

DESCRIPTION

IMAGE PROCESSING DEVICE AND METHOD

TECHNICAL FIELD

[0001]

The present disclosure relates to an image processing device and an image processing method, and more particularly, to an image processing device and an image processing method capable of improving the coding efficiency in multi-viewpoint coding.

BACKGROUND ART

[0002]

In recent years, image information is handled as digital data, and, for the purpose of transmission and accumulation of the information having high-efficiency at that time, devices are widely used which compress and code images by employing a coding system compressing image information through an orthogonal transform such as a discrete cosine transform and motion compression by using the redundancy that is unique to the image information. As examples of such a coding system, there are MPEG (Moving Picture Experts Group), H.264, MPEG-4 Part 10 (Advanced Video Coding, hereinafter, referred to as AVC), and the like.

[0003]

Currently, for the purpose of further improving the coding efficiency to be higher than that of H.264/AVC, standardization of a coding system called high efficiency video coding (HEVC) has been progressed by a joint collaboration team - video coding (JCTVC) that is a joint

standardization organization of the ITU-T and the ISO/IEC. In addition, as an extension thereof, standardization of coding of a multi-viewpoint image has been progressed in parallel therewith, and as a draft for coding a multi-viewpoint image, Non-Patent Document 1 has been issued.

[0004]

Meanwhile, a reference list that is a list in which candidates for a reference image used for decoding a B picture are aligned in a preferential order is sequentially generated from the start of reference images aligned in a preferential order in a temporal list that is a temporary list.

[0005]

In Non-Patent Document 1, the temporal list is generated such that, after reference images disposed in the time direction, reference images disposed in the view direction are arranged. Thus, in order to raise the preferential order of the reference images disposed in the view direction within the temporal list, unless a reference list command is used, it is difficult to arrange the reference images disposed in the view direction in the reference list, and accordingly, it is difficult to refer to the reference images disposed in the view direction.

[0006]

Thus, in Non-Patent Document 2, it is proposed to transmit information designating a position at which a reference image disposed in the view direction is inserted among a plurality of reference images disposed in the time direction using a slice header when a temporal list is generated. Accordingly, in consideration of a view-direction correlation, a reference image disposed in the view direction

can be inserted at a preferable position in the temporal list.

CITATION LIST

NON-PATENT DOCUMENT

[0007]

Non-Patent Document 1: Gerhard Tech, Krzysztof Wegner, Ying Chen, Miska Hannuksela, "MV-HEVC Draft Text2", JCT3V-B1004, 2012,11,07

Non-Patent Document 2: Li Zhang, Ying Chen, Jewon Kang, "AHG5: MV-Hevc software for HTM", JCT3V-B0046, 2012,10,07

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0008]

However, in the technology disclosed in Non-Patent Document 2, also when it is not necessary to change the insertion position of the reference image disposed in the view direction in the temporal list, the slice header needs to be transmitted, and there is concern that the coding efficiency may decrease.

[0009]

Embodiments of the present invention improve the coding efficiency in hierarchical coding or multi-viewpoint coding.

SOLUTIONS TO PROBLEMS

[0010]

Disclosed herein is an image processing device including: a decoding unit that generates an image by decoding a bit stream; a reference list setting unit that sets a reference list being referred to when the image generated by

the decoding unit is predicted by inserting a reference image that can be referred to in a layer direction between a plurality of reference images that can be referred to in a time direction; and a prediction unit that predicts the image generated by the decoding unit by referring to the reference list set by the reference list setting unit.

[0011]

The above-described reference list setting unit may set the reference list by inserting the reference image that can be referred to in the layer direction between a reference image located before the image in time and a reference image located after the image in time among the plurality of reference images that can be referred to in the time direction.

[0012]

The above-described reference list setting unit may set the reference list by arranging images in a direction L0 in order of reference images located before the image in time, the reference image that can be referred to in the layer direction, and reference images located after the image in time.

[0013]

The above-described reference list setting unit may set the reference list by arranging images in a direction L1 in order of reference images located after the image in time, the reference image that can be referred to in the layer direction, and reference images located before the image in time.

[0014]

The above-described reference list setting unit may set the reference list by alternately arranging the reference image that can be referred to in the time direction and the

reference image that can be referred to in the layer direction.
[0015]

The above-described reference list setting unit may set the reference list by alternately arranging an element of a list of the reference images that can be referred to in the time direction set in order of the reference images located before the image in time and the reference images located after the image in time and an element of a list of the reference images that can be referred to in the layer direction, which is configured by the reference images that can be referred to in the layer direction, in a direction L0.
[0016]

The above-described reference list setting unit may set the reference list by alternately arranging an element of a list of the reference images that can be referred to in the time direction set in order of the reference images located after the image in time and the reference images located before the image in time and an element of a list of the reference images that can be referred to in the layer direction, which is configured by the reference images that can be referred to in the layer direction, in a direction L1.
[0017]

The above-described reference list setting unit may set the reference list by inserting the reference images that can be referred to in the layer direction in a direction L1 with order of the reference image that can be referred to in the layer direction being opposite to that of the case of a direction L0.
[0018]

The above-described reference list setting unit may

include: a temporal list setting unit that sets a temporal list that is a temporary list used for setting the reference list by inserting the reference image that can be referred to in the layer direction between the plurality of reference images that can be referred to in the time direction; and a reference image list setting unit that sets the reference list based on the temporal list set by the temporal list setting unit.

[0019]

Disclosed herein is an image processing method implemented in an image processing device. The image processing method includes: generating an image by decoding a bit stream; setting a reference list being referred to when the generated image is predicted by inserting a reference image that can be referred to in a layer direction between a plurality of reference images that can be referred to in a time direction; and predicting the generated image by referring to the set reference list.

[0020]

According to a first aspect of the present invention, there is provided an image processing device comprising: circuitry configured to: set a reference list being referred to when an image is predicted by inserting a reference image that can be referred to in a layer direction between a plurality of reference images that can be referred to in a time direction; predict the image by referring to the set reference list; and generate a bit stream by performing coding using the predicted image, wherein the reference list is set and utilized without reliance on any received syntax element having insertion position information, the reference list

being set by inserting the reference image that can be referred to in the layer direction between a reference image located before the image in time and a reference image located after the image in time among the plurality of reference images that are referred to in the time direction.

[0021]

The above-described reference list setting unit may set the reference list by inserting the reference image that can be referred to in the layer direction between a reference image located before the image in time and a reference image located after the image in time among the plurality of reference images that can be referred to in the time direction.

[0022]

The above-described reference list setting unit may set the reference list by arranging images in a direction L0 in order of reference images located before the image in time, the reference image that can be referred to in the layer direction, and reference images located after the image in time.

[0023]

The above-described reference list setting unit may set the reference list by arranging images in a direction L1 in order of reference images located after the image in time, the reference image that can be referred to in the layer direction, and reference images located before the image in time.

[0024]

The above-described reference list setting unit may set the reference list by alternately arranging the reference image that can be referred to in the time direction and the reference image that can be referred to in the layer direction.

[0025]

The above-described reference list setting unit may set the reference list by alternately arranging an element of a list of the reference images that can be referred to in the time direction set in order of the reference images located before the image in time and the reference images located after the image in time and an element of a list of the reference images that can be referred to in the layer direction, which is configured by the reference images that can be referred to in the layer direction, in a direction L0.

[0026]

The above-described reference list setting unit may set the reference list by alternately arranging an element of a list of the reference images that can be referred to in the time direction set in order of the reference images located after the image in time and the reference images located before the image in time and an element of a list of the reference images that can be referred to in the layer direction, which is configured by the reference images that can be referred to in the layer direction, in a direction L1.

[0027]

The above-described reference list setting unit may set the reference list by inserting the reference images that can be referred to in the layer direction in a direction L1 with order of the reference image that can be referred to in the layer direction being opposite to that of the case of a direction L0.

[0028]

The above-described reference list setting unit may include: a temporal list setting unit that sets a temporal

list that is a temporary list used for setting the reference list by inserting the reference image that can be referred to in the layer direction between the plurality of reference images that can be referred to in the time direction; and a reference image list setting unit that sets the reference list based on the temporal list set by the temporal list setting unit.

[0029]

According to a second aspect of the present invention, there is provided image processing method implemented in an image processing device, the image processing method comprising: setting a reference list being referred to when an image is predicted by inserting a reference image that can be referred to in a layer direction between a plurality of reference images that can be referred to in a time direction; predicting the image by referring to the set reference list; and generating a bit stream by performing coding using the predicted image, wherein the reference list is set and utilized without reliance on any received syntax element having insertion position information, the reference list being set by inserting the reference image that can be referred to in the layer direction between a reference image located before the image in time and a reference image located after the image in time among the plurality of reference images that are referred to in the time direction.

[0030]

According to an embodiment of the present invention, an image is generated by decoding a bit stream, and a reference list being referred to when the image generated is predicted is set by inserting a reference image that can be referred to

in a layer direction between a plurality of reference images that can be referred to in a time direction. Then, the generated image is predicted by referring to the set reference list.

[0031]

According to another embodiment of the present invention, a reference list being referred to when an image is predicted is set by inserting a reference image that can be referred to in a layer direction between a plurality of reference images that can be referred to in a time direction. Then, the image is predicted by referring to the set reference list, and a bit stream is generated by performing coding using the predicted image.

[0032]

Here, the above-described image processing device may be an independent device or an internal block that configures one image encoding device or image decoding device.

EFFECTS OF THE INVENTION

[0033]

According to embodiments of the present invention, an image can be decoded. Particularly, the coding efficiency can be improved.

[0034]

According to another aspect of the present disclosure, an image can be coded. Particularly, the coding efficiency can be improved.

BRIEF DESCRIPTION OF DRAWINGS

[0035]

CLAIMS

1. An image processing device comprising:
circuitry configured to:

set a reference list being referred to when an image is predicted by inserting a reference image that can be referred to in a layer direction between a plurality of reference images that can be referred to in a time direction;

predict the image by referring to the set reference list;
and

generate a bit stream by performing coding using the predicted image,

wherein the reference list is set and utilized without reliance on any received syntax element having insertion position information, the reference list being set by inserting the reference image that can be referred to in the layer direction between a reference image located before the image in time and a reference image located after the image in time among the plurality of reference images that are referred to in the time direction.

2. The image processing device according to claim 1, wherein the reference list is set by arranging images in a forward direction in order of reference images located before the image in time, the reference image that can be referred to in the layer direction, and reference images located after the image in time.

3. The image processing device according to claim 1, wherein the reference list is set by arranging images in a reverse direction in order of reference images located after the image in time, the reference image that can be referred to in the

layer direction, and reference images located before the image in time.

4. The image processing device according to claim 1, wherein the reference list is set by alternately arranging the reference image that can be referred to in the time direction and the reference image that can be referred to in the layer direction.

5. The image processing device according to claim 4, wherein the reference list is set by alternately arranging an element of a list of the reference images that can be referred to in the time direction set in order of the reference images located before the image in time and the reference images located after the image in time and an element of a list of the reference images that can be referred to in the layer direction, which is configured by the reference images that can be referred to in the layer direction, in a forward direction.

6. The image processing device according to claim 4, wherein the reference list is set by alternately arranging an element of a list of the reference images that can be referred to in the time direction set in order of the reference images located after the image in time and the reference images located before the image in time and an element of a list of the reference images that can be referred to in the layer direction, which is configured by the reference images that can be referred to in the layer direction, in a reverse direction.

7. The image processing device according to claim 1, wherein the reference list is set by inserting the reference images that can be referred to in the layer direction in a direction L1 with order of the reference image that can be referred to in the layer direction being opposite to that of the case of a forward direction.

8. The image processing device according to claim 1, wherein the circuitry is further configured to:

set a temporal list that is a temporary list used for setting the reference list by inserting the reference image that can be referred to in the layer direction between the plurality of reference images that can be referred to in the time direction; and

set the reference list based on the set temporal list.

9. The image processing device according to claim 1, wherein the reference list is set as a default process that is performed by the image processing device without reliance on insertion position information transmitted by another device.

10. An image processing method implemented in an image processing device, the image processing method comprising:

setting a reference list being referred to when an image is predicted by inserting a reference image that can be referred to in a layer direction between a plurality of reference images that can be referred to in a time direction;

predicting the image by referring to the set reference list; and

generating a bit stream by performing coding using the predicted image,

wherein the reference list is set and utilized without

reliance on any received syntax element having insertion position information, the reference list being set by inserting the reference image that can be referred to in the layer direction between a reference image located before the image in time and a reference image located after the image in time among the plurality of reference images that are referred to in the time direction.