SAO process, and the offset value is added to the bitstream.

[Citation List]

[Non Patent Literature]
[0004]
[NPL 1] Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, 9th Meeting: Geneva, CH, 27 April – 7 May 2012, JCTVC-I0602_CDTexts_r2.doc, BoG report on integrated text of SAO adoptions on top of JCTVC-I0030, http://phenix.it-sudparis.eu/jct/doc_end_user/documents/9_Geneva/wg11/JCTVC-I0602-v3.zip

[Summary of Invention]

[Technical Problem]
[0005]
In the conventional technique, accelerated processing is desired in coding and decoding an image.
[0006]
Embodiments of the present invention provide an image coding method and an image decoding method in which the processing can be accelerated.

[Solution to Problem]
[0006a]
According to a first aspect of the present invention, there is provided a method including: determining a sample adaptive offset (SAO) parameter category for a SAO offset value; encoding the SAO parameter category into an encoded bitstream, wherein the SAO parameter category indicates that the SAO offset value is a band offset value; determining the SAO offset value, to be added to a pixel value of a reconstructed image, represented as an integer indicating the magnitude of the SAO offset value and a sign bit indicating the sign of the SAO offset value; encoding the determined integer into the encoded bitstream using bypass arithmetic coding with a fixed probability; and encoding the determined sign bit into the encoded bitstream using bypass arithmetic coding with the fixed probability.
[0006b]
According to a second aspect of the present invention, there is provided an apparatus including: at least one processor; at least one memory including computer program code, the memory and the computer program code configured to, working with the at least one processor, cause the apparatus to perform at least the following: decode a sample adaptive offset (SAO) parameter from a bitstream; determine an SAO type parameter category for an SAO offset value from the SAO parameter category, wherein the SAO parameter category indicates that the SAO offset value is a band offset value; decode from the bitstream, using bypass arithmetic coding with a fixed probability, an integer indicating the magnitude of the SAO offset value; decode from the bitstream, using bypass arithmetic coding with the fixed probability, a sign bit indicating the sign of the SAO offset value; and determine the SAO offset value using the decoded integer and the decoded sign bit.
[0006c]
According to a third aspect of the present invention, there is provided a method including: decoding a sample adaptive offset

(SAO) parameter from a bitstream; determining an SAO type parameter category for an SAO offset value from the SAO parameter category, wherein the SAO parameter category indicates that the SAO offset value is a band offset value; decoding from the bitstream, using bypass arithmetic coding with a fixed probability, an integer indicating the magnitude of the SAO offset value; decoding from the bitstream, using bypass arithmetic coding with the fixed probability, a sign bit indicating the sign of the SAO offset value; and determining the SAO offset value using the decoded integer and the decoded sign bit.

[0007]

Disclosed herein is an image coding method for coding an input image, and includes: converting, into a bin string, an offset value used in an offset process to be applied to a pixel value of a reconstructed image corresponding to the input image; and performing bypass arithmetic coding on the bin string using a fixed probability.

[0008]

Disclosed herein is an image decoding method for decoding a coded image, and includes: performing bypass arithmetic decoding on a bin string using a fixed probability, the bin string being coded and indicating an offset value used in an offset process to be applied to a pixel value of a reconstructed image corresponding to the coded image; and converting, into the offset value, the bin string on which the bypass arithmetic decoding is performed.

[0009]

These general or specific aspects of the present invention may be implemented by a system, an apparatus, an integrated circuit, a computer program, a computer-readable recording medium, such as a CD-ROM, or an arbitrary combination of the system, the apparatus, the integrated circuit, the computer program, and the recording medium.

[Advantageous Effects of Invention]

[0010]

With the image coding method, the image coding apparatus, the image decoding method, the image decoding apparatus, and the image coding and decoding apparatus according to embodiments of the present invention, the processing can be accelerated.

[Brief Description of Drawings]

[0011]

[FIG. 1] FIG. 1 is a block diagram illustrating an example configuration of an image coding apparatus according to Embodiment 1.

[FIG. 2] FIG. 2 is a block diagram illustrating an example configuration of an SAO parameter coding unit.

[FIG. 3] FIG. 3 is a block diagram illustrating an example configuration of an sao_offset coding unit.

[FIG. 4] FIG. 4 is a flowchart indicating example processes of the image coding apparatus according to Embodiment 1.

[FIG. 5] FIG. 5 is a flowchart indicating example processes of the SAO parameter coding unit according to Embodiment 1.

[FIG. 6A] FIG. 6A is a flowchart indicating example processes of the sao_offset coding unit according to Embodiment 1.

[FIG. 6B] FIG. 6B is a flowchart indicating example processes of the

CLAIMS

1. A method comprising:

determining a sample adaptive offset (SAO) parameter category for a SAO offset value;

encoding the SAO parameter category into an encoded bitstream, wherein the SAO parameter category indicates that the SAO offset value is a band offset value;

determining the SAO offset value, to be added to a pixel value of a reconstructed image, represented as an integer indicating the magnitude of the SAO offset value and a sign bit indicating the sign of the SAO offset value;

encoding the determined integer into the encoded bitstream using bypass arithmetic coding with a fixed probability; and

encoding the determined sign bit into the encoded bitstream using bypass arithmetic coding with the fixed probability.

2. The method of claim 1, wherein the fixed probability is a 50% probability.

3. The method of claim 1, wherein the SAO parameter category indicates that the SAO offset value is an edge offset value.

4. An apparatus, comprising:

at least one processor;

at least one memory including computer program code, the memory and the computer program code configured to, working with the at least one processor, cause the apparatus to perform at least the following:

decode a sample adaptive offset (SAO) parameter from a bitstream;

determine an SAO parameter category for an SAO offset value from the SAO parameter, wherein the SAO parameter category indicates that the SAO offset value is a band offset value;

decode from the bitstream, using bypass arithmetic coding with a fixed probability, an integer indicating the magnitude of the SAO offset value;

decode from the bitstream, using bypass arithmetic coding with the fixed probability, a sign bit indicating the sign of the SAO offset value; and

determine the SAO offset value using the decoded integer and the decoded sign bit.

5. The apparatus of claim 4, wherein the memory and the computer program code are configured to, working with the at least one processor, cause the apparatus to add the SAO offset value to a pixel value of an image.

6. The apparatus of claim 4, wherein the fixed probability is a 50% probability.

7. The apparatus of claim 4, wherein the SAO parameter category indicates that the SAO offset value is an edge offset value.

8. A method comprising:

decoding a sample adaptive offset (SAO) parameter from a bitstream;

determining an SAO type parameter category for an SAO offset value from the SAO parameter category, wherein the SAO parameter category indicates that the SAO offset value is a band offset value;

decoding from the bitstream, using bypass arithmetic coding with a fixed probability, an integer indicating the magnitude of the SAO offset value;

decoding from the bitstream, using bypass arithmetic coding with the fixed probability, a sign bit indicating the sign of the SAO offset value; and

determining the SAO offset value using the decoded integer and the decoded sign bit.

9. The method of claim 8, further comprising adding the SAO offset value to a pixel value of an image.

10. The method of claim 8, wherein the fixed probability is a 50% probability.

11. The method of claim 8, wherein the SAO parameter category indicates that the SAO offset value is an edge offset value.