[0004]

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[Summary of Invention]

[Technical Problem]

[0005]

However, in the conventional context adaptive arithmetic coding, a large amount of load is sometimes required to select contexts for coding coding-target coefficients.

[0006]

Embodiments of~~In view of this,~~ the present invention provides an image coding method which enables reduction in the amount of load required to select contexts for coding coding-target coefficients.

[Solution to Problem]

[0007]

~~An image coding method A~~according to an first aspect of the present invention, there is provided an image coding method for coding an image on a block-by-block basis ~~and including~~, the image coding method comprising: selecting, for each of a plurality of sub-blocks included in a coding-target block and each including a plurality of coefficients, a context for performing arithmetic coding on a parameter indicating a coding-target coefficient included in the sub-block from a context set corresponding to the sub-block, based on at least one reference coefficient located around the coding-target coefficient, the coding-target block being a transform unit; and performing arithmetic coding on the parameter indicating the coding-target coefficient using probability information about the selected context, wherein, in the selecting, the context is selected from the context set, the context set corresponding to a sum of (i) a value indicating a position in a horizontal direction of the sub-block in

the coding-target block and (ii) a value indicating a position in a vertical direction of the sub-block in the coding-target block.

[0007a]

According to a second aspect of the present invention, there is provided an image coding apparatus which codes an image on a block-by-block basis, the image coding apparatus comprising:

a context selecting unit configured to select, for each of a plurality of sub-blocks included in a coding-target block and each including a plurality of coefficients, a context for performing arithmetic coding on a parameter indicating a coding-target coefficient included in the sub-block from a context set corresponding to the sub-block, based on at least one reference coefficient located around the coding-target coefficient, the coding-target block being a transform unit; and

an arithmetic encoder which performs arithmetic coding on the parameter indicating the coding-target coefficient using probability information about the selected context,

wherein, the context selecting unit is configured to select the context from the context set, the context set corresponding to a sum of (i) a value indicating a position in a horizontal direction of the sub-block in the coding-target block and (ii) a value indicating a position in a vertical direction of the sub-block in the coding-target block.

[0007b]

According to a third aspect of the present invention, there is provided an image decoding method for decoding an image coded on a block-by-block basis, the image decoding method comprising:

selecting, for each of a plurality of sub-blocks included in a decoding-target block and each including a plurality of coefficients, a context for performing arithmetic decoding on a parameter indicating a decoding-target coefficient included in the sub-block from a context set corresponding to the sub-block, based on at least one reference coefficient located around the decoding-target coefficient, the decoding-target block being a transform unit; and

performing arithmetic decoding on the parameter indicating the decoding-target coefficient using probability information about the selected context,

wherein, in the selecting, the context is selected from the context set, the context set corresponding to a sum of (i) a value indicating a position in a horizontal direction of the sub-block in the decoding-target block and (ii) a value indicating a position in a vertical direction of the sub-block in the decoding-target block.

[0007c]

According to a fourth aspect of the present invention, there is provided an image decoding apparatus which decodes an image on a block-by-block basis, the image decoding apparatus comprising:

a context selecting unit configured to select, for each of a plurality of sub-blocks included in a decoding-target block and each including a plurality of coefficients, a context for performing arithmetic decoding on a parameter indicating a decoding-target coefficient included in the sub-block from a context set corresponding to the sub-block, based on at least one reference coefficient located around the decoding-target coefficient, the decoding-target block being a transform unit; and

an arithmetic decoder which performs arithmetic decoding on the parameter indicating the decoding-target coefficient using probability information about the selected context,

wherein, the context selecting unit is configured to select the context from the context set, the context set corresponding to a sum of (i) a value indicating a position in a horizontal direction of the sub-block in the decoding-target block and (ii) a value indicating a position in a vertical direction of the sub-block in the decoding-target block.

[0007d]

According to a fifth aspect of the present invention, there is provided an image coding and decoding apparatus comprising: the image coding apparatus according to the above second aspect and the image decoding apparatus according to the above fourth aspect.

[0008]

These general and specific aspects may be implemented using a system, an apparatus, an integrated circuit, a computer program, or a computer-readable recording medium such as a CD-ROM, or any combination of systems, methods, integrated circuits, computer programs, or computer-readable recording media.

[Advantageous Effects of Invention]

[0009]

An image coding method according to an aspect of the present invention makes it possible to reduce the load of selecting contexts for coding coding-target coefficients in context adaptive arithmetic coding.

[Brief Description of Drawings]

[0010]

[FIG. 1]

FIG. 1 is a diagram for illustrating a scheme of selecting a context for arithmetic coding of significant_flag in the underlying knowledge forming the basis of the present invention.

[FIG. 2]

FIG. 2 is a diagram showing an order of coding the coefficients included in a coding-target block in the underlying knowledge forming the basis of the present invention.

[FIG. 3A]

FIG. 3A is a diagram for illustrating a context set for one of the coefficients included in a sub-block in the underlying knowledge forming the basis of the present invention.

[FIG. 3B]

FIG. 3B is a diagram for illustrating a context set for another one of the coefficients included in a sub-block in the underlying knowledge forming the basis of the present invention.

[FIG. 4]