[DESCRIPTION]

[Title of Invention]

IMAGE DECODING METHOD, IMAGE CODING METHOD, IMAGE DECODING APPARATUS, IMAGE CODING APPARATUS, AND IMAGE CODING AND DECODING APPARATUS

[Technical Field]

[0001]

The present invention relates to image decoding methods of decoding coded moving pictures and to image coding methods of coding moving pictures.

[Background Art]

[0002]

Upon coding and decoding a moving picture, an image decoding method and image coding method have been proposed which apply a loop filter operation (in-loop filter operation) to pixels in the vicinity of a boundary between slices (slice boundary) (Non Patent Literature 1).

[Citation List]

[Non Patent Literature]

[0003]

[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, Title: High efficiency video coding (HEVC) text specification draft 7, Document: JCTVC-I1003_d5

[Summary of Invention]

[Technical Problem]

[0004]

However, there is a problem that processing load is large with the image decoding method and image coding method according to Non Patent Literature 1.

[0005]

~~The~~Embodiments of the present invention provide~~s~~ an image decoding method and image coding method capable of reducing the processing load.

[Solution to Problem]

[0006]

~~An~~According to a first aspect of the present invention, there is provided an image decoding method ~~according to an aspect of the present invention is an image decoding method~~ of decoding a coded picture, the image decoding method ~~including~~comprising: obtaining a boundary control flag for jointly controlling a deblocking filter operation and a sample adaptive offset operation for a slice boundary of a current slice to be decoded included in the coded picture; decoding the current slice; performing the deblocking filter operation based on the boundary control flag only on at least one of a top slice boundary or a left slice boundary among all slice boundaries of the current slice that has been decoded; and performing the sample adaptive offset operation dependent on the boundary control flag only on the at least one of the top slice boundary or the left slice boundary among all the slice boundaries of the current slice that has been decoded.

[0006a]

According to a second aspect of the present invention, there is provided an image decoding method of decoding a coded picture, the image decoding method comprising: obtaining a boundary control flag for controlling a sample adaptive offset operation for a slice boundary of a current slice to be decoded included in the coded picture; decoding the current slice; and performing the sample adaptive offset operation in accordance with the boundary control flag jointly on at least one pixel in the current slice that has been decoded and on at least one pixel in a different slice that has been decoded, the pixels being in a vicinity of at least one of a top slice boundary or a left slice boundary of the current slice.

[0006b]

According to the third aspect of the present invention, there is provided an image coding method of coding a picture, the image coding method comprising: coding a boundary control flag for jointly controlling a deblocking filter operation and a sample adaptive offset operation for a slice boundary of a current slice to be coded included in the picture; coding the current slice; reconstructing the current slice

from data generated by the coding of the current slice; performing the deblocking filter operation based on the boundary control flag only on at least one of a top slice boundary or a left slice boundary among all slice boundaries of the current slice that has been reconstructed; and performing the sample adaptive offset operation dependent on the boundary control flag only on the at least one of the top slice boundary or the left slice boundary among all the slice boundaries of the current slice that has been reconstructed.

[0006c]

According to a fourth aspect of the present invention, there is provided an image coding method of coding a picture, the image coding method comprising: coding a boundary control flag for controlling a sample adaptive offset operation for a slice boundary of a current slice to be coded included in the picture; coding the current slice; reconstructing the current slice from data generated by the coding of the current slice; and performing the sample adaptive offset operation in accordance with the boundary control flag jointly on at least one pixel in the current slice that has been reconstructed and on at least one pixel in a different slice that has been reconstructed, the pixels being in a vicinity of at least one of a top slice boundary or a left slice boundary of the current slice.

[0006d]

According to a fifth aspect of the present invention, there is provided an image decoding apparatus which decodes a coded picture, the image decoding apparatus comprising: processing circuitry; and storage accessible from the processing circuitry, wherein the processing circuitry executes: obtaining a boundary control flag for jointly controlling a deblocking filter operation and a sample adaptive offset operation for a slice boundary of a current slice to be decoded included in the coded picture; decoding the current slice; performing the deblocking filter operation based on the boundary control flag only on at least one of a top slice boundary or a left slice boundary among all slice boundaries of the current slice that has been decoded; and performing the sample adaptive offset operation dependent on the

boundary control flag only on the at least one of the top slice boundary or the left slice boundary among all the slice boundaries of the current slice that has been decoded.

[0006e]

According to a sixth aspect of the present invention, there is provided an image decoding apparatus which decodes a coded picture, the image decoding apparatus comprising: processing circuitry; and storage accessible from the processing circuitry, wherein the processing circuitry executes: obtaining a boundary control flag for controlling a sample adaptive offset operation for a slice boundary of a current slice to be decoded included in the coded picture; decoding the current slice; and performing the sample adaptive offset operation in accordance with the boundary control flag jointly on at least one pixel in the current slice that has been decoded and on at least one pixel in a different slice that has been decoded, the pixels being in a vicinity of at least one of a top slice boundary or a left slice boundary of the current slice.

[0006f]

According to a seventh aspect of the present invention, there is provided an image coding apparatus which codes a picture, the image coding apparatus comprising: processing circuitry; and storage accessible from the processing circuitry, wherein the processing circuitry executes: coding a boundary control flag for jointly controlling a deblocking filter operation and a sample adaptive offset operation for a slice boundary of a current slice to be coded included in the picture; coding the current slice; reconstructing the current slice from data generated by the coding of the current slice; performing the deblocking filter operation based on the boundary control flag only on at least one of a top slice boundary or a left slice boundary among all slice boundaries of the current slice that has been reconstructed; and performing the sample adaptive offset operation dependent on the boundary control flag only on the at least one of the top slice boundary or the left slice boundary among all the slice boundaries of the current slice that has been reconstructed.

[0006g]

According to an eight aspect of the present invention, there is provided an image coding apparatus which codes a picture, the image coding apparatus comprising: processing circuitry; and storage accessible from the processing circuitry, wherein the processing circuitry executes: coding a boundary control flag for controlling a sample adaptive offset operation for a slice boundary of a current slice to be coded included in the picture; coding the current slice; reconstructing the current slice from data generated by the coding of the current slice; and performing the sample adaptive offset operation in accordance with the boundary control flag jointly on at least one pixel in the current slice that has been reconstructed and on at least one pixel in a different slice that has been reconstructed, the pixels being in a vicinity of at least one of a top slice boundary or a left slice boundary of the current slice.

[0006h]

According to a ninth aspect of the present invention, there is provided an image coding and decoding apparatus comprising the image decoding apparatus of the fifth and the sixth aspects and the image coding apparatus of the seventh and eight aspects.

[0007]

General and specific aspects disclosed above may be implemented using a system, a method, 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]

[0008]

The image decoding method and image coding method disclosed herein provide a reduction in processing load.

[Brief Description of Drawings]

[0009]

[FIG. 1A] FIG. 1A illustrates the structure of a picture.

[FIG. 1B] FIG. 1B illustrates the range for the deblocking filter

operation controlled by the boundary control flag.

[FIG. 1C] FIG. 1C illustrates the range for SAO controlled by the boundary control flag.

[FIG. 2] FIG. 2 is a view for illustrating GDR.

[FIG. 3] FIG. 3 is a flow chart illustrating an image coding method involving GDR.