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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : H03M 7/40, H04N 7/50	A1	(11) International Publication Number: WO 00/51243 (43) International Publication Date: 31 August 2000 (31.08.00)

(21) International Application Number: PCT/KR99/00764

(22) International Filing Date: 11 December 1999 (11.12.99)

(30) Priority Data:
1999/6157 24 February 1999 (24.02.99) KR

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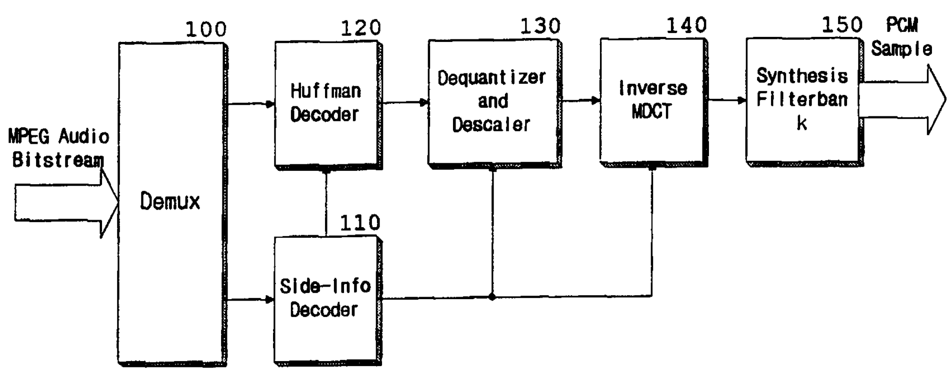
(81) Designated States: AU, BR, CA, CN, DE, ES, GB, IN, JP, RU, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: A BACKWARD DECODING METHOD OF DIGITAL AUDIO DATA



(57) Abstract

This invention provides a method of backward decoding compressed digital audio data into an analog audio data reversed in time. The method according to this invention comprises the steps of locating a header of a last frame of the compressed digital audio data; dequantizing a plurality of data blocks constructing the frame based on information contained in the located header; extracting time signals of each frequency subband from the dequantized data blocks, reducing discontinuities between the dequantized data blocks; and synthesizing the extracted time signals of all subbands backward into real audio signal reversed in time. Therefore, this invention enables to record the decoded analog signal on both tracks on a magnetic tape simultaneously while the magnetic tape travels in one direction with little increase of computation load and memory size, resulting in a high speed recording.

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DESCRIPTION

A BACKWARD DECODING METHOD OF DIGITAL AUDIO DATA

1. Technical Field

The present invention relates to a method of decoding compressed digital audio data backward, more particularly, to a method of backward decoding an MPEG (Moving Picture Experts Group) encoded audio data into analog audio signal with little increase of computation load and memory size.

2. Background Art

Digital audio signal is in general more robust to noise than analog signal and thus the quality is not subject to degradation during copy or transmission over network. The digital audio signals are, moreover, transmitted more rapidly and stored in storage media of less capacity due to effective compression methods recently developed.

Many compression methods have been proposed to effectively encode audio signals into digital data. MPEG (Moving Picture Experts Group) audio coding schemes have been used for the standard in this area. The MPEG audio standards that are standardized as ISO (International Standardization Organization) - MPEG audio layer-1, layer-2, and layer-3 were devised to encode high-quality stereo audio signals with little or no perceptible loss of quality. They have been widely adopted in digital music broadcasting area and in addition have been used with MPEG video standards to encode multimedia data. In addition to MPEG-1, standard specifications for digital environments have been proposed; MPEG-2 includes standards on compression of multimedia data. Standards for object oriented multimedia communication are included in MPEG-4, which is in progress.

MPEG-1 consists of five coding standards for compressing and storing moving picture and audio signals in digital storage media. MPEG audio standard includes three audio coding methods: layer-1, layer-2, and layer-3. MPEG audio layer-3 (hereinafter referred to as "MP3") algorithm includes a much more refined approach than in layer-1 and layer-2 to achieve higher compression ratio and sound quality, which will be described briefly below.

MPEG audio layer-1, 2, 3 compress audio data using perceptual coding techniques which address perception of sound waves of the human auditory system. To be specific, they take an advantage of the human auditory system's inability to hear quantization noise under conditions of auditory masking. The "masking" is a perceptual property of the human ear which occurs whenever the presence of a strong audio signal makes a temporal or spectral neighborhood of weaker audio signals imperceptible. Let us suppose that a pianist plays the piano in front of audience. When the pianist does not touch keyboard, the audience can hear trailing sounds, but is no longer able to hear the trailing sounds at the instant of touching the keyboard. This is because, in presence of masking sounds, or the newly generated sounds, the trailing sounds which fall inside frequency bands centering the masking sound, so-called critical bands, and loudness of which is lower than a masking threshold are not audible. This phenomenon is called spectral masking effect. The masking ability of a given signal component depends on its frequency position and its loudness. The masking threshold is low in the sensitive frequency bands of the human ear, i.e., 2KHz to 5KHz, but high in other frequency bands.

There is the temporal masking phenomenon in the human auditory system. That is, after hearing a loud sound, it takes a period of time for us to be able to hear a new sound that is not louder than the sound. For instance, it requires 5 milliseconds for us to be able to hear a new sound of 40 dB after hearing a sound of 60 dB during 5

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