

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0017]

As described above, according to HEVC standards, no restriction is set to motion vectors in inter prediction. In this case, a decoded image of a different tile at a different time can be used as a reference image. Accordingly, independent encoding and decoding in the time direction for each tile is not allowed.

[0018]

Embodiments of the present invention provide a technique capable of performing encoding and decoding in the time direction independently for each tile.

SOLUTIONS TO PROBLEMS

[0019]

According to a first aspect of the present invention, there is provided a decoding device, comprising: a motion compensation unit configured to generate a prediction image by performing motion compensation of a reference image within a co-located tile based on tile constraint information indicating that the reference image is constrained within the co-located tile as a condition that a tile split information is maintained within a sequence when a picture of a current image is split into tiles and decoded; and a decoding unit configured to decode the encoded data using the prediction image generated by the motion compensation unit, wherein the motion compensation unit and the decoding unit are each implemented via at least one processor.

[0020]

According to a second aspect of the present invention, there is provided a decoding method, comprising: a motion compensation step performed by a decoding device which generates

a prediction image by performing motion compensation of a reference image within a co-located tile based on tile constraint information indicating that the reference image is constrained within the co-located tile as a condition that a tile split information is maintained within a sequence when a picture of a current image is split into tiles and decoded; and a decoding step performed by the decoding device which decodes encoded data using the prediction image generated by the processing of the motion compensation step.

[0021]

According to the above aspects of the present invention, a prediction image is generated by performing, for each of tiles, motion compensation with a reference image within a co-located tile and motion vector information representing a motion vector used for generating encoded data of a decoding target current image when a picture of the current image is split into the tiles and decoded. The encoded data is decoded using the prediction image.

[0022]

Disclosed herein is an encoding device, comprising: a motion compensation unit generating a prediction image by performing motion compensation of a reference image at a time different from the time of an encoding target current image based on a motion vector detected within a tile when a picture of the current image is split into the tiles and encoded; an encoding unit encoding the current image and generating encoded data using the prediction image generated by the motion compensation unit; a setting unit setting tile splittable information indicating that decoding is allowed for each unit of the tiles; and a transmission unit transmitting the encoded data generated by the encoding unit, and the tile splittable information set by the setting unit.

[0023]

Disclosed herein is an encoding method, comprising: a

motion compensation step performed by an encoding device which generates a prediction image by performing motion compensation of a reference image at a time different from the time of an encoding target current image based on a motion vector detected within a tile when a picture of the current image is split into the tiles and encoded; an encoding step performed by the encoding device which encodes the current image and generating encoded data using the prediction image generated by the processing of the motion compensation step; a setting step performed by the encoding device which sets tile splittable information indicating that decoding is allowed for each unit of the tiles; and a transmission step performed by the encoding device which transmits the encoded data generated by the processing of the encoding step, and the tile splittable information set by the processing of the setting step.

[0024]

According to the above aspects of the present invention, a prediction image is generated by performing motion compensation with a reference image at a time different from the time of an encoding target current image based on a motion vector detected within a tile when a picture of the current image is split into the tiles and encoded. Encoded data is generated by encoding the current image using the prediction image. Tile splittable information indicating that decoding is allowed for each unit of the tiles is set. The encoded data and the tile splittable information are transmitted.

[0025]

Further, the above decoding device and the encoding device can be realized by making a computer execute a program.

[0026]

Moreover, the program executed by the computer for realizing the above decoding device and the encoding device can be provided by transmitting the program via a transmission medium, or by recording the program on a recording medium.

[0027]

In addition, the above decoding device and the encoding device may be separate devices, or may be inside blocks constituting one device.

EFFECTS OF THE INVENTION

[0028]

According to the above aspects of the present invention, independent decoding in the time direction for each tile is allowed.

[0029]

Moreover, according to the above aspects of the present invention, independent encoding in the time direction for each tile is allowed.

BRIEF DESCRIPTION OF DRAWINGS

[0030]

Fig. 1 is a diagram describing a reference image for conventional inter prediction.

Fig. 2 is a block diagram showing a constitution example of a conventional decoding device.

Fig. 3 is a block diagram showing a constitution example of an encoding device to which the present technique is applied according to a first embodiment.

Fig. 4 is a block diagram showing a constitution example of an encoding unit in Fig. 3.

Fig. 5 is a diagram describing tiles.

Fig. 6 is a diagram describing a restriction set when a motion vector is detected.

Fig. 7 is a diagram describing a reference image for inter prediction.

Fig. 8 is a diagram showing an example of syntax of SPS.

Fig. 9 is a diagram showing an example of syntax of

CLAIMS

1. A decoding device, comprising:

a motion compensation unit configured to generate a prediction image by performing motion compensation of a reference image within a co-located tile based on tile constraint information indicating that the reference image is constrained within the co-located tile as a condition that a tile split information is maintained within a sequence when a picture of a current image is split into tiles and decoded; and

a decoding unit configured to decode the encoded data using the prediction image generated by the motion compensation unit,

wherein the motion compensation unit and the decoding unit are each implemented via at least one processor.

2. The decoding device according to claim 1, further comprising:

a vector generation unit configured to generate a motion vector of the encoded data from motion vector information using a motion vector of an image located adjacent to the current image and contained within the same tile as the tile of the current image,

wherein the motion compensation unit performs motion compensation with the reference image based on the tile constraint information and the motion vector generated by the motion vector generation unit, and

wherein the vector generation unit is implemented via at least one processor.

3. The decoding device according to claim 1, further comprising:

a filter unit configured to perform filtering of the reference image for each unit of the tiles,

wherein

the filter unit performs the filtering of the reference image based on filter information representing that filtering of the reference image is not performed across the tiles,

the motion compensation unit performs the motion compensation of the reference image obtained after the filtering by the filter unit based on the tile constraint information and the motion vector information, and

the filter unit is implemented via at least one processor.

4. The decoding device according to claim 3, wherein the filter unit performs the filtering of the reference image using a parameter for the filtering associated with an image contained within the corresponding tile based on the filter information and parameter sharing information representing that the parameter is not shared between the tiles.

5. The decoding device according to claim 1, wherein each of the tiles includes one or more slices.

6. The decoding device according to claim 1, wherein the picture of the current image is split into two tiles and decoded,

an image of one of the two tiles is an image for a left eye constituting a 3D image, and

an image of the other one of the two tiles is an image for a right eye constituting a 3D image.

7. The decoding device according to claim 1, further comprising:

an acquisition unit configured to acquire encoded data and an additional information including the tile constraint information and the tile split information;

wherein the motion compensation unit generates the prediction image by performing motion compensation of the reference image based on additional information, and

wherein the acquisition unit is implemented via at least one processor.

8. The decoding device according to claim 7, wherein the tile split information is a Picture Parameter Set (PPS) set in the additional information.

9. A decoding method, comprising:

a motion compensation step performed by a decoding device which generates a prediction image by performing motion compensation of a reference image within a co-located tile based on tile constraint information indicating that the reference image is constrained within the co-located tile as a condition that a tile split information is maintained within a sequence when a picture of a current image is split into tiles and decoded; and

a decoding step performed by the decoding device which decodes encoded data using the prediction image generated by the processing of the motion compensation step.