【DESCRIPTION】

【Invention Title】

APPARATUS FOR DECODING AN IMAGE

【Technical Field】

The present invention relates to an image processing apparatus and method, and more particularly, to an apparatus for reducing the amount of residual signals of an image and entropy-coding the residual signals.

【Background Art】

To efficiently transmit a moving picture signal at a low data rate while maintaining high image quality, various digital moving picture compression technologies have been proposed. These moving picture compression technologies include H.261, Motion Picture Experts Group (MPEG)-2/H.262, H.263, MPEG-4, Advanced Video Coding (AVC)/H.264, and so on. The compression technologies include a discrete cosine transform (DCT) scheme, a motion compensation (MC) scheme, a quantization scheme, an entropy coding scheme, and so on.

For image coding, each picture is divided into a plurality of slices, and each slice is divided into a plurality of coding blocks of a predetermined size. Since an image of a high-definition (HD) grade or above has many flat areas, an image compression can be improved by encoding the image with coding blocks that are larger than a macroblock (MB).

Therefore, new prediction technique is required and changes in transform coding, entropy coding, intra prediction and inter prediction is required as the size of the coding unit increases to increase image compression ratio without increase of the complexity of image compression.

【Disclosure】

【Technical Problem】

The present invention is directed to an apparatus for encoding a moving picture, and more particularly, to an apparatus for effectively encoding transformed residual signals of a moving picture having a predetermined size or more.

【Technical Solution】

One aspect of the present invention provides an apparatus for decoding an image, the apparatus comprising: an entropy decoding unit configured to receive intra prediction mode and one-dimensional (1D) quantized transform coefficients from an image encoding device, and restore a quantized block using the 1D quantized transform coefficients; an inverse quantization/transform unit configured to inversely quantize and inversely transform the quantized block to generate a residual block; a de-blocking filtering unit configured to apply a de-blocking filter to image data received from the inverse quantization/transform unit; an intra prediction unit configured to generate a prediction block according to the intra prediction mode; and an adding unit configured to add the residual block and the prediction block to generate an original block, wherein, when a size of the quantized block is equal to 8x8, wherein, when a size of the quantized block is equal to 8x8, the entropy decoding unit restores a plurality of subsets by applying a scan pattern determined according to the intra prediction mode to the 1D quantized transform coefficients, and restores the quantized block by applying a scan pattern determined according to

the intra prediction mode to the plurality of subsets, wherein the scan pattern applied to restore the plurality of subsets from the 1D quantized transform coefficients is the same as the scan pattern applied to restore the quantized block from the plurality of subsets, wherein a scan pattern applied to flags is the same as the scan pattern applied to restore the quantized block from the plurality of subsets, wherein each flag indicates whether each coefficient of each subset is 0 or not, and wherein the 1D quantized transform coefficients are scanned in a reverse direction using the scan pattern determined according to the intra prediction mode.

In an example, an image encoding apparatus may be provided, including: an intra prediction unit configured to determine an intra prediction mode and generate a prediction block; a transform/quantization unit configured to generate a residual block and to transform and quantize the residual block to generate a quantized block; and an entropy coder configured to entropy-code quantized coefficients of the quantized block, wherein, when a size of the quantized block is equal to 8x8, the coefficients of the quantized block are divided into a plurality of subsets, and the plurality of subsets are scanned in a reverse direction using a scan pattern determined according to the intra prediction mode, wherein a scan pattern for scanning non-zero coefficients of each subset is same with the scan pattern for the plurality of subsets, wherein a scan pattern for scanning flags indicating non-zero coefficients of each subset is same with the scan pattern for scanning non-zero coefficients of each subset, and wherein the intra prediction mode is encoded using a upper intra prediction mode and a left intra prediction mode, wherein the plurality of subsets are composed of a main subset and a plurality of remaining subsets and the main subset includes a DC coefficient.

CLAIMS

1. An apparatus for decoding an image, the apparatus comprising:

an entropy decoding unit configured to receive intra prediction mode and one-dimensional (1D) quantized transform coefficients from an image encoding device, and restore a quantized block using the 1D quantized transform coefficients;

an inverse quantization/transform unit configured to inversely quantize and inversely transform the quantized block to generate a residual block;

a de-blocking filtering unit configured to apply a de-blocking filter to image data received from the inverse quantization/transform unit;

an intra prediction unit configured to generate a prediction block according to the intra prediction mode; and

an adding unit configured to add the residual block and the prediction block to generate an original block,

wherein, when a size of the quantized block is equal to 8x8, wherein, when a size of the quantized block is equal to 8x8, the entropy decoding unit restores a plurality of subsets by applying a scan pattern determined according to the intra prediction mode to the 1D quantized transform coefficients, and restores the quantized block by applying a scan pattern determined according to the intra prediction mode to the plurality of subsets,

wherein the scan pattern applied to restore the plurality of subsets from the 1D quantized transform coefficients is the same as the scan pattern applied to restore the quantized block from the plurality of subsets,

wherein a scan pattern applied to flags is the same as the scan pattern applied to restore the quantized block from the plurality of subsets, wherein each flag indicates whether each coefficient of each subset is 0 or not, and

wherein the 1D quantized transform coefficients are scanned in a reverse direction using the scan pattern determined according to the intra prediction mode.

2. The apparatus of claim 1, wherein the intra prediction mode is a vertical mode, the scan pattern is a horizontal scan.

3. The apparatus of claim 1, wherein the intra prediction mode is a horizontal mode, the scan pattern is a vertical scan.