

efficiency also decreases.

[0010]

In view of this, one non-limiting and exemplary embodiment provides an image coding method and an image decoding method for arithmetically coding and arithmetically decoding the last position information using a context which is appropriately switched among a plurality of contexts.

[Solution to Problem]

[0011]

According to a first aspect of the present invention, there is provided an image coding method for coding last position information indicating a position of a last non-zero coefficient in a predetermined order in a current block to be coded, the coding method comprising: binarizing the last position information to generate a binary signal which includes a first signal having a length smaller than or equal to a predetermined maximum length and does not include a second signal or a binary signal which includes the first signal having the predetermined maximum length and the second signal; a first coding step that arithmetically codes each of binary symbols included in the first signal, wherein the context used for coding a binary symbol depends on a bit position of the binary symbol; and a second coding step that arithmetically codes the second signal using a fixed probability when the binary signal includes the second signal, wherein, in the first coding step, a binary symbol at a last bit position of the first signal in sequence from the left is arithmetically coded using a context exclusive to the last bit position, when the first signal has the predetermined

maximum length.

[0011a]

According to a second aspect of the present invention, there is provided an image coding apparatus configured to code last position information indicating a position of a last non-zero coefficient in a predetermined order in a current block to be coded, the coding apparatus comprising: a binarizing unit configured to binarize the last position information to generate a binary signal which includes a first signal having a length smaller than or equal to a predetermined maximum length and does not include a second signal or a binary signal which includes the first signal having the predetermined maximum length and the second signal; a first coding unit configured to arithmetically code each of binary symbols included in the first signal, wherein the context used for coding a binary symbol depends on a bit position of the binary symbol; and a second coding unit configured to arithmetically code the second signal using a fixed probability when the binary signal includes the second signal, wherein the first coding unit is configured to arithmetically code a binary symbol at a last bit position of the first signal in sequence from the left using a context exclusive to the last bit position, when the first signal has the predetermined maximum length.

[0011b]

According to a third aspect of the present invention, there is provided an image decoding method for decoding last position information indicating a position of a last non-zero coefficient in a predetermined order in a current block to be decoded, the decoding method comprising: a first decoding step that arithmetically decodes each of binary symbols included in a first signal, wherein the context used for decoding a binary symbol depends on a bit position of the binary symbol, the first signal being included in a binary signal of the last position information and having a length smaller than or equal to a predetermined maximum length; and a second decoding step that arithmetically decodes the second signal using a fixed probability, when the binary signal of the last position information includes a second signal, wherein, in the first decoding step, a binary symbol at a last bit position of the first signal in sequence from the left is arithmetically decoded using a context exclusive to the last bit position, when the first signal has the predetermined maximum length.

[0011c]

According to a third aspect of the present invention, there is provided an image decoding apparatus configured to decode last position information

indicating a position of a last non-zero coefficient so e predetermined order in a current block to be decoded, the decoding apparatus comprising: a first decoding unit configured to arithmetically decode each of binary symbols included in a first signal, wherein the context used for decoding a binary symbol depends on a bit position of the binary symbol, the first signal being included In a binary signal of the last position information and having a length smaller than or equal to a predetermined maximum length; and a second decoding unit configured to, when the binary signal of the last position information includes a second signal, arithmetically decode the second signal using a fixed probability, wherein the first decoding unit is configured to arithmetically decode a binary symbol at a last bit position of the first signal in sequence from the left using a context exclusive to the last bit position, when the first signal has the predetermined maximum length.

[0011d]

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

[0012]

It is to be noted that the above 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, apparatuses, integrated circuits, computer programs, or computer-readable recording media.

[Advantageous Effects of Invention]

[0013]

With the image coding method according to an embodiments of the present invention, it is possible to arithmetically code the last position information using a context which is appropriately switched among a plurality of contexts.