【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, 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 intra prediction unit configured to generate a prediction block according to the intra prediction mode; an inverse quantization/transform unit configured to inversely quantize and inversely transform the quantized block to generate a restored residual block; 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, the entropy decoding unit restores a main subset and a plurality of remaining subsets by applying using 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 main subset and the plurality of remaining subsets, wherein the scan pattern applied to restore the main subset and the plurality of

remaining subsets from the 1D quantized transform is the same as the scan pattern applied to restore the quantized block from the main subset and the plurality of remaining subsets, wherein, when the intra prediction mode is a vertical mode, the scan pattern is horizontal mode, and when the intra prediction mode is a horizontal mode, the scan pattern is a vertical scan, wherein the main subset and the plurality of remaining subsets are scanned in a reverse direction.

In an example. an image encoding apparatus may be provided, including: a coding mode determiner configured to determine a size and a prediction mode of a predictive coding block; a transform/quantization unit configured to transform and quantize a residual block of a prediction block generated by intra prediction to generate a quantized block; an inverse quantization/transform unit configured to inversely quantize and inversely transform the quantized block; a de-blocking filtering unit configured to apply a de-blocking filter to an image data received from the inverse quantization/transform unit; and an intra prediction unit configured to determine an intra prediction mode and generate the prediction block according to the intra prediction mode; 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 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.

CLAIMS

1. An apparatus for decoding an image, 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 intra prediction unit configured to generate a prediction block according to the intra prediction mode;

an inverse quantization/transform unit configured to inversely quantize and inversely transform the quantized block to generate a restored residual block; 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, the entropy decoding unit restores a main subset and a plurality of remaining subsets by applying using 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 main subset and the plurality of remaining subsets,

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

wherein, when the intra prediction mode is a vertical mode, the scan pattern is horizontal mode, and when the intra prediction mode is a horizontal mode, the scan pattern is a vertical scan,

wherein the main subset and the plurality of remaining subsets are scanned in a reverse direction.

2. The apparatus of claim 1, wherein the intra prediction unit generates reference pixels when unavailable reference pixels exist.