정보를 기반으로 결정된 상기 현재 블록의 예측 모드를 기반으로 결정되는 것을 특징으로 하는 인트라 예측 수행 방법.

**【청구항 3】**

제 2 항에 있어서,

상기 제1 필터의 적용 여부는 현재 블록의 크기를 기반으로 결정되는 것을 특징으로 하는 인트라 예측 수행 방법.

**【청구항 4】**

제 3 항에 있어서,

상기 제1 필터의 적용 여부는 상기 현재 블록의 예측 모드 및 상기 현재 블록의 크기를 기반으로 미리 지정되는 것을 특징으로 하는 인트라 예측 수행 방법.

**【청구항 5】**

제 1 항에 있어서,

상기 제1 필터의 적용 여부는 상기 주변 블록이 화면내(intra-frame) 부호화되었는지 또는 화면간(inter-frame) 부호화되었는지 여부를 기반으로 결정되는 것을 특징으로 하는 인트라 예측 수행 방법.

**【청구항 6】**

제 1 항에 있어서,

상기 제1 필터는 3-tap 필터 또는 2-tap 필터 중 적어도 어느 하나를 사용하는 것을 특징으로 하는 인트라 예측 수행 방법.

**【청구항 7】**

제 1 항에 있어서,

상기 제2 필터의 적용 여부는 상기 주변 블록의 정보를 기반으로 결정된 상기 현재 블록의 예측 모드를 기반으로 결정되는 것을 특징으로 하는 인트라 예측 수행 방법.

**【청구항 8】**

제 7 항에 있어서,

상기 제2 필터의 적용 여부는 현재 블록의 크기를 기반으로 결정되는 것을 특징으로 하는 인트라 예측 수행 방법.

**【청구항 9】**

제 1 항에 있어서,

상기 제2 필터의 적용 여부는 상기 주변 블록이 화면내 부호화되었는지 또는 화면간 부호화 되었는지 여부를 기반으로 결정되는 것을 특징으로 하는 인트라 예측 수행 방법.

**【청구항 10】**

제 1 항에 있어서,

상기 현재 블록의 예측 모드가 비방향성 모드인 경우,

상기 제2 필터는 상기 참조 화소값의 경계에 인접한 화소의 예측값에 대해서 적용되는 것을 특징으로 하는 인트라 예측 수행 방법.

**【청구항 11】**

제 1 항에 있어서,

상기 제2 필터는 3-tap 필터 또는 2-tap 필터 중 적어도 어느 하나를 사용하는 것을 특징으로 하는 인트라 예측 수행 방법.

**【청구항 12】**

프로세서(processor); 및

상기 프로세서와 연결되며 상기 프로세서를 구동하기 위한 정보를 저장하는 메모리를 포함하되,

상기 프로세서는,

현재 블록(current block)의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하고,

상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하고,

상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측(intra-prediction)을 수행하고,

상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드(prediction mode) 별 예측값에 대한 제2 필터의 적용 여부를 결정하고,

상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제2 필터를 적용하도록 구성되는 것을 특징으로 하는 인코더(encoder).

**【청구항 13】**

제 12 항에 있어서,

상기 제1 필터의 적용 여부는 상기 주변 블록의 정보를 기반으로 결정된 상기 현재 블록의 예측 모드를 기반으로 결정되는 것을 특징으로 하는 인코더.

**【청구항 14】**

제 13 항에 있어서,

상기 제1 필터의 적용 여부는 현재 블록의 크기를 기반으로 결정되는 것을 특징으로 하는 인코더.

**【청구항 15】**

제 14 항에 있어서,

상기 제1 필터의 적용 여부는 상기 현재 블록의 예측 모드 및 상기 현재 블록의 크기를 기반으로 미리 지정되는 것을 특징으로 하는 인코더.

**【청구항 16】**

프로세서(processor); 및

상기 프로세서와 연결되며 상기 프로세서를 구동하기 위한 정보를 저장하는 메모리를 포함하되,

상기 프로세서는,

현재 블록(current block)의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하고,

상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하고,

상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측(intra-prediction)을 수행하고,

상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드(prediction mode) 별 예측값에 대한 제2 필터의 적용 여부를 결정하고,

상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제2 필터를 적용하도록 구성되는 것을 특징으로 하는 디코더(decoder).

**【청구항 17】**

제 16 항에 있어서,

상기 제1 필터의 적용 여부는 상기 주변 블록의 정보를 기반으로 결정된 상기 현재 블록의 예측 모드를 기반으로 결정되는 것을 특징으로 하는 디코더.

**【청구항 18】**

제 17 항에 있어서,

상기 제1 필터의 적용 여부는 현재 블록의 크기를 기반으로 결정되는 것을 특징으로 하는 디코더.

【청구항 19】

제 18 항에 있어서,

상기 제1 필터의 적용 여부는 상기 현재 블록의 예측 모드 및 상기 현재 블록의 크기를 기반으로 미리 지정되는 것을 특징으로 하는 디코더.



**【요약서】****【요약】**

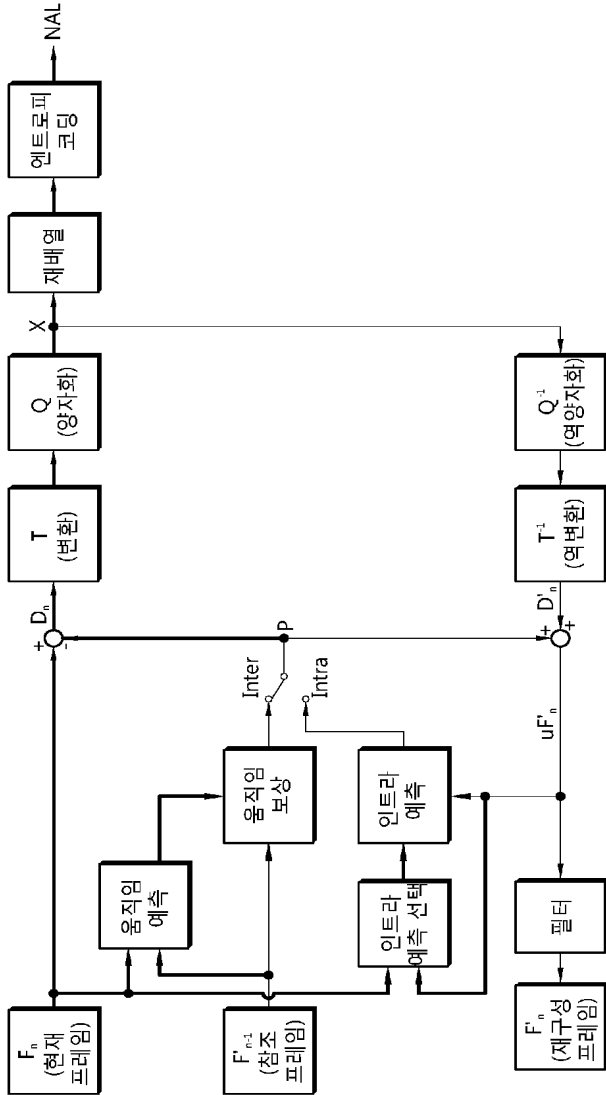
적응적 필터를 이용한 인트라 예측(intra-prediction) 수행 방법 및 장치가 제공된다. 상기 인트라 예측 수행 방법은 현재 블록(current block)의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하는 단계, 상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하는 단계, 상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측을 수행하는 단계, 상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드(prediction mode) 별 예측값에 대한 제2 필터의 적용 여부를 결정하는 단계, 및 상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제2 필터를 적용하는 단계를 포함한다.

**【대표도】**

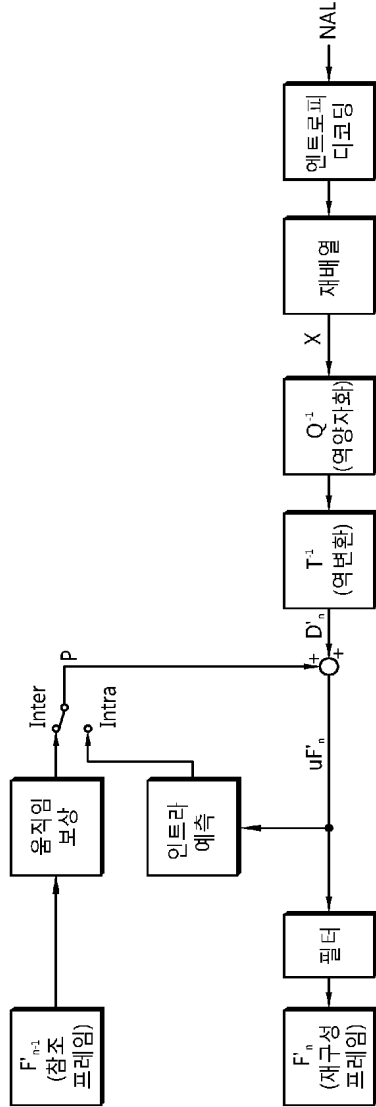
도 6

【도면】

【도 1】



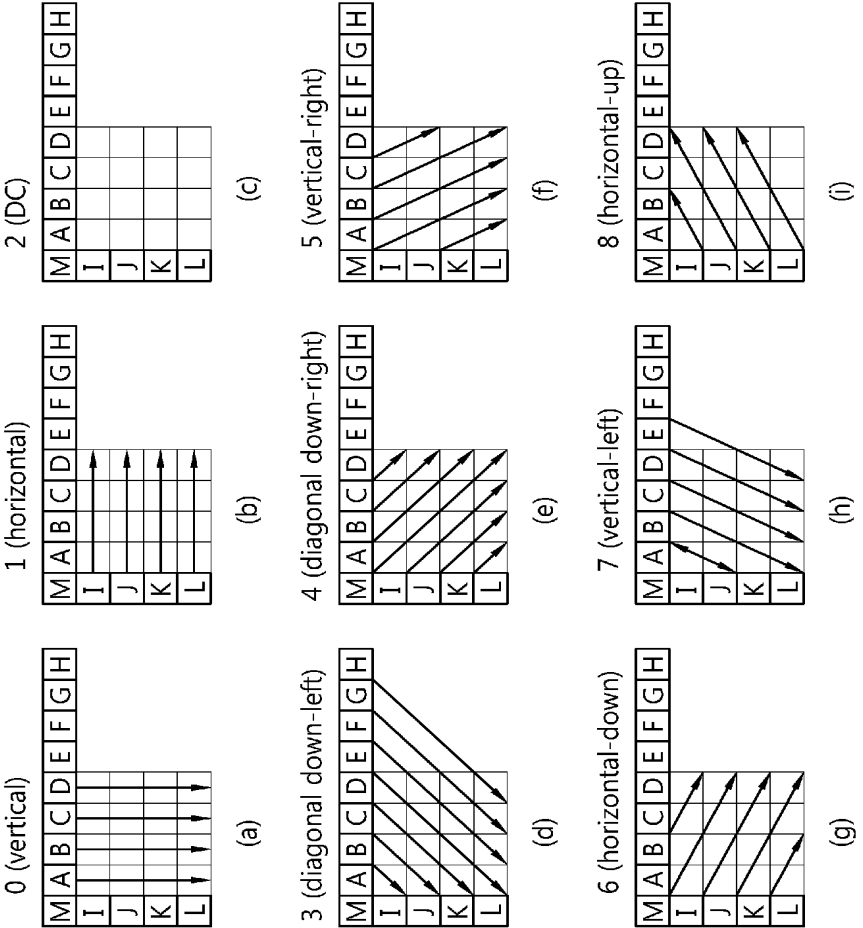
【도 2】



【도 3】

M	A	B	C	D	E	F	G	H
I	a	b	c	d				
J	e	f	g	h				
K	i	j	k	l				
L	m	n	o	p				

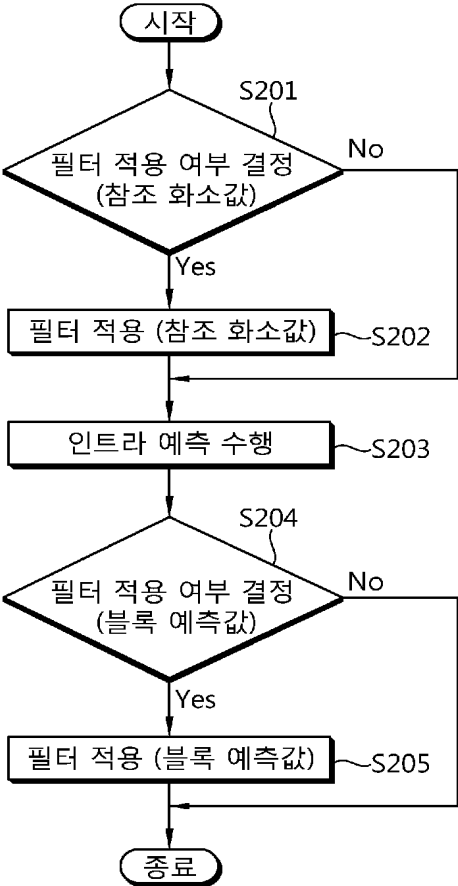
【도 4】



【 5】

Z	Q	R	S	T	U	V	W	X
A								
B								
C								
D								
E								
F								
G								
H								
I								
J								
K								
L								
M								
N								
O								
P								

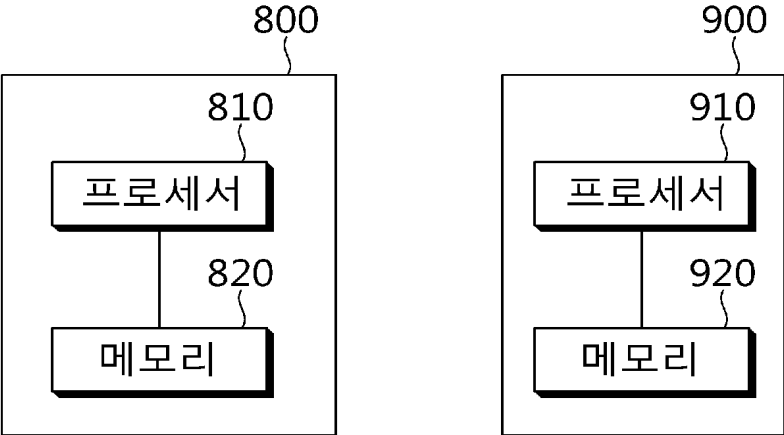
【도 6】



【표 7】

Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Q	a1	b1	c1	d1	e1	f1	g1	h1								
R	a2	b2	c2	d2	e2	f2	g2	h2								
S	a3	b3	...	...	...	...	...	...								
T	a4	b4	...	...	...	...	...	...								
U	a5	b5	...	...	...	...	...	...								
V	a6	b6	...	...	...	f6	g6	h6								
W	a7	b7	...	...	...	f7	g7	h7								
X	a8	b8	...	...	...	f8	g8	h8								

【도 8】

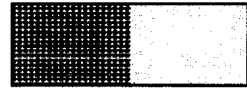




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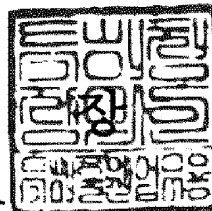
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## 【서지사항】

**【서류명】** 특허출원서  
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**【포괄위임등록번호】** 2009-070456-3  
**【발명의 국문명칭】** 적응적인 필터를 이용한 인트라 예측 부호화/복호화 방법 및 그 장치  
**【발명의 영문명칭】** Method and apparatus for intra prediction encoding and decoding using adaptive filter  
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대리인 양문옥 (서명 또는 인)

**【수수료】**  
**【출원료】** 0 면 38,000 원  
**【가산출원료】** 13 면 0 원  
**【우선권주장료】** 1 건 20,000 원  
**【심사청구료】** 0 항 0 원  
**【합계】** 58,000 원

## 【명세서】

## 【발명의 명칭】

적응적인 필터를 이용한 인트라 예측 부호화/복호화 방법 및 그 장치{Method and apparatus for intra prediction encoding and decoding using adaptive filter}

## 【기술분야】

<1> 본 발명은 동영상 혹은 정지영상을 부호화함에 있어서, 예측하려 하는 블록의 주변 화소값 또는 현재 블록의 예측된 화소값에 적응적인 필터를 적용함으로써 visible artifacts를 줄이고 잔차신호를 줄여서 부호화 효율을 높이는 방법 및 그 장치이다. 보다 상세하게는 인트라 예측을 수행하기 위한 현재 블록의 참조 화소값들에 적응적인 필터(pre-filter)를 적용한 후 예측을 수행하고, 또한 예측된 현재 블록의 화소값들에도 적응적인 필터(post-filter)를 적용한 후 잔차신호를 구하는데 사용한다. 상기 방법으로써 부호화 하려는 휘도 또는 색차 신호 블록을 효과적으로 예측하여 부호화 효율을 향상 시킨다.

## 【배경기술】

<2> 통상, H.264/AVC에서는 인트라 예측시 사용되는 참조 화소값들에 필터를 적용한 후 그 값들을 예측에 사용한다. 여기서 필터는 간단한 Low-pass 필터를 사용하며 Intra\_8x8 블록에 한해서만 적용한다. 필터를 적용하는 방법은 하기 [도 1]에서와 같다.

<3> [수식 1]

<4>  $h[Z] = (A + 2*Z + Q)/4$

<5>  $h[A] = (Z + 2*A + B)/4$

<6> ~

<7>  $h[P] = (O + 3*P)/4$

<8>  $h[Q] = (Z + 2*Q + R)/4$

<9> ~

<10>  $h[X] = (W + 3*X)/4$

<11> 상세히 설명하면  $h[Z]$ 를  $Z$ 에 필터를 적용하여 나온 값이라고 가정할 때 [수식 1]과 같이 구해진다. 즉, (1, 2, 1)의 필터 계수를 통하여 참조(주변) 화소값들에 필터링 과정을 수행하고, 필터링을 거친 참조 화소값( $h[A\sim Z]$ )으로 현재 블록에 대한 9개의 방향 모드별 예측을 수행한다.

<12> 복호화 과정에서 역시 부호화 과정과 같은 방법으로 필터를 적용한다.

**【발명의 내용】**

**【해결하려는 과제】**

<13> 본 발명은 전술한 종래기술의 고정적인 필터 적용을 하지 않고, 적응적으로 필터를 적용하여 보다 효과적인 예측 블록을 만든다. 또한 참조 화소값뿐만 아니라 현재 예측 블록에도 적응적으로 필터를 적용하여 잔차신호의 양을 줄이고 부호화



효율을 향상시키는데 그 목적이 있다.

**【과제의 해결 수단】**

<14> 적응적인 필터를 이용한 인트라 예측 부호화/복호화 방법 및 그 장치

**【발명의 효과】**

<15> 본 발명은 현재 블록을 예측하기 위해 사용되는 참조 화소값 또는 현재 블록의 예측값들에 필터를 적용함으로써 visible artifacts를 줄이고 결론적으로 원본 영상과의 잔차신호를 줄여서 부호화 효율을 향상시킨다. 이는 종래기술이 참조 화소값에 고정적인 필터를 적용 하는 것에 반해 적응적으로 필터를 적용하고, 나아가 현재 블록의 예측값에도 적응적인 필터를 적용하여 보다 효율적으로 인트라 예측을 수행한다. 따라서 본 발명은 종래 부호화/복호화 장치 및 방법을 개선함으로써 압축률을 높이는 효과가 있다.

**【도면의 간단한 설명】**

<16> 도 1은 종래기술을, 도 2 내지 도 5는 본 발명을 설명하기 위한 도면이다.

**【발명을 실시하기 위한 구체적인 내용】**

<17> 본 발명은 인트라 예측을 수행함에 있어 예측 전에 참조 화소값들에 대한 적응적인 필터 적용 및 현재 블록의 예측된 값에 대한 적응적인 필터 적용하는 장치 및 그 방법에 관한 것이다. 보다 상세하게는 [도 2]에서와 같이 종래기술의 필터를 적용하기 전에 "필터 적용 판별부(201)"를 거치게 된다. 필터를 적용한 후 예측을 하는 것이 항상 좋은 것은 아니기 때문에 "필터 적용 판별부"에서는 주변 블록의

정보를 이용한 적응적인 방법 또는 율-왜곡 최적화(RDO: Rate-Distortion Optimization) 방법 등 중에서 적어도 하나의 방법을 사용하여 필터 적용 여부를 결정한다. 본 발명에서 참조 화소값에 대해서 필터링을 적용한다는 것은 반드시 참조 화소값의 모든 영역에 대해 필터링을 적용하도록 한정하는 것은 아니며, 참조 화소값들 중에서 일부 영역에 대해서만 필터링을 적용할 수도 있다.

&lt;18&gt;

필터 적용 판별부(201)에서는 주변 블록의 모드 정보(MPM)를 이용하여 현재 블록 모드를 결정한 후, 결정된 현재 블록 모드에 따라 참조 화소값에 대한 필터 적용 여부를 달리 할 수 있다. 주변 블록의 모드 정보(MPM)를 이용하여 현재블록 모드를 결정하는 보다 구체적인 예를 들면, [도 4]는 현재 블록이 'C' 이고 상위 블록이 'A' 이며 왼쪽 블록이 'B' 인 경우이다. 여기서 현재 블록의 예측 모드가 'A' 블록의 예측 모드와 같을 경우, 'A' 블록의 예측 모드를 현재 블록의 예측 모드로 결정하며, 현재 블록의 예측 모드가 'B' 블록의 예측 모드와 같을 경우, 'B' 블록의 예측 모드를 현재 블록의 예측 모드로 결정한다. 이때, [도 4]에서처럼, 현재 블록과 주변 블록들의 크기가 다른 상황에서도 적용될 수 있다.

&lt;19&gt;

또한, 결정된 현재 블록 모드뿐 아니라 현재 블록의 크기에 따라서도 참조 화소값에 대한 필터 적용 여부를 달리 할 수 있다. 하기 [도 5]는 본 발명의 하나의 실시예로, 참조 화소값들에 필터를 적용함에 있어, 예측 대상 블록의 크기와 예측 모드에 따른 필터 적용 여부를 테이블화하여 적응적으로 필터 적용 여부를 결정하는 방법을 나타낸다. 여기서, '0' 은 필터를 적용하지 않는 것을 의미하며, '1' 은 필터를 적용한다는 것을 의미한다.

<20> 또 다른 예로, 주변 블록이 화면내 부호화 되었는지 화면간 부호화 되었는지에 따라 참조 화소값에 대한 필터 적용 여부 및/또는 필터 종류를 달리 할 수 있다. 예를 들어, constrained intra prediction의 경우, 주변 블록이 화면간 부호화 되었을 때 화면내로 부호화 된 주변의 다른 블록의 값들을 이용하여 상기 화면간으로 부호화된 값을 채우게 되는데 이 값들에 대해서는 필터링을 적용하지 않을 수 있다.

<21> 상기 결정된 필터를 "필터 적용부(202)"에서 적용하며, 또한 필터링을 수행하는 과정에서 필터링된 화소값이 다음 화소값의 필터링 작업을 위해 사용될 수도 있고, 필터는 종래기술에서 사용한 필터를 포함한 다수의 필터 중 하나를 사용한다. 예를 들어, [수식 1]에서와 같이 3-tap 필터를 사용할 수 있으며, 또 다른 방법으로는 2-tap 필터를 사용할 수 있다. 이때, 2-tap 필터에 사용되는 필터 계수는  $[1/8, 7/8]$  또는  $[2/8, 6/8]$ ,  $[3/8, 5/8]$  등이 될 수 있다.

<22> 상기 방식의 참조 화소값들에 대한 필터링 과정을 거친 후 "인트라 예측 수행부(203)"를 통한 부호화는 효율을 향상시키는 결과를 가져왔다. 따라서 참조 화소값들 뿐만아니라 현재 블록의 예측값에도 필터를 적용하여 부호화 성능을 높일 수 있다.

<23> "필터 적용 판별부(204)"는 현재 블록의 부호화를 위해 예측된 9가지 모드별 예측값에 필터를 적용하는 여부를 결정한다. 여기서도 (201)과 같이 주변 블록의 정보 또는 율-왜곡 최적화 방법을 사용하게 된다. 본 발명에서 예측된 값에 대해서 필터링을 적용한다는 것은 반드시 예측된 값의 모든 영역에 대해 필터링을 적용하

도록 한정하는 것은 아니며, 예측된 값들 중에서 일부 영역에 대해서만 필터링을 적용할 수도 있다.

<24>

필터 적용 판별부(204)에서는 주변 블록의 모드 정보(MPM) 이용하여 현재블록 모드를 결정한 후, 결정된 현재 블록 모드에 따라 예측된 값에 대한 필터 적용 여부를 달리 할 수 있다. 보다 구체적으로 예를 들면, [도 4]는 현재 블록이 'C' 이고 상위 블록이 'A' 이며 왼쪽 블록이 'B' 인 경우이다. 여기서 현재 블록의 예측 모드가 'A' 블록의 예측 모드와 같을 경우, 'A' 블록의 예측 모드를 현재 블록의 예측 모드로 결정하며, 현재 블록의 예측 모드가 'B' 블록의 예측 모드와 같을 경우, 'B' 블록의 예측 모드를 현재 블록의 예측 모드로 결정한다. 이때 결정된 현재 블록 모드뿐 아니라 현재 블록의 크기에 따라서도 예측된 값에 대한 필터 적용 여부를 달리 할 수 있다. 예를 들어, 현재 블록의 예측 모드가 비 방향성 모드(DC 또는 Planar)인 경우에는 참조 화소값들과 예측된 값들 사이의 차이가 방향성 모드에 비해 상대적으로 커질 수 있다. 따라서 이러한 모드의 경우, 참조 화소값에 인접한 예측한 화소값들에 대해 필터를 적용하여 예측을 보다 효율적으로 할 수 있다.

<25>

필터 적용부(205)의 하나의 실시예로, 현재 블록의 예측 모드가 비 방향성 모드(DC 또는 Planar)인 경우, 예측된 값과 주변의 복원된 참조 화소값과의 경계에 인접한 예측한 화소값들에 대해서만 필터링을 적용할 수 있다. 예를 들어, [도 3]의 경우 경계 부분의 한 라인(a1~a8, b1, c1, d1, e1, f1, g1, h1) 또는 두 라인(a1~a8, b1~b8, c1, d1, e1, f1, g1, h1, c2, d2, e2, f2, g2, h2) 등에 해당하는

예측된 값들에 대해 필터링을 수행할 수 있다. 이때, 사용하는 필터는 [수식 1]에  
 서와 같이 3-tap필터를 사용할 수 있으며, 또 다른 방법으로는 2-tap 필터를 사용  
 할 수 있다. 2-tap 필터에 사용되는 필터 계수는 [1/8, 7/8] 또는 [2/8, 6/8],  
 [3/8, 5/8] 등이 될 수 있다. 하나의 실시 예로 [수식 3]은 화소값의 위치에 따라  
 2-tap 필터와 3-tap필터 중에서 선택하여 사용하는 방법을 나타내며 2-tap 필터로  
 [2/8, 6/8]의 필터 계수를 사용한 경우이다. 여기서, f[a1]은 예측된 값 'a1' 에  
 필터링을 적용한 값을 나타내며 'A' 와 'Q' 는 참조 화소값에 해당한다. 다른 필  
 터 계수에 대해서도 같은 방법으로 적용할 수 있다.

<26> [수식 3]

<27>  $f[a1] = (2*A + 4*a1 + 2*Q)/8$

<28>  $f[b1] = (2*B + 6*b1)/8$

<29>  $f[c1] = (2*C + 6*c1)/8$

<30> ~

<31>  $f[a2] = (2*Q + 6*a2)/8$

<32>  $f[a3] = (2*S + 6*a3)/8$

<33> ~

<34> 또 다른 예로, 주변 블록이 화면내 부호화 되었는지 화면간 부호화 되었는지  
 에 따라 예측된 값에 대한 필터 적용 여부 및/또는 필터 종류를 달리 할 수 있다.

<35>           상기 단계에서 필터를 적용하기로 결정이 되면 "필터 적용부(205)"를 통하여 현재 블록의 예측값에 필터링 과정을 수행한다.

<36>           이로써 현재 블록의 예측이 완료되고 잔차신호를 구한 후 엔트로피 부호화를 수행한다. RDO 방법을 사용할 경우 [도 2]의 과정을 여러 번 반복하여 최적의 모드를 결정한다.

<37>           하기 [도 3]과 [수식 2]는 본 발명의 실시예로서, 현재 블록의 예측값에 필터를 적용하는 방법을 나타낸다. H.264에는 방향에 따른 9가지 모드에 대해 예측을 수행한다. 본 실시예는 예측된 각 모드에 대해 RDO 기반으로 적응적인 필터를 적용할 시 사용된다. 사용되는 필터는 필터계수 (1, 2, 1)을 가지는 low-pass 필터이고 수평과 수직의 두 방향에 대해 순차적으로 수행한다.

<38>           여기서, 현재 필터링을 거친 화소값이 다음 화소값의 필터링을 위한 값으로 사용될 수 있고 안 될 수도 있는데, [수식 2]에서는 사용하는 것으로 한다. 따라서 수직 방향으로 필터를 적용하고, 적용되어진 값들을 가지고 수평 방향으로 다시 한번 필터를 적용한다.

<39>           [수식 2]

<40>           1. Vertical low-pass filter

<41>            $v[a1] = (A + 2*a1 + a2)/4$

<42>            $v[a2] = (v[a1] + 2*a2 + a3)/4$

<43>           ~

<44>  $v[a8] = (v[a7] + 3*a8)/4$

<45>  $v[b1] = (B + 2*b1 + b2)/4$

<46> ~

<47> 2. Horizontal low-pass filter

<48>  $h[a1] = (Q + 2* v[a1] + v[b1])/4$

<49>  $h[b1] = (h[a1] + 2* v[b1] + v[c1])/4$

<50> ~

<51>  $h[h1] = (h[g1] + 3* v[h1])/4$

<52>  $h[a2] = (R + 2* v[a2] + v[b2])/4$

<53> ~

**【특허청구범위】**

**【청구항 1】**

적응적인 필터를 이용한 인트라 예측 부호화/복호화 방법 및 그 장치



**【요약서】**

**【요약】**

적응적인 필터를 이용한 인트라 예측 부호화/복호화 방법 및 그 장치

**【대표도】**

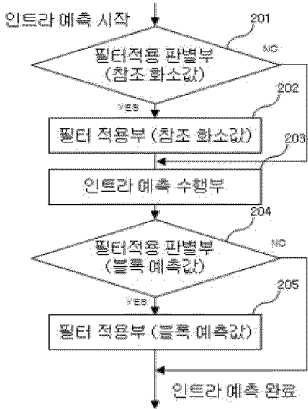
도 2

【도면】

【도 1】

Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Q																
R																
S																
T																
U																
V																
W																
X																

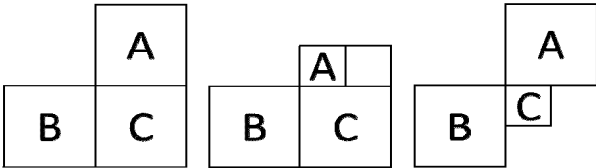
【도 2】



【도 3】

Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Q	a1	b1	c1	d1	e1	f1	g1	h1								
R	a2	b2	c2	d2	e2	f2	g2	h2								
S	a3	b3	...	...	...	...	...	...								
T	a4	b4	...	...	...	...	...	...								
U	a5	b5	...	...	...	...	...	...								
V	a6	b6	...	...	...	f6	g6	h6								
W	a7	b7	...	...	...	f7	g7	h7								
X	a8	b8	...	...	...	f8	g8	h8								

【도 4】



【도 5】

예측 모드	블록 크기			
	4x4	8x8	16x16	32x32
0	0	0	0	0
1	0	0	0	0
2	1	1	1	1
3	0	1	1	1
4	0	1	1	1
...	...	...	...	...

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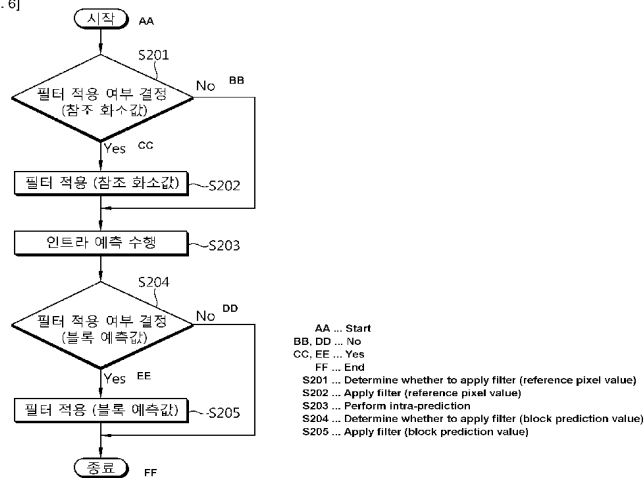
(81) 지정국 (별도의 표시가 없는 한, 가능한 모든 종류의 국내 권리의 보호를 위하여): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KZ,

[다음 쪽 계속]

(54) Title: METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER

(54) 발명의 명칭 : 적응적 필터를 이용한 인트라 예측 수행 방법 및 장치

[Fig. 6]



(57) Abstract: Provided is a method and apparatus for performing intra-prediction using an adaptive filter. The method for performing intra-prediction comprises the steps of: determining whether or not to apply a first filter for a reference pixel value on the basis of information of a neighboring block of a current block; applying the first filter for the reference pixel value when it is determined to apply the first filter; performing intra-prediction on the current block on the basis of the reference pixel value; determining whether or not to apply a second filter for a prediction value according to each prediction mode of the current block, which is predicted by the intra-prediction performance on the basis of the information of the neighboring block; and applying the second filter for the prediction value according to each prediction mode of the current block when it is determined to apply the second filter.

(57) 요약서:

[다음 쪽 계속]

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LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

TM), 유럽 (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(84) 지정국 (별도의 표시가 없는 한, 가능한 모든 종류의 역내 권리의 보호를 위하여): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), 유라시아 (AM, AZ, BY, KG, KZ, MD, RU, TJ,

**공개:**

— 국제조사보고서 없이 공개하며 보고서 접수 후 이를 별도 공개함 (규칙 48.2(g))

적응적 필터를 이용한 인트라 예측(intra-prediction) 수행 방법 및 장치가 제공된다. 상기 인트라 예측 수행 방법은 현재 블록(current block)의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제 1 필터의 적용 여부를 결정하는 단계, 상기 제 1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제 1 필터를 적용하는 단계, 상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측을 수행하는 단계, 상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드(prediction mode) 별 예측값에 대한 제 2 필터의 적용 여부를 결정하는 단계, 및 상기 제 2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제 2 필터를 적용하는 단계를 포함한다.

## 명세서

### 발명의 명칭: 적응적 필터를 이용한 인트라 예측 수행 방법 및 장치 기술분야

[0001] 본 발명은 영상 코딩(video coding)에 관한 것으로, 보다 상세하게는 예측하려는 블록(block)의 주변 화소값 또는 현재 블록의 예측된 화소값에 적응적 필터를 적용하여 인트라 예측(intra-prediction)을 수행하는 방법 및 장치에 관한 것이다.

### 배경기술

[0002] 최근 디지털 TV 등의 도래로 인해 방송 텔레비전 및 홈 엔터테인먼트(home entertainment) 분야의 기술이 급격하게 발전하고 있다. 이러한 분야의 기술은 비디오 압축(video compression) 기술의 표준화(standardization)에 의해서 상용화되고 있다. 비디오 압축을 위하여 ITU-T(International Telecommunications Union - Telecommunication) H.263 표준이 광범위하게 사용되고 있으며, MPEG(Motion Picture Experts Group)의 다음 표준인 MPEG-4가 인터넷 기반(internet-based) 비디오 어플리케이션을 위하여 사용되고 있다.

[0003] H.263 표준 완성 이후, ITU-T VCEG (Video Coding Experts Group)는 H.263 표준에 추가적인 특징을 추가하기 위한 단기적 목표와 낮은 비트율(bitrate)의 시각 통신(visual communication)을 위한 새로운 표준을 개발하기 위한 장기적 목표를 경주하여 왔다. 2001년, MPEG와 VCEG의 전문가들로 이루어진 JVT(Joint Video Team)이 구성되었고, JVT에 의해서 비디오 영상의 코딩을 위한 새로운 표준인 ITU-T H.264/MPEG-4 part 10의 표준화 작업이 진행되어 왔다. H.264 표준은 AVC(Advanced Video Coding)로 불릴 수도 있다. H.264/AVC의 기술적 목표는 코딩 효율(coding efficiency)의 현저한 향상, 손실 및 에러에 강인(robust)한 코딩 기술, 네트워크 친화적(network friendliness)인 코딩 기술, 낮은 지연 용량(latency capability) 및 정확한 매치 디코딩(match decoding) 등이다.

[0004] 영상 내에서 주변 화소들은 대부분 비슷한 값을 가지며, 이는 H.264/AVC 표준의 최소 블록(block) 크기인 4×4 블록 또는 16×16 블록에 대해서도 마찬가지이다. 이와 같이 블록 간 값들의 유사성을 이용하여 영상에 대한 예측을 수행하고, 원본 영상과의 차이를 인코딩할 수 있다. 이를 인트라 예측(intra-prediction)이라 하며, 인트라 예측에 의해서 영상 코딩의 효율을 높일 수 있다.

[0005] 또한, 인트라 예측을 수행함에 있어서 인트라 예측 수행 이전에 필터가 적용될 수 있다. 통상적으로 H.264/AVC 표준에서 인트라 예측을 수행할 때 참조 화소값들에 필터를 적용한 후 필터가 적용된 값들을 인트라 예측에 사용한다. 그러나 경우에 따라서 필터를 적용한 후 인트라 예측을 수행하는 것보다 필터를 적용하지 않고 인트라 예측을 수행할 때 영상 코딩의 성능이 더 높을 수 있다.

[0006] 이에 따라, 인트라 예측 수행시 필터 적용 여부를 결정하는 방법이 제안될 수

있다.

## 발명의 요약

### 기술적 과제

- [0007] 본 발명의 기술적 과제는 영상 인코딩에서 예측하려는 블록(block)의 주변 화소값 또는 현재 블록의 예측된 화소값에 적응적 필터를 적용하여 인트라 예측(intra-prediction)을 수행하는 방법 및 장치를 제공하는 데에 있다. 보다 상세하게는 인트라 예측을 수행하기 위한 현재 블록의 참조 화소값들에 적응적인 필터(pre-filter)를 적용한 후 예측을 수행하고, 또한 예측된 현재 블록의 화소값들에도 적응적인 필터(post-filter)를 적용하여 잔차 신호(residual signal)를 계산한다.

### 과제 해결 수단

- [0008] 일 양태에 있어서, 인트라 예측(intra-prediction) 수행 방법이 제공된다. 상기 인트라 예측 수행 방법은 현재 블록(current block)의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하는 단계, 상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하는 단계, 상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측을 수행하는 단계, 상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드(prediction mode) 별 예측값에 대한 제2 필터의 적용 여부를 결정하는 단계, 및 상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제2 필터를 적용하는 단계를 포함한다.
- [0009] 상기 제1 필터의 적용 여부는 상기 주변 블록의 정보를 기반으로 결정된 상기 현재 블록의 예측 모드를 기반으로 결정될 수 있다.
- [0010] 상기 제1 필터의 적용 여부는 현재 블록의 크기를 기반으로 결정될 수 있다.
- [0011] 상기 제1 필터의 적용 여부는 상기 현재 블록의 예측 모드 및 상기 현재 블록의 크기를 기반으로 미리 지정될 수 있다.
- [0012] 상기 제1 필터의 적용 여부는 상기 주변 블록이 화면내(intra-frame) 부호화되었는지 또는 화면간(inter-frame) 부호화 되었는지 여부를 기반으로 결정될 수 있다.
- [0013] 상기 제1 필터는 3-tap 필터 또는 2-tap 필터 중 적어도 어느 하나를 사용할 수 있다.
- [0014] 상기 제2 필터의 적용 여부는 상기 주변 블록의 정보를 기반으로 결정된 상기 현재 블록의 예측 모드를 기반으로 결정될 수 있다.
- [0015] 상기 제2 필터의 적용 여부는 현재 블록의 크기를 기반으로 결정될 수 있다.
- [0016] 상기 제2 필터의 적용 여부는 상기 주변 블록이 화면내 부호화되었는지 또는 화면간 부호화 되었는지 여부를 기반으로 결정될 수 있다.
- [0017] 상기 제2 필터는 상기 참조 화소값의 경계에 인접한 화소의 예측값에 대해서



적용될 수 있다.

[0018] 상기 제2 필터는 3-tap 필터 또는 2-tap 필터 중 적어도 어느 하나를 사용할 수 있다.

[0019] 다른 양태에 있어서, 인코더(encoder)가 제공된다. 상기 인코더는 프로세서(processor), 및 상기 프로세서와 연결되며 상기 프로세서를 구동하기 위한 정보를 저장하는 메모리(memory)를 포함하되, 상기 프로세서는 현재 블록의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하고, 상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하고, 상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측을 수행하고, 상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드 별 예측값에 대한 제2 필터의 적용 여부를 결정하고, 상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제2 필터를 적용하도록 구성된다.

[0020] 또 다른 양태에 있어서, 디코더(decoder)가 제공된다. 상기 디코더는 프로세서, 및 상기 프로세서와 연결되며 상기 프로세서를 구동하기 위한 정보를 저장하는 메모리를 포함하되, 상기 프로세서는 현재 블록의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하고, 상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하고, 상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측을 수행하고, 상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드 별 예측값에 대한 제2 필터의 적용 여부를 결정하고, 상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제2 필터를 적용하도록 구성된다.

### 발명의 효과

[0021] 부호화하려는 휘도 또는 색차 신호 블록을 효과적으로 예측하여 부호화 성능을 향상시킨다.

### 도면의 간단한 설명

[0022] 도 1은 H.264/AVC(Advanced Video Coding) 표준의 인코더의 블록도이다.

[0023] 도 2는 H.264/AVC 표준의 디코더의 블록도이다.

[0024] 도 3은 4x4 루마 예측 모드에서 예측 샘플(prediction sample)을 라벨링(labeling)한 예를 나타낸다.

[0025] 도 4는 4x4 루마 예측 모드 내의 9가지 예측 모드를 나타낸다.

[0026] 도 5는 인트라 예측 수행 이전에 필터를 적용하는 방법의 일 예를 나타낸다.

[0027] 도 6은 제안된 적응적 필터를 이용한 인트라 예측 수행 방법의 일 실시예를 나타낸다.

[0028] 도 7은 제안된 적응적 필터를 이용한 인트라 예측 수행 방법에 따라 예측값에

필터가 적용되는 경우를 나타낸다.

[0029] 도 8은 본 발명의 실시예가 구현되는 인코더 및 디코더의 블록도이다.

### 발명의 실시를 위한 형태

[0030] 아래에서는 첨부한 도면을 참고로 하여 본 발명의 실시예에 대하여 본 발명이 속하는 기술 분야에서 통상의 지식을 가진 자가 용이하게 실시할 수 있도록 상세히 설명한다. 그러나, 본 발명은 여러 가지 상이한 형태로 구현될 수 있으며 여기에서 설명하는 실시예에 한정되지 않는다. 그리고 도면에서 본 발명을 명확하게 설명하기 위해서 설명과 관계없는 부분은 생략하였으며, 명세서 전체를 통하여 유사한 부분에 대해서는 유사한 도면 부호를 붙였다. 또한 상세한 설명을 생략하여도 본 기술분야의 당업자가 쉽게 이해할 수 있는 부분의 설명은 생략하였다.

[0031] 명세서 및 청구범위 전체에서, 어떤 부분이 어떤 구성 요소를 “포함”한다고 할 때, 이는 특별히 반대되는 기재가 없는 한 다른 구성 요소를 제외하는 것이 아니라 다른 구성 요소를 더 포함할 수 있는 것을 의미한다.

[0032] 도 1은 H.264/AVC(Advanced Video Coding) 표준의 인코더의 블록도이다.

[0033] 도 1을 참조하면, 인코더는 2가지 경로의 테이트 흐름을 포함한다. 하나는 전진 경로(forward path)이며, 나머지 하나는 재구성 경로(reconstruction path)이다.

[0034] 먼저 전진 경로를 설명한다. 입력 프레임  $F_n$ 에 대하여 매크로블록(macro block) 단위로 인코딩이 수행된다. 매크로블록은 원본 이미지에서  $16 \times 16$  픽셀의 크기를 가진다. 각 입력 프레임에 대해서 인트라 예측(intra-prediction) 또는 인터 예측(inter-prediction)이 수행된다. 인트라 예측은 프레임 내에서 블록 간 값들의 유사성을 이용하여 예측을 수행하고 원본 영상과의 차이를 인코딩하며, 인터 예측은 프레임 간 블록 간 값들의 유사성을 이용하여 예측을 수행하고 원본 영상과의 차이를 인코딩한다. 인트라 예측 또는 인터 예측시에 예측 매크로블록(prediction macroblock)인 P가 재구성 프레임(reconstructed frame)을 기반으로 형성된다. 인트라 예측 시에, P는 이전에 인코딩 된 현재 프레임, 디코딩 된 현재 프레임 또는 재구성된 현재 프레임( $uF_n'$ ) 내의 샘플로부터 형성될 수 있다. P가 재구성된 현재 프레임으로부터 형성될 때 필터링되지 않은(unfiltered) 샘플이 사용될 수 있다. 인터 예측 시에, P는 하나 이상의 참조 프레임(reference frame)으로부터 움직임 보상(motion compensation) 또는 움직임 예측(motion prediction)이 수행되어 형성될 수 있다. 도 1에서 참조 프레임은 이전에 인코딩된 프레임인  $F_{n-1}$ '인 것으로 가정한다. 그러나 이에 제한되지 않으며, 각 예측 매크로블록은 이미 인코딩 되거나 재구성된 이전 1 프레임 또는 2 프레임 또는 이후 1 프레임 또는 2 프레임으로부터 형성될 수 있다.

[0035] P는 잔차(residual) 또는 차이(difference) 매크로블록  $D_n$ 을 생성하기 위하여 현재 매크로블록으로부터 빼진다.  $D_n$ 은 블록 변환(block transform)을 이용하여 변환(T, transformed)되고, 양자화(Q, quantized)되어 X를 생성한다. X는 인코딩된

계수(coefficient)들의 집합이다. 인코딩된 계수들은 재배열(reorder)되고 엔트로피 코딩(entropy coding)되며, 엔트로피 코딩된 계수들은 매크로블록을 디코딩하기 위하여 필요한 정보와 함께 압축된 비트열(compressed bitstream)을 형성한다. 압축된 비트열은 전송 또는 저장을 위하여 NAL(Network Abstraction Layer)로 보내진다.

[0036] 이제 재구성 경로에 대해서 설명한다. 양자화된 매크로블록 계수인  $X$ 는 다른 매크로블록들의 인코딩을 위하여 사용되는 재구성 프레임을 생성하기 위하여 디코딩된다.  $X$ 는 역양자화( $Q^{-1}$ )되고, 역변환( $T^{-1}$ , Inverse Transformed)되어 차이 매크로블록  $D_n'$ 을 생성한다. 재구성 경로에서 생성된 차이 매크로블록  $D_n'$ 은 전진 경로에서 생성된 차이 매크로블록인  $D_n$ 과 동일하지 않다. 양자화에 의해서 손실이 발생하며, 이에 따라  $D_n'$ 은  $D_n$ 의 왜곡된 형태일 수 있다. 예측 매크로블록  $P$ 가  $D_n'$ 에 더해지고, 재구성 매크로블록  $uF_n'$ 이 생성된다. 재구성 매크로블록  $uF_n'$ 도 원래 매크로블록  $F_n$ 의 왜곡된 형태일 수 있다.  $uF_n'$ 에 대하여 블로킹 왜곡(blocking distortion)을 줄이기 위하여 필터가 적용될 수 있고, 재구성 프레임은 필터가 적용된 복수의 재구성 매크로블록으로부터 형성될 수 있다.

[0037] 도 2는 H.264/AVC 표준의 디코더의 블록도이다.

[0038] 도 2를 참조하면, 디코더는 NAL로부터 압축된 비트열을 수신한다. 수신된 데이터는 양자화된 계수들의 집합인  $X$ 를 생성하기 위하여 엔트로피 디코딩(entropy decoded)되고, 재배열된다.  $X$ 에 역양자화 및 역변환이 수행되어  $D_n'$ 이 생성되며, 디코더는 비트열에서 디코딩된 헤더 정보(header information)를 이용하여 인코더에서 생성된 예측 매크로블록과 동일한 예측 매크로블록  $P$ 를 생성한다.  $P$ 에  $D_n'$ 이 더해져  $uF_n'$ 이 생성되며,  $uF_n'$ 이 필터를 거쳐 디코딩된 매크로블록  $F_n'$ 이 생성될 수 있다.

[0039] 이하, 인트라 예측에 대해서 설명한다.

[0040] 블록(또는 매크로블록)에 대하여 인트라 예측이 수행될 때, 예측 블록(또는 매크로블록)  $P$ 가 인코딩된 블록(또는 매크로블록)들 또는 재구성된 블록(또는 매크로블록)들을 기반으로 형성될 수 있다.  $P$ 는 원본 영상으로부터 빠지고,  $P$ 가 빠진 차이값이 인코딩되어 전송된다. 인트라 예측은 루마 예측 모드(luma prediction mode) 또는 크로마 예측 모드(chroma prediction mode)에 의해서 수행될 수 있다. 루마 예측 모드에서  $4 \times 4$  크기의 서브블록(sub-block) 또는  $16 \times 16$  크기의 매크로블록 단위로 인트로 예측이 수행될 수 있으며,  $4 \times 4$  루마 예측 모드에서는 총 9개의 추가적인 예측 모드가,  $16 \times 16$  루마 예측 모드에서는 총 4개의 추가적인 예측 모드가 존재한다. 인트라 예측이 수행되는 단위는 서브블록 또는 매크로블록에 제한되지 않으며, 다양한 크기의 유닛을 단위로 하여 수행될 수 있다. 인트라 예측이 수행되는 화소의 단위를 코딩 유닛(CU; Coding Unit) 또는 예측 유닛(PU; Prediction Unit) 등으로 부를 수 있으며, CU 또는 PU의 크기가 앞서 설명한 바와 같이 서브블록 또는 매크로블록의 크기와 같을 수도 있다.

[0041] 도 3은  $4 \times 4$  루마 예측 모드에서 예측 샘플(prediction sample)을

라벨링(labeling)한 예를 나타낸다. 도 3을 참조하면, 예측 블록 P는 A 내지 H 또는 I 내지 L로 라벨링된 샘플을 기반으로 계산된다.

- [0042] 도 4는 4x4 루마 예측 모드 내의 9가지 예측 모드를 나타낸다.
- [0043] 인코더는 예측 블록 P와 인코딩될 블록 사이의 차이를 최소화하기 위하여 각 블록에 대하여 9가지 예측 모드 중 어느 하나를 선택할 수 있다. 9가지 예측 모드는 다음과 같다.
- [0044] 1) 모드 0(vertical): 예측 블록의 상위 샘플들인 A 내지 D가 수직적으로 외삽(extrapolate)된다.
- [0045] 2) 모드 1(horizontal): 예측 블록의 왼쪽 샘플들인 I 내지 L이 수평적으로 외삽된다.
- [0046] 3) 모드 2(DC); P 내의 모든 샘플이 A 내지 D 및 I 내지 L이 평균에 의해서 예측된다.
- [0047] 4) 모드 3(Diagonal Down-Left): P 내의 샘플들은 아래-왼쪽과 위-오른쪽 사이에서 45도 각도로 보간(interpolate)된다.
- [0048] 5) 모드 4(Diagonal Down-Right): P 내의 샘플들은 우하향 45도 각도로 외삽된다.
- [0049] 6) 모드 5(Vertical-Right): P 내의 샘플들은 수직축에서 오른쪽으로 약 26.6도의 각도로 외삽 또는 보간된다.
- [0050] 7) 모드 6(Horizontal-Down): P 내의 샘플들은 수평축에서 아래쪽으로 약 26.6도의 각도로 외삽된다.
- [0051] 8) 모드 7(Vertical-Left): P 내의 샘플들은 수직축에서 왼쪽으로 약 26.6도의 각도로 외삽된다.
- [0052] 9) 모드 8(Horizontal-Up): P 내의 샘플들은 수평축에서 위쪽으로 약 26.6도의 각도로 보간된다.
- [0053] 도 4에서 화살표는 각 모드 내에서 예측이 수행되는 방향을 지시한다. 한편, 모드 3 내지 모드 8에 대하여, 예측 블록 내의 샘플들은 예측 샘플 A 내지 H 또는 I 내지 L의 가중 평균(weighted average)으로부터 형성된다. 예를 들어 모드 4에서, 예측 블록의 오른쪽 상위에 위치하는 샘플  $d = \text{round}(B/4 + C/2 + D/4)$ 로 예측될 수 있다. 인코더는 각 예측 모드에 의해서 생성된 예측 블록에 대하여 절대 에러의 합(SAE; Sum of Absolute Errors)을 각각 계산하고, SAE가 가장 작은 예측 모드에 의해서 인트라 예측을 수행한다.
- [0054] 도 5는 인트라 예측 수행 이전에 필터를 적용하는 방법의 일 예를 나타낸다.
- [0055] 일반적으로 H.264/AVC 표준에서 사용되는 샘플들에 필터를 적용한 후에 인트라 예측이 수행된다. 샘플은 참조(reference) 화소값으로 불릴 수도 있다. 도 5의 예에서는 필터가 저대역 필터(low-pass filter)이며, 8x8 블록에 한해서 필터가 적용되는 것을 가정한다.
- [0056] 수학식 1은 참조 화소값에 적용되는 3-tap 필터를 나타내는 수학식의 일 예이다.
- [0057] <수학식 1>

- [0058]  $h[Z] = (A + 2 \times Z + Q)/4$
- [0059]  $h[A] = (Z + 2 \times A + B)/4$
- [0060] ...
- [0061]  $h[P] = (O + 3 \times P)/4$
- [0062]  $h[Q] = (Z + 2 \times Q + R)/4$
- [0063] ...
- [0064]  $h[X] = (W + 3 \times X)/4$
- [0065]  $h[Z]$ 는  $Z$ 에 필터를 적용하여 계산한 값을 나타낸다. 수학식 1을 참조하면, 필터 계수 (1,2,1)이 적용되어 참조 화소값에 대한 필터링이 수행되고, 필터링을 거친 참조 화소값( $h[A] \sim h[Z]$ )을 기반으로 9개의 예측 모드에 의한 인트라 예측이 수행된다. 복호화 과정에서도 부호화 과정과 마찬가지로 필터가 적용될 수 있다.
- [0066] 인트라 예측 수행 이전에 필터링을 수행함에 있어서, 필터링을 수행하지 않을 때 인코딩의 성능이 향상되는 경우가 있을 수 있다. 이에 따라 적응적으로 필터를 적용하여 인트라 예측을 수행하는 방법이 제안될 수 있다.
- [0067] 도 6은 제안된 적응적 필터를 이용한 인트라 예측 수행 방법의 일 실시예를 나타낸다.
- [0068] 도 6을 참조하면, 단계 S201에서 인코더는 참조 화소값에 대한 필터 적용 여부를 결정한다. 인코더는 필터 적용 여부를 결정할 때, 주변 블록의 정보를 이용하거나 율-왜곡 최적화(RDO; Rate-Distortion Optimization) 방법에 의하여 필터 적용 여부를 결정할 수 있다.
- [0069] 주변 블록의 정보를 이용하여 참조 화소값에 대한 필터 적용 여부를 결정할 때, 주변 블록의 예측 모드 정보(MPM; Most Probable Mode)를 기반으로 현재 블록의 예측 모드를 결정하고, 결정된 현재 블록의 예측 모드에 따라 참조 화소값에 대한 필터 적용 여부를 결정할 수 있다. 예를 들어 현재 블록이 'C'이고 상위 블록이 'A', 왼쪽 블록이 'B'이라 가정하면, 현재 블록의 예측 모드가 'A'의 예측 모드와 같을 경우 'A'의 예측 모드를 현재 블록의 예측 모드로 결정하며, 현재 블록의 예측 모드가 'B'의 예측 모드와 같을 경우 'B'의 예측 모드를 현재 블록의 예측 모드로 결정할 수 있다. 또는, 현재 블록의 예측 모드가 'A'의 예측 모드 또는 'B'의 예측 모드를 제외한 다른 예측 모드일 경우, 해당 예측 모드를 부호화하여 전송한다. 이와 같이 결정된 현재 블록의 예측 모드에 따라 참조 화소값에 대한 필터 적용 여부가 결정될 수 있다. 현재 블록과 상위 블록 또는 왼쪽 블록의 크기가 다른 경우에도 주변 블록의 예측 모드에 따라 현재 블록의 예측 모드를 결정할 수 있다.
- [0070] 또는, 주변 블록의 정보를 이용하여 참조 화소값에 대한 필터 적용 여부를 결정할 때, 주변 참조 화소값의 변화량을 기반으로 필터 적용 여부를 결정할 수 있다. 예를 들어 필터를 적용하려는 참조 화소값을  $p[n]$ 이라 하면, 주변 참조 화소값인  $p[n-1]$  및  $p[n+1]$ 의 차이값을 계산하고 이를 특정 문턱값(threshold)과 비교하여 필터 적용 여부를 결정할 수 있다.

[0071] 또는, 현재 블록의 예측 모드 이외에 현재 블록의 크기에 따라 참조 화소값에 대한 필터 적용 여부를 결정할 수 있다. 이때 현재 블록의 예측 모드 및 현재 블록의 크기에 따른 필터 적용 여부를 미리 지정하고, 해당 예측 모드 또는 해당 크기에 따라 적응적으로 필터 적용 여부를 결정한다.

[0072] 표 1은 현재 블록의 예측 모드 및 현재 블록의 크기에 따른 필터 적용 여부를 지정한 표이다.

[0073]

현재 블록의 예측 모드	현재 블록 크기			
	4x4	8x8	16x16	32x32
0	0	0	0	0
1	0	0	0	0
2	1	1	1	1
3	0	1	1	1
4	0	1	1	1
...	...	...	...	...

[0074] 표 1을 참조하면, ‘0’은 필터가 적용되지 않는 것을 의미하며, ‘1’은 필터가 적용되는 것을 의미한다. 예를 들어 현재 블록의 크기가 4x4일 때, 현재 블록의 예측 모드가 1이면 필터가 적용되지 않으며, 현재 블록의 예측 모드가 3이면 필터가 적용될 수 있다.

[0075] 또한, 주변 블록의 화면내(intra-frame) 부호화 또는 화면간(inter-frame) 부호화 여부에 따라 참조 화소값에 대한 필터 적용 여부가 결정될 수 있다. 예를 들어 제한된 인트라 예측(constrained intra-prediction) 수행의 경우, 주변 블록이 화면간 부호화되었을 때 화면내로 부호화된 주변 블록의 값들을 이용하여 상기 화면간으로 부호화된 값을 채우게 되며, 이때에는 필터링을 적용하지 않을 수 있다.

[0076] 참조 화소값에 대하여 필터를 적용하기로 결정된 경우 단계 S202에서 인코더는 참조 화소값에 대하여 필터를 적용한다. 적용되는 필터를 일반적으로 사용되는 필터일 수 있다. 예를 들어 수학적 1의 3-tap가 사용될 수 있으며, 또는 2-tap 필터가 사용될 수도 있다. 2-tap 필터가 사용될 때 (1/8, 7/8), (2/8, 6/8), (3/8, 5/8) 등의 다양한 필터 계수가 사용될 수 있다. 필터가 적용된 참조 화소값이 다른 참조 화소값에 필터를 적용할 때 사용될 수 있다. 또한, 참조 화소값에 필터를 적용하는 경우 모든 참조 화소값에 대하여 필터를 적용할 수도 있고, 일부 참조 화소값에 대해서만 필터를 적용할 수도 있다.

[0077] 단계 S203에서 인코더는 필터가 적용된 또는 필터가 적용되지 않은 참조 화소값을 기반으로 인트라 예측을 수행한다.

[0078] 단계 S204에서 인코더는 현재 블록의 부호화를 위해 상기 인트라 예측 수행에

의해서 예측된 각 예측 모드별 예측값에 대한 필터 적용 여부를 결정한다.

여기서 각 예측 모드는 4x4 루마 예측 모드의 9개의 예측 모드일 수 있다. 각 예측 모드별 예측값에 대하여 필터 적용 여부를 결정할 때에도 주변 블록의 정보를 이용하거나 RDO 방법에 의하여 필터 적용 여부를 결정할 수 있다.

[0079] 주변 블록의 정보를 이용하여 예측값에 대한 필터 적용 여부를 결정할 때, 주변 블록의 예측 모드 정보(MPM)를 기반으로 현재 블록의 예측 모드를 결정하고, 결정된 현재 블록의 예측 모드에 따라 예측값에 대한 필터 적용 여부를 결정할 수 있다. 예를 들어 현재 블록이 'C'이고 상위 블록이 'A', 왼쪽 블록이 'B'이라 가정하면, 현재 블록의 예측 모드가 'A'의 예측 모드와 같을 경우 'A'의 예측 모드를 현재 블록의 예측 모드로 결정하며, 현재 블록의 예측 모드가 'B'의 예측 모드와 같을 경우 'B'의 예측 모드를 현재 블록의 예측 모드로 결정할 수 있다. 또는, 현재 블록의 예측 모드가 'A'의 예측 모드 또는 'B'의 예측 모드를 제외한 다른 예측 모드일 경우, 해당 예측 모드를 부호화하여 전송한다. 이때 현재 블록의 예측 모드가 특정 예측 모드(DC 또는 planar)인 경우, 참조 화소값과 예측값 간의 차이가 다른 예측 모드에 비해서 상대적으로 커질 수 있다. 예를 들어 planar 예측 모드에서의 참조 화소값과 예측값과의 차이가 다른 예측 모드에 비해서 비교적 클 수 있다. planar 예측 모드에서의 예측값은 각 행을 수평적으로 선형 보간(linear interpolation)하여 얻어진 제1 예측값과 각 열을 수직적으로 선형 보간하여 얻어진 제2 예측값의 평균으로 계산될 수 있다. 수평적으로 선형 보간할 때 오른쪽 값은 참조 화소값 중 우상향에 위치한 값(즉, 도 3에서 H)과 동일하며, 수직적으로 선형 보간할 때 아래쪽 값은 참조 화소값 중 좌하향에 위치한 값(즉, 도 3에서 I)과 동일하다. 예측값이 참조 화소값으로부터 바로 구해지는 것이 아니므로 참조 화소값과 예측값의 차이가 비교적 클 수 있다. 이와 같은 경우 예측값에 대하여 필터를 적용하여 인트라 예측의 효율성을 높일 수 있다. 이와 같이 결정된 현재 블록의 예측 모드에 따라 예측값에 대한 필터 적용 여부가 결정될 수 있다. 현재 블록과 상위 블록 또는 왼쪽 블록의 크기가 다른 경우에도 주변 블록의 예측 모드에 따라 현재 블록의 예측 모드를 결정할 수 있다.

[0080] 또는, 현재 블록의 예측 모드 이외에 현재 블록의 크기에 따라 예측값에 대한 필터 적용 여부를 결정할 수 있다. 이때 현재 블록의 예측 모드 및 현재 블록의 크기에 따른 필터 적용 여부를 미리 지정하고, 해당 예측 모드 또는 해당 크기에 따라 적응적으로 필터 적용 여부를 결정한다. 또는, 주변 블록의 화면내 부호화 또는 화면간 부호화 여부에 따라 예측값에 대한 필터 적용 여부가 결정될 수 있다.

[0081] 예측값에 대하여 필터를 적용하기로 결정된 경우 단계 S205에서 인코더는 예측값에 대하여 필터를 적용한다. 이에 따라 현재 블록의 예측이 완료되며, 인코더는 잔차 신호를 계산하고 엔트로피 부호화를 수행한다.

[0082] 도 7은 제안된 적응적 필터를 이용한 인트라 예측 수행 방법에 따라 예측값에

필터가 적용되는 경우를 나타낸다.

[0083] 도 7을 참조하면, 현재 블록의 예측 모드가 비방향성 모드인 경우, 참조 화소값과 예측값 간의 차이가 다른 예측 모드에 비해서 상대적으로 커질 수 있으므로, 주변의 복원된 참조 화소값과의 경계에 인접한 화소의 예측값에 대해서만 필터를 적용할 수 있다. 예를 들어 도 3에서 경계에 위치한 한 줄의 화소인 a1~a8 및 b1, c1, d1, e1, f1, g1, h1에 해당하는 예측값에 대하여 필터링을 수행할 수 있다. 또는, 경계에 위치한 두 줄의 화소인 a1~a8, b1~b8 및 c1~c2, d1~d2, e1~e2, f1~f2, g1~g2, h1~h2에 해당하는 예측값에 대하여 필터를 적용할 수 있다. 이때 적용되는 필터를 일반적으로 사용되는 필터일 수 있다. 예를 들어 수학적 식 1의 3-tap가 사용될 수 있으며, 또는 2-tap 필터가 사용될 수도 있다. 2-tap 필터가 사용될 때 (1/8, 7/8), (2/8, 6/8), (3/8, 5/8) 등의 다양한 필터 계수가 사용될 수 있다. 또는, 화소의 위치에 따라 2-tap 필터 또는 3-tap 필터 중 어느 하나를 선택하여 사용할 수도 있다.

[0084] 같은 방법으로, 현재 블록의 예측 모드가 모드 0, 모드 3 또는 모드 7과 같이 A~P에 해당하는 참조 화소값을 이용하는 예측 모드인 경우, 참조 화소값과 예측값 간의 차이가 비교적 큰 a1~a8에 해당하는 예측값에 대하여 필터를 적용할 수 있다. 또한, 현재 블록의 예측 모드가 모드 1 또는 모드 8과 같이 Q~X에 해당하는 참조 화소값을 이용하는 예측 모드인 경우, 참조 화소값과 예측값 간의 차이가 비교적 큰 a1, b1, c1, d1, e1, f1, g1 및 h1에 해당하는 예측값에 대하여 필터를 적용할 수 있다.

[0085] 수학적 식 2는 화소의 위치에 따라 2-tap 필터 또는 3-tap 필터를 선택하여 사용하는 경우, 예측값에 적용되는 필터를 나타내는 수학적 식의 일 예이다.

[0086] <수학적 식 2>

[0087]  $f[a1] = (2 \times A + 4 \times a1 + 2 \times Q) / 8$

[0088]  $f[b1] = (2 \times B + 6 \times b1) / 8$

[0089]  $f[c1] = (2 \times C + 6 \times c1) / 8$

[0090] ...

[0091]  $f[a2] = (2 \times R + 6 \times a2) / 8$

[0092]  $f[a3] = (2 \times S + 6 \times a3) / 8$

[0093] ...

[0094] 수학적 식 2에서 f[a1]은 예측값 a1에 필터를 적용한 값이며, A와 Q는 참조 화소값을 나타낸다. 수학적 식 2를 참조하면, a1에 위치한 화소의 예측값에 대하여 3-tap 필터가 적용되고, 나머지 화소의 예측값에 대하여는 2-tap 필터가 적용됨을 알 수 있다.

[0095] 수학적 식 3은 제안된 적응적 필터를 이용한 인트라 예측 수행 방법에 따라 예측값에 필터가 적용되는 경우, 예측값에 적용되는 필터를 나타내는 수학적 식의 또 다른 예이다.

[0096] <수학적 식 3>



- [0097] 1. Vertical low-pass filter
- [0098]  $v[a1] = (A + 2 \times a1 + a2)/4$
- [0099]  $v[a2] = (v[a1] + 2 \times a2 + a3)/4$
- [0100] ...
- [0101]  $v[a8] = (v[a7] + 3 \times a8)/4$
- [0102]  $v[b1] = (B + 2 \times b1 + b2)/4$
- [0103] ...
- [0104] 2. Horizontal low-pass filter
- [0105]  $h[a1] = (Q + 2 \times v[a1] + v[b1])/4$
- [0106]  $h[b1] = (h[a1] + 2 \times v[b1] + v[c1])/4$
- [0107] ...
- [0108]  $h[h1] = (h[g1] + 3 \times v[h1])/4$
- [0109]  $h[a2] = (R + 2 \times v[a2] + v[b2])/4$
- [0110] ...
- [0111] 수학식 3의 필터는 각 예측 모드에 대하여 주변 블록의 정보를 이용하는 방법 또는 RDO 방법을 기반으로 하여 적응적인 필터를 적용할 때에 사용될 수 있다. 수학식 3을 참조하면, 필터 계수가 (1,2,1)인 저대역 필터가 수직과 수평의 두 방향에 대해 순차적으로 수행된다. 먼저 수직 방향으로 필터가 적용되며, 필터가 적용된 값을 기반으로 다시 수평 방향으로 필터가 적용된다. 필터가 적용된 예측값이 다른 예측값에 필터를 적용할 때 사용될 수 있다.
- [0112] 한편, RDO 방법이 적용되는 경우, 도 6에서 설명된 인트라 예측 수행 방법이 반복되어 수행될 수 있다.
- [0113] 도 8은 본 발명의 실시예가 구현되는 인코더 및 디코더의 블록도이다.
- [0114] 인코더(800)는 프로세서(810; processor) 및 메모리(820; memory)를 포함한다. 프로세서(810)는 제안된 기능, 과정 및/또는 방법을 구현한다. 프로세서(810)는 현재 블록의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하고, 상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하고, 상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측을 수행하고, 상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드 별 예측값에 대한 제2 필터의 적용 여부를 결정하고, 상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제2 필터를 적용하도록 구성된다. 메모리(820)는 프로세서(810)와 연결되어, 프로세서(810)를 구동하기 위한 다양한 정보를 저장한다.
- [0115] 디코더(900)는 프로세서(910) 및 메모리(920)를 포함한다. 프로세서(910)는 제안된 기능, 과정 및/또는 방법을 구현한다. 프로세서(910)는 현재 블록의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하고, 상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1

필터를 적용하고, 상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측을 수행하고, 상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드 별 예측값에 대한 제2 필터의 적용 여부를 결정하고, 상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제2 필터를 적용하도록 구성된다.

메모리(920)는 프로세서(910)와 연결되어, 프로세서(910)를 구동하기 위한 다양한 정보를 저장한다.

- [0116] 프로세서(810, 910)은 ASIC(application-specific integrated circuit), 다른 칩셋, 논리 회로 및/또는 데이터 처리 장치를 포함할 수 있다. 메모리(820, 920)는 ROM(read-only memory), RAM(random access memory), 플래쉬 메모리, 메모리 카드, 저장 매체 및/또는 다른 저장 장치를 포함할 수 있다. 실시예가 소프트웨어로 구현될 때, 상술한 기법은 상술한 기능을 수행하는 모듈(과정, 기능 등)로 구현될 수 있다. 모듈은 메모리(820, 920)에 저장되고, 프로세서(810, 910)에 의해 실행될 수 있다. 메모리(820, 920)는 프로세서(810, 910) 내부 또는 외부에 있을 수 있고, 잘 알려진 다양한 수단으로 프로세서(810, 910)와 연결될 수 있다.
- [0117] 상술한 예시적인 시스템에서, 방법들은 일련의 단계 또는 블록으로써 순서도를 기초로 설명되고 있지만, 본 발명은 단계들의 순서에 한정되는 것은 아니며, 어떤 단계는 상술한 바와 다른 단계와 다른 순서로 또는 동시에 발생할 수 있다. 또한, 당업자라면 순서도에 나타낸 단계들이 배타적이지 않고, 다른 단계가 포함되거나 순서도의 하나 또는 그 이상의 단계가 본 발명의 범위에 영향을 미치지 않고 삭제될 수 있음을 이해할 수 있을 것이다.
- [0118] 상술한 실시예들은 다양한 양태의 예시들을 포함한다. 다양한 양태들을 나타내기 위한 모든 가능한 조합을 기술할 수는 없지만, 해당 기술 분야의 통상의 지식을 가진 자는 다른 조합이 가능함을 인식할 수 있을 것이다. 따라서, 본 발명은 이하의 특허청구범위 내에 속하는 모든 다른 교체, 수정 및 변경을 포함한다고 할 것이다.

## 청구범위

- [청구항 1] 현재 블록(current block)의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하는 단계;  
 상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하는 단계;  
 상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측(intra-prediction)을 수행하는 단계;  
 상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드(prediction mode) 별 예측값에 대한 제2 필터의 적용 여부를 결정하는 단계; 및  
 상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제2 필터를 적용하는 단계를 포함하는 인트라 예측 수행 방법.
- [청구항 2] 제 1 항에 있어서,  
 상기 제1 필터의 적용 여부는 상기 주변 블록의 정보를 기반으로 결정된 상기 현재 블록의 예측 모드를 기반으로 결정되는 것을 특징으로 하는 인트라 예측 수행 방법.
- [청구항 3] 제 2 항에 있어서,  
 상기 제1 필터의 적용 여부는 현재 블록의 크기를 기반으로 결정되는 것을 특징으로 하는 인트라 예측 수행 방법.
- [청구항 4] 제 3 항에 있어서,  
 상기 제1 필터의 적용 여부는 상기 현재 블록의 예측 모드 및 상기 현재 블록의 크기를 기반으로 미리 지정되는 것을 특징으로 하는 인트라 예측 수행 방법.
- [청구항 5] 제 1 항에 있어서,  
 상기 제1 필터의 적용 여부는 상기 주변 블록이 화면내(intra-frame) 부호화되었는지 또는 화면간(inter-frame) 부호화 되었는지 여부를 기반으로 결정되는 것을 특징으로 하는 인트라 예측 수행 방법.
- [청구항 6] 제 1 항에 있어서,  
 상기 제1 필터는 3-tap 필터 또는 2-tap 필터 중 적어도 어느 하나를 사용하는 것을 특징으로 하는 인트라 예측 수행 방법.
- [청구항 7] 제 1 항에 있어서,  
 상기 제2 필터의 적용 여부는 상기 주변 블록의 정보를 기반으로 결정된 상기 현재 블록의 예측 모드를 기반으로 결정되는 것을 특징으로 하는 인트라 예측 수행 방법.
- [청구항 8] 제 7 항에 있어서,  
 상기 제2 필터의 적용 여부는 현재 블록의 크기를 기반으로

- 결정되는 것을 특징으로 하는 인트라 예측 수행 방법.
- [청구항 9] 제 1 항에 있어서,  
상기 제2 필터의 적용 여부는 상기 주변 블록이 화면내 부호화되었는지 또는 화면간 부호화 되었는지 여부를 기반으로 결정되는 것을 특징으로 하는 인트라 예측 수행 방법.
- [청구항 10] 제 1 항에 있어서,  
상기 현재 블록의 예측 모드가 비방향성 모드인 경우,  
상기 제2 필터는 상기 참조 화소값의 경계에 인접한 화소의 예측값에 대해서 적용되는 것을 특징으로 하는 인트라 예측 수행 방법.
- [청구항 11] 제 1 항에 있어서,  
상기 제2 필터는 3-tap 필터 또는 2-tap 필터 중 적어도 어느 하나를 사용하는 것을 특징으로 하는 인트라 예측 수행 방법.
- [청구항 12] 프로세서(processor); 및  
상기 프로세서와 연결되며 상기 프로세서를 구동하기 위한 정보를 저장하는 메모리를 포함하되,  
상기 프로세서는,  
현재 블록(current block)의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하고,  
상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하고,  
상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측(intra-prediction)을 수행하고,  
상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드(prediction mode) 별 예측값에 대한 제2 필터의 적용 여부를 결정하고,  
상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제2 필터를 적용하도록 구성되는 것을 특징으로 하는 인코더(encoder).
- [청구항 13] 제 12 항에 있어서,  
상기 제1 필터의 적용 여부는 상기 주변 블록의 정보를 기반으로 결정된 상기 현재 블록의 예측 모드를 기반으로 결정되는 것을 특징으로 하는 인코더.
- [청구항 14] 제 13 항에 있어서,  
상기 제1 필터의 적용 여부는 현재 블록의 크기를 기반으로 결정되는 것을 특징으로 하는 인코더.
- [청구항 15] 제 14 항에 있어서,  
상기 제1 필터의 적용 여부는 상기 현재 블록의 예측 모드 및 상기

현재 블록의 크기를 기반으로 미리 지정되는 것을 특징으로 하는 인코더.

[청구항 16]

프로세서(processor); 및  
 상기 프로세서와 연결되며 상기 프로세서를 구동하기 위한 정보를 저장하는 메모리를 포함하되,  
 상기 프로세서는,  
 현재 블록(current block)의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제1 필터의 적용 여부를 결정하고,  
 상기 제1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제1 필터를 적용하고,  
 상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측(intra-prediction)을 수행하고,  
 상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드(prediction mode) 별 예측값에 대한 제2 필터의 적용 여부를 결정하고,  
 상기 제2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제2 필터를 적용하도록 구성되는 것을 특징으로 하는 디코더(decoder).

[청구항 17]

제 16 항에 있어서,  
 상기 제1 필터의 적용 여부는 상기 주변 블록의 정보를 기반으로 결정된 상기 현재 블록의 예측 모드를 기반으로 결정되는 것을 특징으로 하는 디코더.

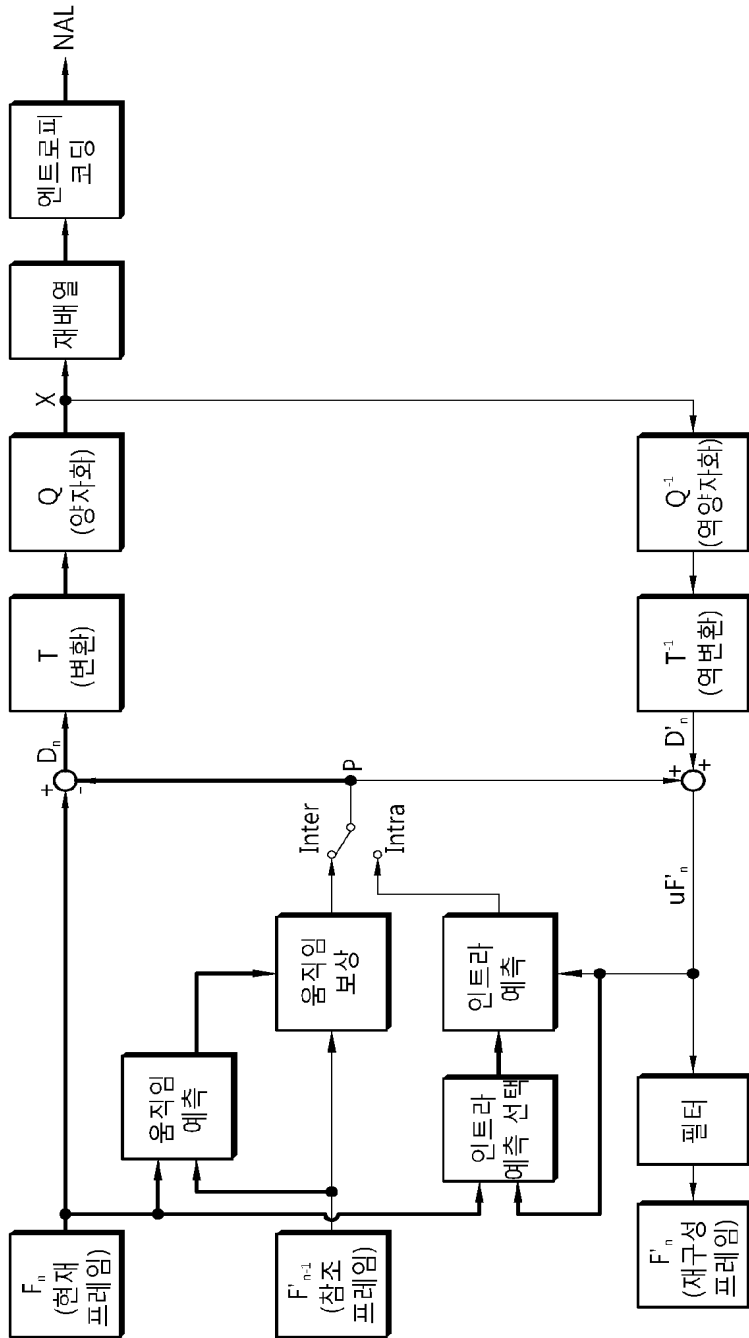
[청구항 18]

제 17 항에 있어서,  
 상기 제1 필터의 적용 여부는 현재 블록의 크기를 기반으로 결정되는 것을 특징으로 하는 디코더.

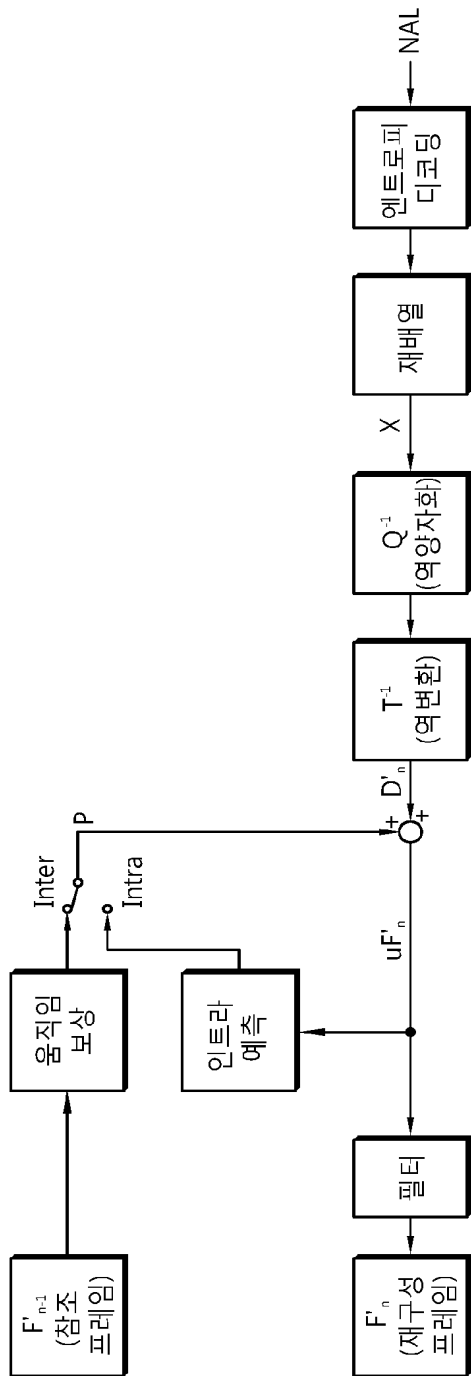
[청구항 19]

제 18 항에 있어서,  
 상기 제1 필터의 적용 여부는 상기 현재 블록의 예측 모드 및 상기 현재 블록의 크기를 기반으로 미리 지정되는 것을 특징으로 하는 디코더.

[Fig. 1]



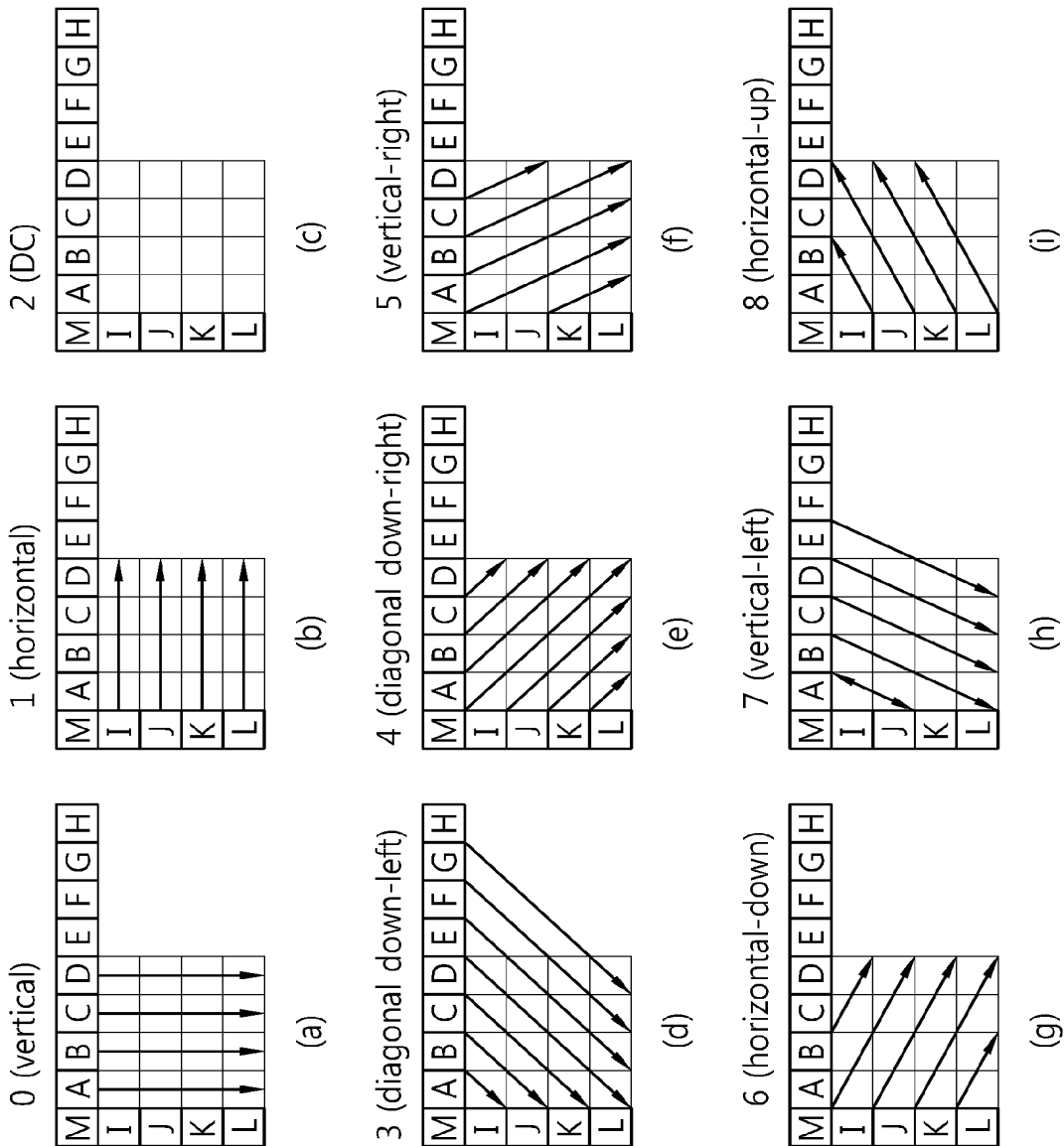
[Fig. 2]



[Fig. 3]

M	A	B	C	D	E	F	G	H
I	a	b	c	d				
J	e	f	g	h				
K	i	j	k	l				
L	m	n	o	p				

[Fig. 4]

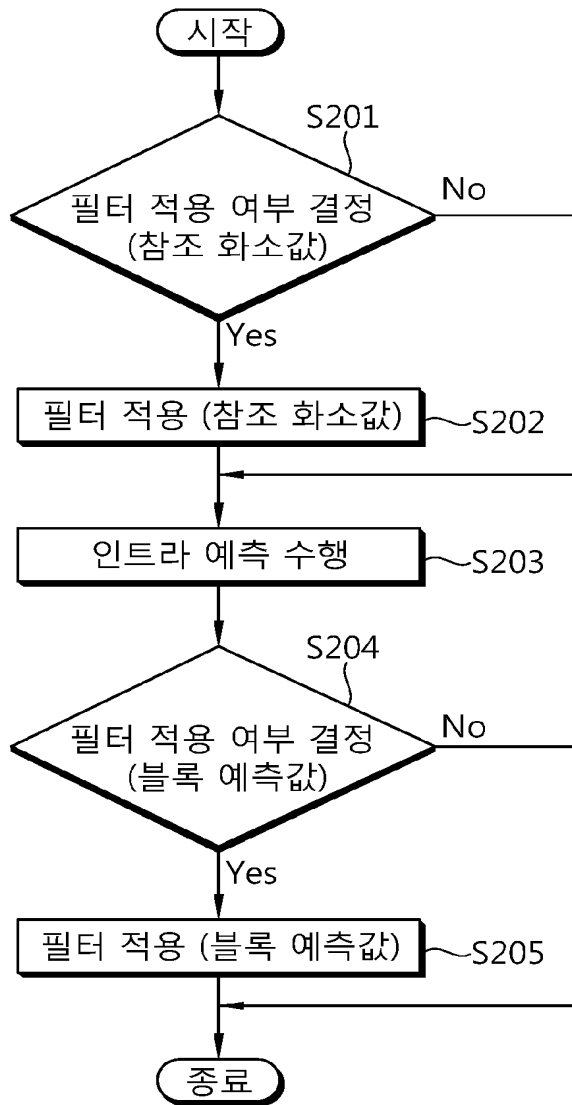




[Fig. 5]

Z	Q	R	S	T	U	V	W	X
A								
B								
C								
D								
E								
F								
G								
H								
I								
J								
K								
L								
M								
N								
O								
P								

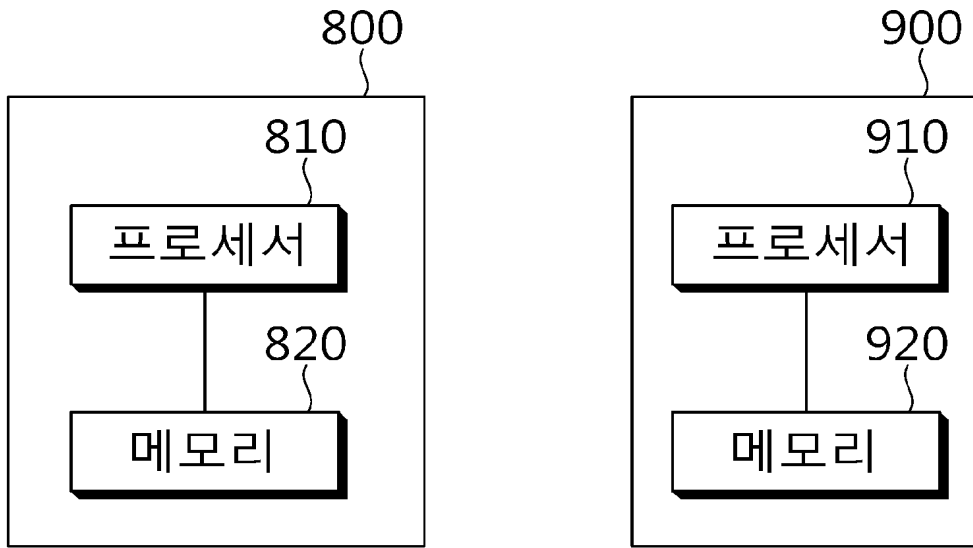
[Fig. 6]



[Fig. 7]

Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Q	a1	b1	c1	d1	e1	f1	g1	h1								
R	a2	b2	c2	d2	e2	f2	g2	h2								
S	a3	b3	...	...	...	...	...	...								
T	a4	b4	...	...	...	...	...	...								
U	a5	b5	...	...	...	...	...	...								
V	a6	b6	...	...	...	f6	g6	h6								
W	a7	b7	...	...	...	f7	g7	h7								
X	a8	b8	...	...	...	f8	g8	h8								

[Fig. 8]



(12) 특허협력조약에 의하여 공개된 국제출원

(19) 세계지식재산권기구  
국제사무국



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PCT

(10) 국제공개번호  
WO 2011/126349 A3

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H04N 7/32 (2006.01)
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- (22) 국제출원일: 2011년 4월 11일 (11.04.2011)
- (25) 출원언어: 한국어
- (26) 공개언어: 한국어
- (30) 우선권정보:  
10-2010-0032778 2010년 4월 9일 (09.04.2010) KR  
10-2011-0026079 2011년 3월 23일 (23.03.2011) KR  
10-2011-0032766 2011년 4월 8일 (08.04.2011) KR
- (71) 출원인 (US 을(를) 제외한 모든 지정국에 대하여): 한국 전자통신연구원 (ELECTRONICS AND TELECOMMUNICATIONS RESEARCH INSTITUTE) [KR/KR]; 대전광역시 유성구 가정동 161번지, 305-700 Daejeon (KR).
- (72) 발명자: 겸
- (75) 발명자/출원인 (US 에 한하여): 이진호 (LEE, Jin Ho) [KR/KR]; 대전시 동구 용운동 용방마을 아파트 313동 1102호, 300-787 Daejeon (KR). 김휘용 (KIM, Hui Yong) [KR/KR]; 대전시 유성구 지족동 열매마을 아파트 601동 201호, 305-770 Daejeon (KR). 정세윤 (JEONG, Se Yoon) [KR/KR]; 대전시 대덕구 비래동

금성백조 아파트 101동 1203호, 306-769 Daejeon (KR). 조숙희 (CHO, Suk Hee) [KR/KR]; 대전시 유성구 봉산동 휴먼시아 아파트 103동 802호, 305-763 Daejeon (KR). 이하현 (LEE, Ha Hyun) [KR/KR]; 서울시 중랑구 면목2동 136-5, 131-819 Seoul (KR). 김종호 (KIM, Jong Ho) [KR/KR]; 대전시 유성구 신성동 146-8 파인하우스 205호, 305-804 Daejeon (KR). 임성창 (LIM, Sung Chang) [KR/KR]; 대전시 유성구 신성동 254-8번지 세종빌라 201호, 305-750 Daejeon (KR). 최진수 (CHOI, Jin Soo) [KR/KR]; 대전시 유성구 반석동 613번지 반석마을 6단지 아파트 609동 1605호, 305-750 Daejeon (KR). 김진웅 (KIM, Jin Woong) [KR/KR]; 대전시 유성구 전민동 엑스포 아파트 305동 1603호, 305-761 Daejeon (KR). 안치득 (AHN, Chie Teuk) [KR/KR]; 대전시 유성구 도룡동 과거원 아파트 2동 504호, 305-340 Daejeon (KR).

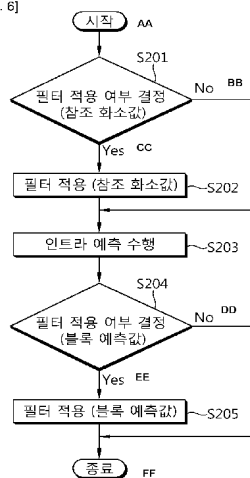
- (74) 대리인: 양문옥 (YANG, Moon Ock); 서울 강남구 역삼동 735-10 삼흥역삼빌딩 2층 에센특허법률사무소, 135-080 Seoul (KR).
- (81) 지정국 (별도의 표시가 없는 한, 가능한 모든 종류의 국내 권리의 보호를 위하여): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KZ,

[다음 쪽 계속]

(54) Title: METHOD AND APPARATUS FOR PERFORMING INTRA-PREDICTION USING ADAPTIVE FILTER

(54) 발명의 명칭 : 적응적 필터를 이용한 인트라 예측 수행 방법 및 장치

[Fig. 6]



AA ... Start  
 BB, DD ... No  
 CC, EE ... Yes  
 FF ... End  
 S201 ... Determine whether to apply filter (reference pixel value)  
 S202 ... Apply filter (reference pixel value)  
 S203 ... Perform intra-prediction  
 S204 ... Determine whether to apply filter (block prediction value)  
 S205 ... Apply filter (block prediction value)

(57) Abstract: Provided is a method and apparatus for performing intra-prediction using an adaptive filter. The method for performing intra-prediction comprises the steps of: determining whether or not to apply a first filter for a reference pixel value on the basis of information of a neighboring block of a current block; applying the first filter for the reference pixel value when it is determined to apply the first filter; performing intra-prediction on the current block on the basis of the reference pixel value; determining whether or not to apply a second filter for a prediction value according to each prediction mode of the current block, which is predicted by the intra-prediction performance on the basis of the information of the neighboring block; and applying the second filter for the prediction value according to each prediction mode of the current block when it is determined to apply the second filter.

(57) 요약서:

[다음 쪽 계속]

WO 2011/126349 A3



LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(84) **지정국** (별도의 표시가 없는 한, 가능한 모든 종류의 역내 권리의 보호를 위하여): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), 유라시아 (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), 유럽 (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,

**공개:**

- 국제조사보고서와 함께 (조약 제 21 조(3))
- 청구범위 보정 기한 만료 전의 공개이며, 보정서를 접수하는 경우 그에 관하여 별도 공개함 (규칙 48.2(h))

(88) **국제조사보고서 공개일:** 2012년 1월 26일

적응적 필터를 이용한 인트라 예측(intra-prediction) 수행 방법 및 장치가 제공된다. 상기 인트라 예측 수행 방법은 현재 블록(current block)의 주변 블록의 정보를 기반으로 참조 화소값에 대한 제 1 필터의 적용 여부를 결정하는 단계, 상기 제 1 필터를 적용하기로 결정된 경우 상기 참조 화소값에 대하여 상기 제 1 필터를 적용하는 단계, 상기 참조 화소값을 기반으로 상기 현재 블록에 대한 인트라 예측을 수행하는 단계, 상기 주변 블록의 정보를 기반으로 상기 인트라 예측 수행에 의해서 예측된 상기 현재 블록의 각 예측 모드(prediction mode) 별 예측값에 대한 제 2 필터의 적용 여부를 결정하는 단계, 및 상기 제 2 필터를 적용하기로 결정된 경우 상기 현재 블록의 각 예측 모드별 예측값에 대하여 상기 제 2 필터를 적용하는 단계를 포함한다.

## INTERNATIONAL SEARCH REPORT

International application No.

**PCT/KR2011/002514**

## A. CLASSIFICATION OF SUBJECT MATTER

**H04N 7/32(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04N 7/32; H04N 7/68; H04N 7/50; G06T 1/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
Korean Utility models and applications for Utility models: IPC as above  
Japanese Utility models and applications for Utility models: IPC as aboveElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
eKOMPASS (KIPO internal) & Keywords: "filter, intra, prediction mode"

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-2005-0090451 A (THOMSON LICENSING S.A.) 13 September 2005 See abstract, page 2, line 1 - page 3, line 8 and claim 1.	1-19
A	KR 10-2009-0079894 A (THOMSON LICENSING) 22 July 2009 See abstract, figure 1 and claim 1.	1-19
A	KR 10-1992-0008629 A (VICTOR CO OF JAPAN LTD) 28 May 1992 See abstract and claim 1.	1-19

 Further documents are listed in the continuation of Box C.
  See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family


Date of the actual completion of the international search

30 NOVEMBER 2011 (30.11.2011)

Date of mailing of the international search report

**13 DECEMBER 2011 (13.12.2011)**

Name and mailing address of the ISA/KR


 Korean Intellectual Property Office  
 Government Complex-Daejeon, 139 Seonsa-ro, Daejeon 302-701,  
 Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT  
Information on patent family members

International application No.

**PCT/KR2011/002514**

Patent document cited in search report	Publication date	Patent family member	Publication date
KR 10-2005-0090451 A	13.09.2005	AU 2003-248913 A1	10.08.2004
		CN 1720747 C0	11.01.2006
		EP 1645135 A1	12.04.2006
		JP 04-474288 B2	12.03.2010
		JP 2006-513635 A	20.04.2006
		US 2006-0072676 A1	06.04.2006
		WO 2004-064406 A1	29.07.2004
KR 10-2009-0079894 A	22.07.2009	CN 101711481 A	19.05.2010
		EP 2082585 A2	29.07.2009
		JP 2010-507335 A	04.03.2010
		US 2009-0238276 A1	24.09.2009
		WO 2008-048489 A3	24.04.2008
KR 10-1992-0008629 A	28.05.1992	EP 0480353 A2	15.04.1992
		EP 0480353 A3	22.12.1993
		EP 0480353 B1	07.02.1996
		JP 02-549013 B2	08.08.1996
		JP 04-145767 A	19.05.1992
		JP 2549013 B2	30.10.1996
		US 05283656A A	01.02.1994



**A. 발명이 속하는 기술분류(국제특허분류(IPC))**

**H04N 7/32(2006.01)i**

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**B. 조사된 분야**

조사된 최소문헌(국제특허분류를 기재)  
H04N 7/32; H04N 7/68; H04N 7/50; G06T 1/00

조사된 기술분야에 속하는 최소문헌 이외의 문헌  
한국등록실용신안공보 및 한국공개실용신안공보: 조사된 최소문헌란에 기재된 IPC  
일본등록실용신안공보 및 일본공개실용신안공보: 조사된 최소문헌란에 기재된 IPC

국제조사에 이용된 전산 데이터베이스(데이터베이스의 명칭 및 검색어(해당하는 경우))  
eKOMPASS(특허청 내부 검색시스템) & 키워드: "filter,intra,prediction mode"

**C. 관련 문헌**

카테고리*	인용문헌명 및 관련 구절(해당하는 경우)의 기재	관련 청구항
A	KR 10-2005-0090451 A (봄슨 라이선싱 에스.에이.) 2005.09.13 요약, 페이지2, 라인1 - 페이지3, 라인8 및 청구항1.	1-19
A	KR 10-2009-0079894 A (봄슨 라이선싱) 2009.07.22 요약,도면1 및 청구항1.	1-19
A	KR 10-1992-0008629 A (니홍비구타가부시기가이샤) 1992.05.28 요약 및 청구항1.	1-19

추가 문헌이 C(계속)에 기재되어 있습니다.       대응특허에 관한 별지를 참조하십시오.

* 인용된 문헌의 특별 카테고리:	
"A" 특별히 관련이 없는 것으로 보이는 일반적인 기술수준을 정의한 문헌	"T" 국제출원일 또는 우선일 후에 공개된 문헌으로, 출원과 상충하지 않으며 발명의 기초가 되는 원리나 이론을 이해하기 위해 인용된 문헌
"E" 국제출원일보다 빠른 출원일 또는 우선일을 가지나 국제출원일 이후에 공개된 선출원 또는 특허 문헌	"X" 특별한 관련이 있는 문헌. 해당 문헌 하나만으로 청구된 발명의 신규성 또는 진보성이 없는 것으로 본다.
"L" 우선권 주장에 의문을 제기하는 문헌 또는 다른 인용문헌의 공개일 또는 다른 특별한 이유(이유를 명시)를 밝히기 위하여 인용된 문헌	"Y" 특별한 관련이 있는 문헌. 해당 문헌이 하나 이상의 다른 문헌과 조합하는 경우로 그 조합이 당업자에게 자명한 경우 청구된 발명은 진보성이 없는 것으로 본다.
"O" 구두 개시, 사용, 전시 또는 기타 수단을 언급하고 있는 문헌	"&" 동일한 대응특허문헌에 속하는 문헌
"P" 우선일 이후에 공개되었으나 국제출원일 이전에 공개된 문헌	

국제조사의 실제 완료일 2011년 11월 30일 (30.11.2011)	국제조사보고서 발송일 <b>2011년 12월 13일 (13.12.2011)</b>
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ISA/KR의 명칭 및 우편주소 대한민국 특허청 (302-701) 대전광역시 서구 청사로 189, 정부대전청사 팩스 번호 82-42-472-7140	심사관 김영태 전화번호 82-42-481-8367
--	-----------------------------------

국제조사보고서에서 인용된 특허문헌	공개일	대응특허문헌	공개일
KR 10-2005-0090451 A	2005.09.13	AU 2003-248913 A1	2004.08.10
		CN 1720747 C0	2006.01.11
		EP 1645135 A1	2006.04.12
		JP 04-474288 B2	2010.03.12
		JP 2006-513635 A	2006.04.20
		US 2006-0072676 A1	2006.04.06
		WO 2004-064406 A1	2004.07.29
KR 10-2009-0079894 A	2009.07.22	CN 101711481 A	2010.05.19
		EP 2082585 A2	2009.07.29
		JP 2010-507335 A	2010.03.04
		US 2009-0238276 A1	2009.09.24
		WO 2008-048489 A3	2008.04.24
KR 10-1992-0008629 A	1992.05.28	EP 0480353 A2	1992.04.15
		EP 0480353 A3	1993.12.22
		EP 0480353 B1	1996.02.07
		JP 02-549013 B2	1996.08.08
		JP 04-145767 A	1992.05.19
		JP 2549013 B2	1996.10.30
		US 05283656A A	1994.02.01