STUDY GROUP 16 Question 6 Video Coding Experts Group (VCEG) 30th Meeting: Hangzhou, China, 23 - 24 October, 2006

Summary of Invention

Technical Problem

[0008]

However, increasing selectable transform unit size types also increases the number of available quantization matrices. Increasing amount of codes of quantization matrices may degrade coding efficiency. The coding efficiency may degrade more remarkably if the number of quantization matrices which can be designated for each transform unit size changes from one to more.

[0009]

Embodiment of the present invention provide an image processing device and an image processing method capable of suppressing an increase in amount of codes due to an increase in the number of quantization matrices.

Solution to Problem

[0009a]

According to a first aspect of the present invention, there is provided an image processing apparatus comprising: circuitry configured to: select, from a plurality of transform units with different sizes, a 32 x 32 transform unit used for orthogonal transformation of image data to be encoded; and quantize transform coefficient data generated by orthogonally transforming the image data based on the 32 x 32 transform unit by using a 32 x 32 quantization matrix based on an 8 x 8 quantization matrix, wherein the circuitry is configured to generate the 32 x 32 quantization matrix b duplicating one of a first element and a second element adjacent to each other in the 8 x 8 quantization matrix as an element between the first element and the second element in the 32 x 32 quantization matrix.

[0009b]

According to a second aspect of the present invention, there is provided an image processing method comprising: selecting, by circuitry of an image processing

apparatus and from a plurality of transform units with different sizes, a 32 x 32 transform unit used for orthogonal transformation of image data to be encoded; and quantizing, by the circuitry, transform coefficient data generated by orthogonally transforming the image data based on the 32 x 32 transform unit by using a 32 x 32 quantization matrix based on an 8 x 8 quantization matrix, wherein the 32 x 32 quantization matrix is generated by duplicating one of a first element and a second element adjacent to each other in the 8 x 8 quantization matrix as an element between the first element and the second element in the 32 x 32 quantization matrix.

[0010]

Disclosed herein is an image processing device including a selection section configured to select, from a plurality of transform units with different sizes, a transform unit used for inverse orthogonal transformation of image data to be decoded, a generation section configured to generate, from a first quantization matrix corresponding to a transform unit for a first size, a second quantization matrix corresponding to a transform unit for a second size, and an inverse quantization section configured to inversely quantize transform coefficient data for the image data using the second quantization matrix generated by the generation section when the selection section selects the transform unit for the second size.

[0011]

The image processing device can be realized typically as an image decoding device for decoding an image.

quantization matrix.

[0020]

Further, the second size may be smaller than the first size. The generation section may calculate the predicted matrix by averaging a plurality of elements adjacent to each other in the first quantization matrix.

[0021]

Further, the generation section may generate the second quantization matrix from the first quantization matrix when one of a sequence parameter set and a picture parameter set provides a second flag to specify use of a user-defined matrix as the second quantization matrix.

[0022]

Disclosed herein is an image processing method including selecting, from a plurality of transform units with different sizes, a transform unit used for inverse orthogonal transformation of image data to be decoded, generating, from a first quantization matrix corresponding to a transform unit for a first size, a second quantization matrix corresponding to a transform unit for a second size, and inversely quantizing transform coefficient data for the image data using the second quantization matrix generated from the first quantization matrix when a transform unit for the second size is selected.

[0023]

Disclosed herein is an image processing device including a selection section configured to select, from a plurality of transform units with different sizes, a transform unit used for orthogonal transformation of image data to be encoded, a quantization section configured to quantize transform coefficient data generated by orthogonally transforming the image data based on a transform unit selected by the selection section, by using a quantization matrix corresponding to the selected transform unit, and an encoding section configured to encode information for generating a second quantization matrix corresponding to a transform unit for a second size from a first quantization matrix corresponding to a transform unit for a first size.

[0024]

The image processing device can be realized typically as an image encoding device for encoding an image.

[0025]

Disclosed herein is an image processing method including selecting, from a plurality of transform units with different sizes, a transform unit used for orthogonal transformation of image data to be encoded, quantizing transform coefficient data generated by orthogonally transforming the image data based on a selected transform unit, by using a quantization matrix corresponding to the selected transform unit, and encoding information for generating a second quantization matrix corresponding to a transform unit for a second size from a first quantization matrix corresponding to a transform unit for a first size.

Advantageous Effects of Invention

[0026]

As described above, the image processing device and the image processing method according to embodiments of the present invention can suppress in an increase in the code amount due to an increase in the number of quantization matrices.

Brief Description of Drawings

[0027]

[Fig. 1] Fig. 1 is a block diagram illustrating a hardware configuration of an image encoding device according to an embodiment.

[Fig. 2] Fig. 2 is a block diagram illustrating a detailed configuration of an orthogonal transformation and quantization section according to an embodiment.

[Fig. 3] Fig. 3 is a block diagram illustrating a more detailed configuration of a matrix processing section according to an embodiment.

[Fig. 4] Fig. 4 is an explanatory diagram illustrating information inserted into a sequence parameter set according to an embodiment.

[Fig. 5] Fig. 5 is an explanatory diagram illustrating information inserted into a