

Exhibit C

U.S. Patent No. 6,744,818

Method and Apparatus for Visual Perception Encoding

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Sheraizin et al.

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(54) **METHOD AND APPARATUS FOR VISUAL PERCEPTION ENCODING**

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(51) **Int. Cl.⁷** **H04N 7/12**

(52) **U.S. Cl.** **375/240.29**

(58) **Field of Search** 375/240, 240.01, 375/240.16, 240.29; 382/264; 704/229, 500; H04N 7/12

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,341,442	A	8/1994	Barrett	
5,491,519	A	2/1996	Kim	
5,537,510	A	* 7/1996	Kim	704/229
5,586,200	A	12/1996	Devaney et al.	
5,613,035	A	* 3/1997	Kim	704/229
5,627,937	A	* 5/1997	Kim	375/240
5,774,593	A	6/1998	Zick et al.	
5,796,864	A	8/1998	Callahan	
5,845,012	A	12/1998	Jung	
5,847,766	A	12/1998	Peak	
5,870,501	A	2/1999	Kim	
6,005,626	A	* 12/1999	Ding	375/240.16
6,466,912	B1	* 10/2002	Johnston	704/500
6,473,532	B1	* 10/2002	Sheraizin et al.	382/264

OTHER PUBLICATIONS

U.S. patent application Ser. No. 09/524,618, Sheraizin et al., filed Mar. 14, 2000.

Raj Talluri, et al., "A Robust, Scalable, Object-Based Video Compression Technique for Very Low Bit-Rate Coding", IEEE Transaction of Circuit and Systems for Video Technology, vol. 7, No. 1, Feb. 1997.

Awad Kh. Al-Asmari, "An Adaptive Hybrid Coding Scheme for HDTV and Digital Video Sequences," IEEE Transactions on Consumer Electronics, vol. 41, No. 3, pp. 926-936, Aug. 1995.

Kwok-Tung Lo & Jian Feng, "Predictive Mean Search Algorithms for Fast VQ Encoding of Images," IEEE Transactions on Consumer Electronics, vol. 41, No. 2, pp. 327-331, May 1995.

James Goel, et al., "Pre-processing for MPEG Compression Using Adaptive Spatial Filtering", IEEE Transactions on Consumer Electronics, vol. 41, No. 3, pp. 687-698, Aug. 1995.

Jian Feng, et al., "Motion Adaptive Classified Vector Quantization for ATM Video Coding", IEEE Transactions on Consumer Electronics, vol. 41, No. 2, pp. 322-326, May 1995.

(List continued on next page.)

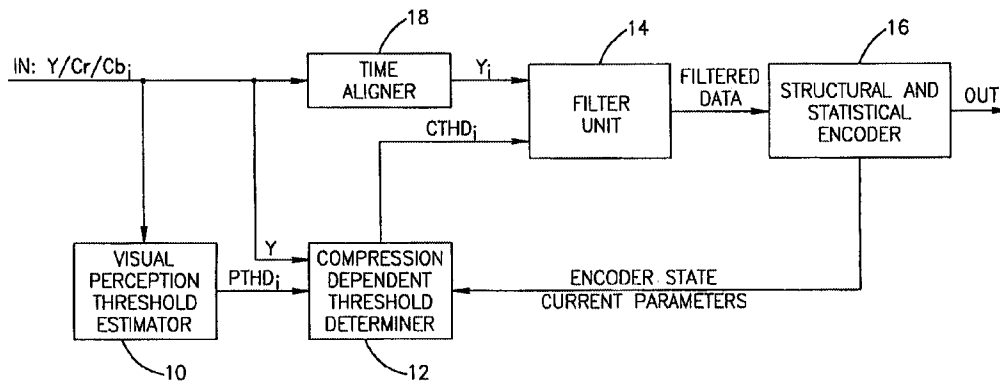
Primary Examiner—Young Lee

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(57) **ABSTRACT**

A video encoding system includes a visual perception estimator, an encoder, a compression dependent threshold estimator and a filter unit. The visual perception estimator estimates a perception threshold for a pixel of a current frame of a videostream. The encoder encodes the current frame. The compression dependent threshold estimator estimates a compression dependent threshold for the pixel at least from the perception threshold and information from the encoder. The filter unit filters the pixel at least according to the compression dependent threshold.

9 Claims, 12 Drawing Sheets



OTHER PUBLICATIONS

Austin Y. Lan, et al., "Scene-Context-Dependent Reference-Frame Placement for MPEG Video Coding," IEEE Transactions on Circuits and Systems for Video Technology, vol. 9, No. 3, pp. 478-489, Apr. 1999.

Kuo-Chin Fan & Kou-Sou Kan, "An Active Scene Analysis-Based Approach for Pseudoconstant Bit-Rate Video Coding," IEEE Transactions on Circuits and Systems for Video Technology, vol. 8, No. 2, pp. 159-170, Apr. 1998.

Takashi Ida & Yoko Sambonsugi, "Image Segmentation and Contour Detection Using Fractal Coding," IEEE Transactions on Circuits and Systems for Video Technology, vol. 8, No. 8, pp. 968-975, Dec. 1998.

Liang Shen & Rangaraj M. Rangayyan, "A Segmentation-Based Lossless Image Coding Method for High-Resolution Medical Image Compression," IEEE Transactions on Medical Imaging, vol. 16, No. 3, pp. 301-316, Jun. 1997.

Adrian Munteanu, et al., "Wavelet-Based Lossless Compression of Coronary Angiographic Images," IEEE Transactions on Medical Imaging, vol. 18, No. 3, pp. 272-281, Mar. 1999.

Akira Okumura, et al., "Signal Analysis and Compression Performance Evaluation of Pathological Microscopic Images," IEEE Transactions on Medical Imaging, vol. 16, No. 6, pp. 701-710, Dec. 1997.

* cited by examiner

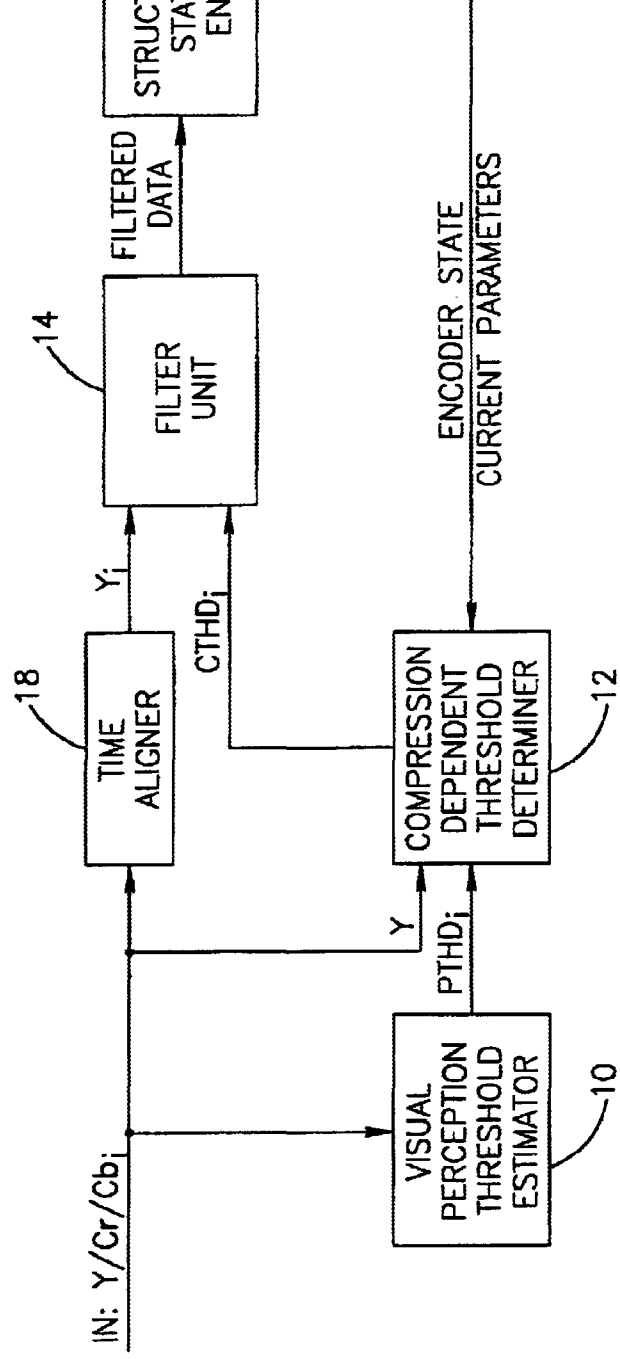


FIG.1

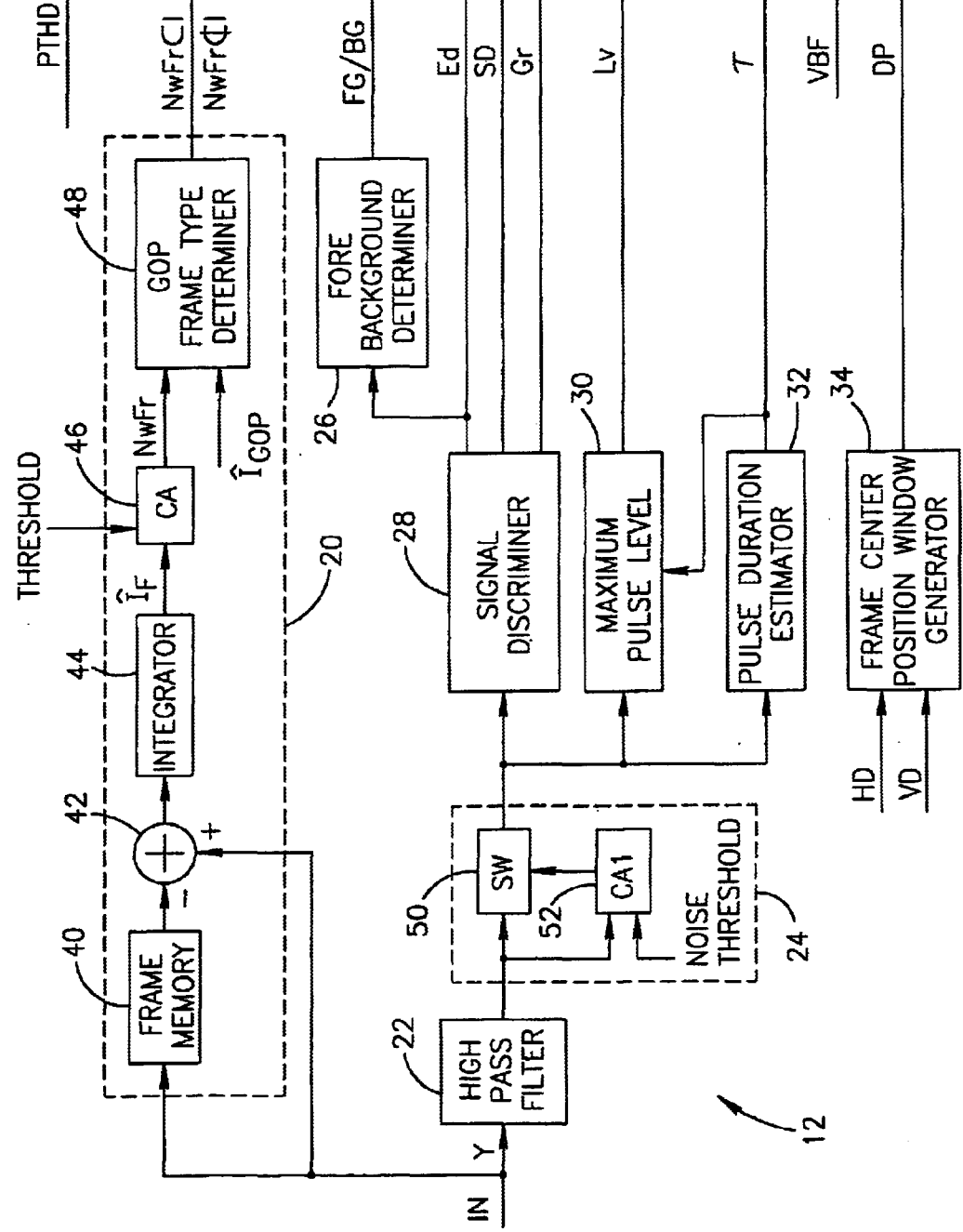


FIG. 2

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