

DESCRIPTION
IMAGE PROCESSING APPARATUS AND METHOD

TECHNICAL FIELD

[0001]

The present invention relates to an image processing apparatus and a method, and more particularly, to an image processing apparatus and a method capable of reducing the amount of codes required for controlling a sample adaptive offset filter.

BACKGROUND ART

[0002]

In recent years, image information is treated as digital information, and at that occasion, an apparatus is becoming widely prevalent that compresses and encodes an image by employing a coding method for performing compression by orthogonal transformation and motion compensation such as discrete cosine transform using redundancy unique to image information for the purpose of highly efficient transmission and accumulation of information. Examples of the coding methods include MPEG (Moving Picture Experts Group), H.264 and MPEG-4 Part 10 (Advanced Video Coding, hereinafter referred to as H.264/AVC), and the like.

[0003]

Currently, for the purpose of further improving the encoding efficiency as compared with the H.264/AVC, a coding method called HEVC (High Efficiency Video Coding) is being standardized by JCTVC (Joint Collaboration Team-Video Coding) which is a joint standards organization of the ITU-T and the ISO/IEC (for example, see Non-Patent Document 1).

[0004]

In the current draft of HEVC, sample adaptive offset (SAO) filter is employed. In the sample adaptive offset filter, control signals between components of Y, Cb, Cr are all transmitted independently.

[0005]

In contrast, Non-Patent Document 2 suggests transmission upon replacing an ON/OFF control signal between components with a single syntax and transmitting the type of the filter and coefficients independently between components.

CITATION LIST

NON-PATENT DOCUMENT

[0006]

Non-Patent Document 1: Benjamin Bross, Woo-Jin Han, Jens-Rainer Ohm, Gary J. Sullivan, Thomas Wiegand, "High efficiency video coding (HEVC) text specification draft 7", JCTVC-I1003 ver3, 2012.6.1

Non-Patent Document 2: Woo-Shik Kim, Do-Kyoung Kwon, In Suk Chong, Marta Karczewicz, "LCU SAO Enable Flag Coding", JCTVC-I0193, 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

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0007]

However, in the above suggestion, the type information is transmitted independently between the components of Y, Cb, Cr, and therefore, there is a high amount of codes required for controlling the sample adaptive offset filter.

[0008]

Embodiments of the present invention can reduce the amount of codes required for controlling the sample adaptive offset filter.

SOLUTIONS TO PROBLEMS

[0009]

Disclosed herein is an image processing apparatus including a decoding unit configured to perform decoding processing on a coded stream to generate an image, and a sample adaptive offset filter unit configured to apply sample

adaptive offset filter to the image generated by the decoding unit in accordance with a type of a sample adaptive offset filter which is common to components of the image.

[0009a]

According to a first aspect of the present invention, there is provided an image processing apparatus including: a setting unit configured to set type information indicating a type which is common to a type of a sample adaptive offset filter of a first color difference component of an image and a type of a sample adaptive offset filter of a second color difference component of the image; a sample adaptive offset filter unit configured to apply sample adaptive offset filtering to an image which is locally decoded when the image is encoded; an encoding unit configured to use the image, to which the sample adaptive offset filtering is applied by the sample adaptive offset filter unit, to perform encoding processing on the image to generate a coded stream; and a transmission unit configured to transmit the type information which is set by the setting unit and the coded stream generated by the encoding unit.

[0010]

The type of the sample adaptive offset filter is common to a brightness component and a color difference component of the image.

[0011]

The type of the sample adaptive offset filter is common to color difference components of the image.

[0012]

The type of the offset filter is common to a first color difference component and a second color difference component.

[0013]

When the type of the sample adaptive offset filter corresponding to the first color difference component is a band offset, the type of the sample adaptive offset filter corresponding to the second color difference component is a band offset.

[0014]

When the type of the sample adaptive offset filter corresponding to the first color difference component is an edge offset, the type of the sample adaptive offset filter corresponding to the second color difference component is an edge offset.

[0015]

When the type of the sample adaptive offset filter is an edge offset, a pattern rule of the edge offset is common between color difference components of the image.

[0016]

When the type of the offset filter corresponding to the first color difference component is one-dimensional pattern of an edge offset, the type of the offset filter corresponding to the second color difference component is one-dimensional pattern of the edge offset.

[0017]

When the type of the offset filter corresponding to the first color difference component is two-dimensional pattern of the edge offset, the type of the offset filter corresponding to the second color difference component is two-dimensional pattern of the edge offset.

[0018]

When the type of the offset filter corresponding to the first color difference component is a type for not applying an offset, the type of the offset filter corresponding to the second color difference component is a type for not applying an offset.

[0019]

A color space of the image is in a Y/Cb/Cr format and wherein the first color difference component of the image is a Cb component and the second color difference component of the image is a Cr component, and wherein the type information indicates a type common to the type of the sample adaptive offset filter of the Cb component of the image and the type of the sample adaptive offset filter of the Cr component of the image.

[0020]

The image processing apparatus further includes a reception unit configured to receive the coded stream and type information indicating the type of the sample adaptive offset filter common between components of the image, and the decoding unit can use the type information received by the reception unit to decode the coded stream received by the reception unit.

[0021]

The image processing apparatus further includes a deblock filter unit configured to apply deblock filter to the image generated by the decoding unit, and the sample adaptive offset filter unit can apply sample adaptive offset filter on the image to which the deblock filter is applied by the deblock filter unit.

[0022]

The reception unit can receive a merge flag indicating a same offset as an adjacent coding unit adjacent to a current coding unit, and the sample adaptive offset filter unit can use the merge flag received by the reception unit to apply sample adaptive offset filter to the image generated by the decoding unit.

[0023]

Disclosed herein is an image processing method including performing decoding processing on a coded stream to generate an image, and applying sample adaptive offset filter to the generated image in accordance with a type of a sample adaptive offset filter which is common to components of the image.

[0023a]

According to a second aspect of the present invention, there is provided an image processing method including: setting type information indicating a type which is common to a type of a sample adaptive offset filter of a first color difference component of an image and a type of a sample adaptive offset filter of a second color difference component of the image; applying sample adaptive offset filtering to an image which is locally decoded when the image is encoded;

using the image, to which the sample adaptive offset filtering is applied, to perform encoding processing on the image to generate a coded stream; and transmitting the type information which is set and the coded stream which is generated.

[0024]

In the above disclosure, the coded stream is decoded, and the image is generated. Then, the sample adaptive offset filter is applied to the generated image in accordance with the type of the sample adaptive offset filter which is common between the components of the image.

[0025]

It should be noted that the image processing apparatus explained above may be an independent apparatus, or may be an internal block constituting an image coding device or an image decoding device.

EFFECTS OF THE INVENTION

[0026]

According to embodiments of the present invention, an image can be encoded. In particular, the amount of codes can be reduced.

BRIEF DESCRIPTION OF DRAWINGS

[0027]

Fig. 1 is a block diagram illustrating an example of main configuration of an image coding device.

Fig. 2 is a flowchart for explaining an example of flow of encoding processing.

Fig. 3 is a block diagram illustrating a main example of configuration of an image decoding device.

CLAIMS:

1. An image processing apparatus comprising:

a setting unit configured to set type information indicating a type which is common to a type of a sample adaptive offset filter of a first color difference component of an image and a type of a sample adaptive offset filter of a second color difference component of the image;

a sample adaptive offset filter unit configured to apply sample adaptive offset filtering to an image which is locally decoded when the image is encoded;

an encoding unit configured to use the image, to which the sample adaptive offset filtering is applied by the sample adaptive offset filter unit, to perform encoding processing on the image to generate a coded stream; and

a transmission unit configured to transmit the type information which is set by the setting unit and the coded stream generated by the encoding unit.

2. The image processing apparatus according to claim 1, wherein the setting unit sets, as the type information, information which is made common to first type information indicating the type of the sample adaptive offset filter of the first color difference component of the image and second type information indicating the type of the sample adaptive offset filter of the second color difference component of the image.

3. The image processing apparatus according to claim 2, wherein the setting unit sets, for each maximum encoding unit, the first type information indicating the type of the sample adaptive offset filter of the first color difference component

of the image and the second type information indicating the type of the sample adaptive offset filter of the second color difference component of the image in such a manner that the first type information and the second type information are made common.

4. The image processing apparatus according to claim 2, wherein the transmission unit transmits, as the type information that is set by the setting unit, the first type information indicating the type of the sample adaptive offset filter of the first color difference component of the image and the second type information indicating the type of the sample adaptive offset filter of the second color difference component of the image in such a manner that the first type information and the second type information are made common.

5. The image processing apparatus according to claim 4, wherein the transmission unit transmits, as a syntax of the coded stream, the first type information indicating the type of the sample adaptive offset filter of the first color difference component of the image and the second type information indicating the type of the sample adaptive offset filter of the second color difference component of the image in such a manner that the first type information and the second type information are made common.

6. The image processing apparatus according to claim 1, wherein the setting unit sets, as the type information, information indicating that the type of the sample adaptive offset filter of the first color difference component of the image and the type of the sample adaptive offset filter of the second color difference component of the image are common and

are band offsets.

7. The image processing apparatus according to claim 1, wherein the setting unit sets, as the type information, information indicating that the type of the sample adaptive offset filter of the first color difference component of the image and the type of the sample adaptive offset filter of the second color difference component of the image are common and are edge offsets.

8. The image processing apparatus according to claim 7, wherein the setting unit sets, as the type information, information indicating that the type of the sample adaptive offset filter of the first color difference component of the image and the type of the sample adaptive offset filter of the second color difference component of the image are common and are pattern rules of edge offsets.

9. The image processing apparatus according to claim 8, wherein the setting unit sets, as the type information, information indicating that the type of the sample adaptive offset filter of the first color difference component of the image and the type of the sample adaptive offset filter of the second color difference component of the image are common and are one-dimensional pattern rules of edge offsets.

10. The image processing apparatus according to claim 8, wherein the setting unit sets, as the type information, information indicating that the type of the sample adaptive offset filter of the first color difference component of the image and the type of the sample adaptive offset filter of the second color difference component of the image are common and

are two-dimensional pattern rules of edge offsets.

11. The image processing apparatus according to claim 1, wherein the setting unit sets, as the type information, information indicating that the type of the sample adaptive offset filter of the first color difference component of the image and the type of the sample adaptive offset filter of the second color difference component of the image are common and are types for not applying any offset.

12. The image processing apparatus according to claim 1, wherein a color space of the image is in a Y/Cb/Cr format and wherein the first color difference component of the image is a Cb component and the second color difference component of the image is a Cr component, and wherein the type information indicates a type common to the type of the sample adaptive offset filter of the Cb component of the image and the type of the sample adaptive offset filter of the Cr component of the image.

13. The image processing apparatus according to claim 1, wherein the encoding unit encodes the image in a unit having a hierarchical structure.

14. The image processing apparatus according to claim 1, further comprising a deblock filter unit configured to apply deblock filter to the image locally decoded,

wherein the sample adaptive offset filter unit applies sample adaptive offset filter to the image to which the deblock filter is applied by the deblock filter unit.

15. An image processing method comprising:

setting type information indicating a type which is common to a type of a sample adaptive offset filter of a first color difference component of an image and a type of a sample adaptive offset filter of a second color difference component of the image;

applying sample adaptive offset filtering to an image which is locally decoded when the image is encoded;

using the image, to which the sample adaptive offset filtering is applied, to perform encoding processing on the image to generate a coded stream; and

transmitting the type information which is set and the coded stream which is generated.