(19) Japan Patent Office (JP)

(12) **Japanese Unexamined Patent Application Publication** (A)

(11) Japanese Unexamined Patent Application Publication Number

H9-198019

(43) Publication date July 31,1997

(51) Int. Cl.[6]	Identification codes	JPO file numbers	FI		Technical indications
G09G 5/10		9377-5H	G09G 5/10	B	
5/00		9377-5H	5/00	X	
	550	9377-5H		550 C	
H04N 1/407			H04N 1/407	101 E	

Request for examination Not yet requested Number of claims 4 OL (Total of 4 pages)

(21) Application number: Japanese Patent Application H8-5867

(22) Date of application: January 17, 1996

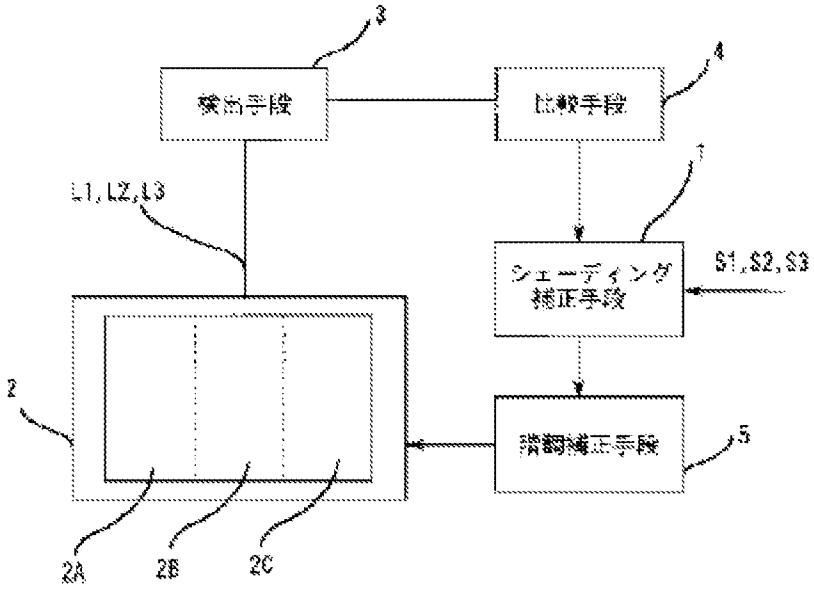
(71) Applicant: 000005201
FUJI PHOTO FILM CO., LTD.
210 Nakanuma, Minami-ashigara, Kanagawa-ken

(72) Inventor: OGAWA EIJI
c/o FUJI PHOTO FILM CO., LTD
798 Miyanodai, Kaisei-machi, Ashigarakami-gun, Kanagawa-ken

(74) Agent: Patent attorney Yanagida Masashi (and 1 other)

(54) (TITLE OF THE INVENTION) IMAGE DISPLAY METHOD AND APPARATUS

(57) (ABSTRACT)
(PROBLEM) In displaying an image on a light emitting display means such as a CRT, shading resulting from variation in the brightness of the CRT is corrected to accurately display an image.
(MEANS FOR SOLVING) A CRT 2 is divided into three regions 2A, 2B, 2C, and the brightnesses of the respective regions 2A, 2B, 2C are detected by a detecting means 3. The detection result is compared at a comparing means 4, and correction is performed so that the brightnesses of the images to be displayed at the respective regions 2A, 2B, 2C are made approximately equivalent by means of a shading correcting means 1 based on this comparison result. The corrected image signals S1, S2, S3 are subject to gradation correction by a gradation correcting means 5 and are respectively displayed at the respective regions 2A, 2B, 2C of the CRT 2.



(SCOPE OF PATENT CLAIMS)
(CLAIM 1) An image display method that displays an image signal as visible light on a light emitting display means; characterized in that

the brightness of each of the portions of the light emitting display means is detected, and,

based on said detection result, shading correction is performed on the image signal so that the brightness of each of the portions of the light emitting display means becomes approximately equivalent.
(CLAIM 2) An image display method according to Claim 1; characterized in that the light emitting display means is divided into a plurality of regions, the brightnesses of said respective regions are detected, and the shading correction is performed for each of said respective regions.
(CLAIM 3) An image display apparatus that displays an image signal as visible light on a light emitting display means; characterized in that it comprises

a brightness detecting means, which detects the brightness of each of the portions of the light emitting display means, and

a shading correcting means, which, based on said detection result, performs shading correction on the image signal so that the brightness of each of the portions of the light emitting display means becomes approximately equivalent.
(CLAIM 4) An image display apparatus according to Claim 3; characterized in that the brightness detecting means is a means that divides the light emitting display means into a plurality of regions to detect the brightness of each of said respective regions, and the shading correcting means is a means that performs the shading correction for each of said respective regions.
(DETAILED DESCRIPTION OF THE INVENTION)
[0001]
(TECHNICAL FIELD OF THE INVENTION)

The present invention relates to an image display method and apparatus that display an image on a light emitting display means such as a CRT and particularly relates to an image display method and apparatus that perform shading correction on an image signal to perform display on a light emitting display means.
[0002]
(PRIOR ART)

Conventionally, in the case in which an image is to be displayed on a light emitting display means such as a CRT, a gradation conversion table, which makes the gradation characteristic (the relationship between the image signal value and the logarithmic value of the brightness on the light emitting display means) of the light emitting display means linear, is comprised, and an image is displayed after gradation conversion has been performed on an image signal according to this gradation conversion table.
[0003]
(PROBLEMS TO BE SOLVED BY THE INVENTION)

However, in a light emitting display means such as that discussed above, due to such factors as irregularities of the fluorescent material layer, variation in the curvature of the tube surface, and electron gun output irregularity, shading occurs, and the brightness unfortunately becomes irregular at each of the portions on the light emitting display means. For example, in the CRT, in general, the brightness is higher the nearer the center of the tube surface, and the brightness is lower than nearer the periphery. When the brightness varies in this way, it becomes impossible to correctly display image information that the image signal carries on the light emitting display means. Particularly in a case such as one in which the light emitting display means is divided into a plurality of regions, and an image for medical use is displayed in the respective regions to perform a comparative diagnosis, when there is variation in brightness, there is concern that it will not be possible to perform an accurate comparison and that misdiagnosis will unfortunately occur.
[0004]

The present invention takes the aforementioned circumstances into account, and its purpose is to provide an image display method and apparatus that are able to eliminate variation in brightness resulting from shading of the light emitting display means.
[0005]
(MEANS TO SOLVE PROBLEMS)

The image display method and apparatus of the present invention are such that an image display method that displays an image signal as a visible image on a light emitting display means is characterized in that the brightness of each of the portions of the light emitting display means is detected, and shading correction is performed on the image signal based on said detection result so that the brightness of each of the portions of the light emitting display means becomes approximately equivalent.
[0006]

In addition, in the image display method and apparatus, it is preferable that the light emitting display means is divided into a plurality of regions, the brightness of each of said respective regions be detected, and the shading correction to be performed for each of said respective regions.

[0007]

(EFFECTS OF THE INVENTION)

The image display method and apparatus according to the present invention detect the brightness of each of the portions of a light emitting display means such as a CRT and perform shading correction on an image signal based on these detected brightnesses so that the brightness of each of these portions becomes equivalent, so even if there is variation in the brightness of each of the portions of the light emitting display means, this variation is corrected. Therefore, it is possible to display an accurate image that has no effects of shading on the light emitting display means.

[0008]

In addition, in a case in which the light emitting display means is divided into a plurality of regions, and a plurality of images are displayed at the respective regions for the purpose of a comparative diagnosis, by detecting the brightness of each of the respective regions to perform shading correction, it is possible to correct variation of the brightness in each of the respective regions to display images using a brightness that is approximately mutually equivalent in the respective regions. Therefore, in the case in which a plurality of images are displayed on a light emitting display means to perform comparative diagnosis, it is possible to perform an accurate comparative diagnosis, and, through this, it is possible to prevent misdiagnosis resulting from the effects of shading.

[0009]

(EMBODIMENTS OF THE INVENTION)

Embodiments of the present invention will be described while referring to the following drawings.

[0010]

Fig. 1 is a block diagram that shows an embodiment of an image display apparatus resulting from the present invention. The illustrated display apparatus is a display apparatus that displays a plurality of images for medical use on one light emitting display means, and it comprises a shading correcting means 1, which performs shading correction on image signals S1, S2, S3 as discussed below, a gradation correcting means 5, which performs gradation correction of the image signals S1, S2, S3 on which shading correction has been performed by the shading correcting means 1, a CRT 2 as an example of a light emitting display means that, based on the image signals S1, S2, S3 that have been gradation corrected by the gradation correcting means 5, displays images carried by these image signals S1, S2, S3 in the respective three divided regions 2A, 2B, 2C as shown in Fig. 1, a detecting means 3 such as a luminance meter, which detects the brightnesses of the respective regions 2A, 2B, 2C of the CRT 2, and a comparing means 4, which compares the brightnesses of the respective regions 2A, 2B, 2C of the CRT 2. It is also such that, at the shading correcting means 1, shading correction of the image signals S1, S2, S3 is performed based on the comparison results of the comparing means 4 so that the brightnesses of the respective regions 2A, 2B, 2C become approximately equivalent.

[0011]

Next, the action of an image display apparatus according to the present invention will be described. First, the brightnesses of the respective regions 2A, 2B, 2C of the CRT 2 are detected by the detecting means 3. This detection of the brightnesses is performed in the following way. First, in a state in which an image with a uniform pixel value has been displayed on the CRT 2, the brightness L1, L2, L3 of each of the three divided regions 2A, 2B, 2C is detected by the detecting means 3. This detection of the brightnesses L1, L2, L3 is performed by detecting, for example, the average level of the brightnesses of the respective regions 2A, 2B, 2C. When the brightnesses L1, L2, L3 of the respective regions 2A, 2B, 2C are detected in this way, a comparison of these brightnesses L1, L2, L3 is performed at the comparing means 4. Then the comparison result from the comparing means 4 is input to the shading correcting means 1.

[0012]

At the shading correcting means 1, correction of the respective image signals S1, S2, S3 is performed based on the comparison result from the comparing means 4 so that the brightnesses of the images to be displayed in the respective regions 2A, 2B, 2C become approximately equivalent. This correction is performed so that, based on the comparison result, the brightness levels of other regions match that of the region in which the brightness level is lowest. For example, in the case in which brightness L3 of region 2C from among brightnesses L1, L2 and L3 of the respective regions 2A, 2B, 2C shown in Fig. 2 had the lowest level, correction of image signals S1 and S2 is performed so that brightnesses L1 and L2 of the other regions 2A, 2B match brightness L3 of region 2C. Specifically, correction is performed so that the levels of the respective image signals S1 and S2 are reduced so that the levels of image signals S1 and S2 to be respectively displayed in regions 2A and 2B become approximately equivalent to the brightness level of image signal S3 to be displayed in region 2C. Then, image signals S1, S2 and

S3, on which shading correction has been performed in this way, are subject to gradation correction at the gradation correcting means 5 and are displayed as visible images at the respective regions 2A, 2B, 2C of the CRT 2.

[0013]

In this way, in the case in which respectively different images are displayed in the divided regions 2A, 2B, 2C of the CRT 2 to perform comparative diagnosis, by detecting the brightness L1, L2, L3 of each of the respective regions 2A, 2B, 2C to perform shading correction, it is possible to correct the variation in the brightness in each of the respective regions 2A, 2B, 2C to display images at approximately mutually equivalent brightnesses in the respective regions 2A, 2B, 2C. Therefore, in the case in which a plurality of images are to be displayed on the CRT 2 to perform comparative diagnosis, it is possible to perform accurate comparative diagnosis, and, through this, it is possible to prevent misdiagnosis resulting from the effects of shading.

[0014]

Note that, in the embodiments discussed above, an example of shading correction in the case in which the CRT 2 has been divided vertically in three was described, but it is also possible to apply the present invention with any division format, such as three horizontal divisions or four divisions.

[0015]

In addition, in the aforementioned embodiments, a CRT 2 was divided, and images were displayed in the respective divided regions 2A, 2B, 2C, but even in the case in which the CRT 2 is not divided and one image is displayed, variation in brightness resulting from shading is apparent at each of the portions of the CRT 2. In the case in which one image is to be displayed on a CRT in this way, the brightness of each of the portions of the CRT 2 may be detected by the detecting means 3 similarly to the embodiments discussed above, the detection result may be compared at the comparing means 4, and correction of the image signals of each of the respective portions may be performed based on this comparison result by the shading correcting means 1. By performing shading correction on the image signals so that the brightness of each of the portions of the CRT 2 becomes equivalent in this way, even if there is variation in the brightness of each of the portions of the CRT 2, it is possible for this variation to be corrected and for an accurate image in which there are no effects of shading to thereby be displayed on the CRT 2.

(BRIEF DESCRIPTION OF THE DRAWINGS)

FIG. 1

FIG. 1 is a block diagram that shows an embodiment of an image display apparatus according to the present invention.

FIG. 2

FIG. 2 is a graph that shows the brightnesses of the respective regions of the CRT.

(DESCRIPTION OF SYMBOLS)

1	shading correcting means
2	light emitting display means (CRT)
2A, 2B, 2C	region
3	detecting means
4	comparing means
5	gradation correcting means
S1, S2, S3	image signal

DOCKET ALARM

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS
Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS
Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS
Sync your system to PACER to automate legal marketing.