Kirchhoffer, Haricharan Lakshman, Detlev Marpe, Simon Oudin, Matthias Preiss, Heiko Schwarz, Mischa Siekmann, Karsten Suehring, and Thomas Wiegand, "Description of video coding technology proposed by Fraunhofer HHI," JCTVC-A116, April, 2010

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0013]

However, these techniques illustrate processes in the same view only and cannot perform inter-view vector prediction in the case of multi-view encoding. Thus, encoding efficiency may decrease.

[0014]

Embodiments of the present invention are made in view of the situations, and aim to suppress a decrease in the encoding efficiency.

SOLUTIONS TO PROBLEMS

[0014a]

According to a first aspect of the present invention, there is provided an image processing device including: a predictive motion vector generating unit that sets a co-located block to be not available when a type of a reference picture of a current block is different from a type of the reference picture of a co-located block included in a co-located picture when encoding a current motion vector of the current block used in prediction using correlation in a temporal direction and generates a predictive motion vector of the current motion vector using a reference motion vector referred when generating a predictive motion vector; and a reconstructing unit that reconstructs the current motion vector by adding the predictive motion vector generated by the predictive motion vector

generating unit to a difference vector between the current motion vector and the predictive motion vector.

[0014b]

According to a second aspect of the present invention, there is provided an image processing method of an image processing device, for allowing the image processing device to execute the steps of: setting a co-located block to be not available when a type of a reference picture of a current block is different from a type of the reference picture of a co-located block included in a co-located picture when encoding a current motion vector of the current block used in prediction using correlation in a temporal direction, and generating a predictive motion vector of the current motion vector using a reference motion vector referred when generating a predictive motion vector; and reconstructing the current motion vector by adding the generated predictive motion vector to a difference motion vector between the current motion vector and the predictive motion vector.

[0015]

Disclosed herein is an image processing device including: a predictive vector generating unit that generates a predictive vector of a current parallax vector of a current block used in prediction using correlation in a parallax direction using a reference parallax vector referred when generating a predictive motion vector, when encoding the current parallax vector; and a difference vector generating unit that generates a difference vector between the current parallax vector and the predictive vector generated by the predictive vector generating unit.

[0016]

The predictive vector generating unit may generate a predictive vector of the current parallax vector using a parallax vector of a co-located block included in a co-located

picture of a time different from a current picture of the same view as a current view.

[0017]

The predictive vector generating unit may set the co-located block to be available when a property of a vector of the current block is identical to a property of a vector of the co-located block.

[0018]

The property of the vector is a type of a vector, and the predictive vector generating unit may set the co-located block to be available when the property of the vector of the current block is a parallax vector and the property of the vector of the co-located block is a parallax vector.

[0019]

The predictive motion vector generating unit may determine the property of the vector of the current block and the property of the vector of the co-located block using POC (Picture Order Count) that indicates an output order of pictures.

[0020]

The predictive motion vector generating unit may determine the property of the vector of the current block and the property of the vector of the co-located block using the POC of the current picture, the POC of a current reference picture referred from the current picture, the POC of the co-located picture, and the POC of a co-located reference picture referred from the co-located picture.

[0021]

The predictive motion vector generating unit may determine that the property of the vector of the current block and the property of the vector of the co-located block are parallax vectors when the POC of the current picture is identical to the

POC of the current reference picture referred from the current picture and the POC of the co-located picture is identical to the POC of the co-located reference picture referred from the co-located picture.

[0022]

The predictive vector generating unit may set the co-located block to be not available when the property of the vector of the current block is different from the property of the vector of the co-located block.

[0023]

The property of the vector is a type of a reference picture, and the predictive vector generating unit may set the co-located block to be not available when the type of the reference picture of the current block is different from the type of the reference picture of the co-located block.

[0024]

The property of the vector is a type of a reference picture, and the predictive vector generating unit may skip a process of searching a reference index when the type of the reference picture of the current block is a long reference type and the type of the reference picture of the co-located block is a long reference type.

[0025]

The predictive vector generating unit may generate a predictive vector of the current parallax vector using a parallax vector of a reference block included in a picture of the same time as a current picture of a view different from the current view.

[0026]

The predictive vector generating unit may scale the reference parallax vector based on a positional relationship between a current picture and a reference picture referred when

generating a predictive motion vector to generate a predictive vector of the current parallax vector.

[0027]

The predictive vector generating unit may generate a predictive vector of the current motion vector using a reference motion vector referred when generating a predictive motion vector, when encoding the current motion vector of the current block used in prediction using correlation in a temporal direction, and the difference vector generating unit may generate a difference vector between the current motion vector and the predictive vector generated by the predictive vector generating unit.

[0028]

The predictive vector generating unit may generate the predictive vector of the current motion vector using a motion vector of the reference block included in a picture of the same time as the current picture of a view different from the current view.

[0029]

The predictive vector generating unit may generate a predictive vector of the current motion vector using a motion vector of a reference block included in a picture of a time different from the current picture of the same view as the current view.

[0030]

The predictive vector generating unit may scale the reference motion vector based on a positional relationship between the current picture and a reference picture referred when generating a predictive motion vector to generate a predictive vector of the current motion vector.

[0031]

The predictive vector generating unit may generate the

predictive vector using a vector of a block located at the same position as the current block in a state where a position of a pixel of a picture of the same time as the current picture of a view different from the current view is shifted.

[0032]

The predictive vector generating unit may set a shift amount of the image according to a parallax vector of a neighboring region of the current block.

[0033]

The predictive vector generating unit may use a parallax vector in an X-direction, of the neighboring block in which the value of a parallax vector in a Y-direction is not zero as the shift amount.

[0034]

The predictive vector generating unit may use a value calculated from parallax vectors in an X-direction, of a plurality of the neighboring blocks in which the value of a parallax vector in a Y-direction is not zero as the shift amount.

[0035]

The predictive vector generating unit may use an average value or a median value of the parallax vectors in the X-direction, of the plurality of the neighboring blocks in which the value of the parallax vector in the Y-direction is not zero as the shift amount of the image.

[0036]

The predictive vector generating unit may set the shift amount of the image according to a global parallax vector.

[0037]

Disclosed herein is an image processing method of an image processing device, for allowing the image processing device to execute: generating a predictive vector of a current parallax

vector of a current block used in prediction using correlation in a parallax direction using a reference parallax vector referred when generating a predictive motion vector, when encoding the current parallax vector; and generating a difference vector between the current parallax vector and the generated predictive vector.

[0038]

Disclosed herein is an image processing device including: a predictive vector generating unit that generates a predictive vector of a current parallax vector of a current block used in prediction using correlation in a parallax direction using a reference parallax vector referred when generating a predictive motion vector, when decoding the current parallax vector; and an arithmetic unit that performs an operation of adding the predictive vector generated by the predictive vector generating unit to a difference vector between the current parallax vector and the predictive vector to reconstruct the current parallax vector.

[0039]

Disclosed herein is an image processing method of an image processing device, for allowing the image processing device to execute: generating a predictive vector of a current parallax vector of a current block used in prediction using correlation in a parallax direction using a reference parallax vector referred when generating a predictive motion vector, when decoding the current parallax vector; and performing an operation of adding the generated predictive vector to a difference vector between the current parallax vector and the predictive vector to reconstruct the current parallax vector.

[0040]

Disclosed herein is an image processing device including: a predictive vector generating unit that sets a co-located

block to be not available when a type of a reference picture of a current block is different from a type of the reference picture of a co-located block included in a co-located picture of a different time from a current picture when encoding a current motion vector of the current block used in prediction using correlation in a temporal direction and generates a predictive vector of the current motion vector using a reference motion vector referred when generating a predictive motion vector; and a difference vector generating unit that generates a difference vector between the current motion vector and the predictive vector generated by the predictive vector generating unit.

[0041]

Disclosed herein is an image processing method of an image processing device, for allowing the image processing device to execute: setting a co-located block to be not available when a type of a reference picture of a current block is different from a type of the reference picture of a co-located block included in a co-located picture of a different time from a current picture when encoding a current motion vector of the current block used in prediction using correlation in a temporal direction, and generating a predictive vector of the current motion vector using a reference motion vector referred when generating a predictive motion vector; and generating a difference vector between the current motion vector and the generated predictive vector.

[0042]

In one embodiment of the present invention, a predictive vector of a current parallax vector of a current block used in prediction using correlation in a parallax direction is generated using a reference parallax vector referred when generating a predictive motion vector, when encoding the

current parallax vector; and a difference vector between the current parallax vector and the generated predictive vector is generated.

[0043]

According to another embodiment of the present invention, a predictive vector of a current parallax vector of a current block used in prediction using correlation in a parallax direction is generated using a reference parallax vector referred when generating a predictive motion vector, when decoding the current parallax vector; and an operation of adding the generated predictive vector to a difference vector between the current parallax vector and the predictive vector to reconstruct the current parallax vector is performed.

[0044]

According to a still another embodiment of the present invention, a co-located block is set to be not available when a type of a reference picture of a current block is different from a type of the reference picture of a co-located block included in a co-located picture of a different time from a current picture when encoding a current motion vector of the current block used in prediction using correlation in a temporal direction; a predictive vector of the current motion vector is generated using a reference motion vector referred when generating a predictive motion vector; and a difference vector between the current motion vector and the generated predictive vector is generated.

EFFECTS OF THE INVENTION

[0045]

According to embodiments of the present invention, it is possible