CLAIMS

[1] A moving image decoding device comprising:

an intra prediction unit for, when an encoding mode associated with a coding block is an intra encoding mode, carrying out an intra-frame prediction process on each block which is a unit for prediction process of said coding block,

wherein said intra prediction unit generates an intermediate predicted value from reference samples according to an intra prediction parameter, sets a value which is obtained by filtering the intermediate predicted value as a final predicted value only at specific positions in said block, and sets the intermediate predicted value as a final predicted value at any other positions in said block.

[2] A moving image decoding device comprising:

an intra prediction unit for, when an encoding mode associated with a coding block is an intra encoding mode, carrying out an intra-frame prediction process on each block which is a unit for prediction process of said coding block,

wherein said intra prediction unit generates an intermediate predicted value from reference samples according to an intra prediction parameter, and determines whether to set either a value which is obtained by filtering the intermediate predicted value or the intermediate predicted value as a final predicted value according to a block size of said block.

[3] A moving image decoding device comprising:

an intra prediction unit for, when an encoding mode associated with a coding block is an intra encoding mode, carrying out an intra-frame prediction process on each block which is a unit for prediction process of said coding block,

wherein said intra prediction unit generates an intermediate predicted value from reference samples according to an intra prediction parameter, and determines whether to set either a value which is obtained by filtering the intermediate predicted value or the intermediate predicted value as a final predicted value according to said intra prediction parameter.

[4] The moving image decoding device according to claim 1, wherein when encoded data multiplexed into a bitstream are variable-length-decoded to obtain filter coefficients of a Wiener filter, the intra prediction unit carries out a filtering process on the prediction image by using said Wiener filter and sets the prediction image on which the intra prediction unit has carried out the filtering process as a final prediction image generated thereby.

[5] The moving image decoding device according to claim 1, wherein said moving image decoding device comprises:

a variable length decoding unit for variable-length-decoding encoded data multiplexed into a bitstream to obtain compressed data and an encoding mode which are associated with each of coding blocks into which an image is divided, and for, when said encoding mode is an intra encoding mode, variable-length-decoding the encoded data to obtain intra prediction parameters;

the intra prediction unit for carrying out an intra-frame prediction process using an already-decoded image signal in a frame to generate a prediction;

a difference image generating unit for generating a pre-compressed difference image from the compressed data associated with the coding block variable-length-decoded by said variable length decoding unit; and

a decoded image generating unit for adding the difference image generated by said difference image generating unit and the prediction image generated by said intra prediction unit to generate a decoded image.

[6] The moving image decoding device according to claim 1, wherein said moving image encoding device includes a motion-compensated prediction unit for, when the encoding mode associated with the coding block, which is variable-length-decoded by a variable length decoding unit, is an inter encoding mode, carrying out a motion-compensated prediction process on said coding block to generate a prediction image by using reference images, and a decoded image generating unit adds the difference image generated by a difference image generating unit and the prediction image generated by the intra prediction unit or said motion-compensated prediction unit to generate a decoded image.

[7] The moving image decoding device according to claim 6, wherein the variable length decoding unit variable-length-decodes encoded data multiplexed into a bitstream to obtain a quantization parameter~~,~~ and ~~a~~ transformation block size information which are associated with each of ~~the~~ coding blocks, and the difference image generating unit inverse-quantizes ~~the~~ compressed data associated with the coding block which is variable-length-decoded by said variable length decoding unit by using the quantization parameter associated with said coding block and carries out an inverse transformation process on the compressed data inverse-quantized thereby in units of a block having said transformation block size to generate a pre-compressed difference image.

[8] A moving image encoding device comprising:

an intra prediction unit for, when an intra encoding mode is selected as an encoding mode associated with one of coding blocks into which an inputted image is divided, carrying out an intra-frame prediction process on each block which is a unit for prediction process of said coding block,

wherein said intra prediction unit generates an intermediate predicted value from reference samples according to said intra prediction parameters, and sets a value which is obtained by filtering the intermediate predicted value as a final predicted value only at specific positions in said block, and sets the intermediate predicted value as a final predicted value at any other positions in said block.

[9] A moving image encoding device comprising:

an intra prediction unit for, when an intra encoding mode is selected as an encoding mode associated with one of coding blocks into which an inputted image is divided, carrying out an intra-frame prediction process on each block which is a unit for prediction process of said coding block,

wherein said intra prediction unit generates an intermediate predicted value from reference samples according to an intra prediction parameter, and determines whether to set either a value which is obtained by filtering the intermediate predicted value or the intermediate predicted value as a final predicted value according to a block size of said block.

[10] A moving image encoding device comprising:

an intra prediction unit for, when an intra encoding mode is selected as an encoding mode associated with one of coding blocks into which an inputted image is divided, carrying out an intra-frame prediction process on each block which is a unit

for prediction process of said coding block,

wherein said intra prediction unit generates an intermediate predicted value from reference samples according to an intra prediction parameter, and determines whether to set either a value which is obtained by filtering the intermediate predicted value or the intermediate predicted value as a final predicted value according to said intra prediction parameter.

[11] The moving image encoding device according to claim 8, wherein the intra prediction unit designs a Wiener filter, carries out a filtering process on the prediction image by using said Wiener filter, and sets the prediction image on which said intra prediction unit has carried out the filtering process as a final prediction image generated thereby, and the variable length encoding unit variable-length-encodes filter coefficients of the Wiener filter designed by said intra prediction unit and multiplexes encoded data of said filter coefficients into a bitstream.

[12] The moving image encoding device according to claim 8, wherein said moving image encoding device comprises:

an encoding controlling unit for determining a maximum size of a coding block which is a unit to be processed at a time when an encoding process is carried out, and also determining a hierarchy number upper limit at a time when a coding block having the maximum size is divided hierarchically, and for selecting an encoding mode which determines an encoding method of encoding each coding block from one or more available encoding modes;

a block dividing unit for dividing an inputted image into coding blocks each having a predetermined size, and also dividing each of said coding blocks hierarchically until its

hierarchy number reaches the hierarchy number upper limit determined by said encoding controlling unit;

an intra prediction unit for, when an intra encoding mode is selected by said encoding controlling unit as an encoding mode corresponding to one of the coding blocks into which the inputted image is divided by said block dividing unit, carrying out an intra-frame prediction process to generate a prediction image by using already-encoded image signals in a frame;

a difference image generating unit for generating a difference image between the one of the coding blocks into which the inputted image is divided by said block dividing unit, and the prediction image generated by said intra prediction unit;

an image compression unit for compressing the difference image generated by said difference image generating unit, and outputting compressed data of said difference image; and

a variable length encoding unit for variable-length-encoding the compressed data outputted from said image compression unit and the encoding mode selected by said encoding controlling unit to generate a bitstream into which encoded data of said compressed data and encoded data of said encoding mode are multiplexed.

[13] The moving image encoding device according to claim 12, wherein said moving image encoding device includes a motion-compensated prediction unit for, when an inter encoding mode is selected by the encoding controlling unit as an encoding mode corresponding to the one of the coding blocks into which the inputted image is divided by the block dividing unit, carrying out a motion-compensated prediction process on said coding block to generate a prediction image by using reference images, and the difference image generating unit generates a

difference image between the one of the coding blocks into which the inputted image is divided by said block dividing unit, and the prediction image generated by the intra prediction unit or said motion-compensated prediction unit.

[14] The moving image encoding device according to claim 13, wherein the encoding controlling unit determines a quantization parameter and transformation block size information which are used when the difference image is compressed for each of the coding blocks, and also determines intra prediction parameters, which are used when an intra-frame prediction process is carried out, for each of the coding blocks when an intra encoding mode is selected by said encoding controlling unit as the encoding mode or inter prediction parameters, which are used when a motion-compensated prediction process is carried out, for each of the coding blocks when an inter encoding mode is selected by said encoding controlling unit as the encoding mode, the image compression unit carries out a transformation process on the difference image generated by the difference image generating unit in units of a block having the transformation block size determined by said encoding controlling unit and also quantizes transform coefficients of said difference image by using the quantization parameter determined by said encoding controlling unit to output the transform coefficients quantized thereby as the compressed data of said difference image, and, when variable-length-encoding the compressed data outputted from said image compression unit and the encoding mode selected by said encoding controlling unit, the variable length encoding unit variable-length-encodes the intra prediction parameters or the inter prediction parameters which are determined by said encoding controlling unit, and the quantization parameter and

the transformation block size information to generate a bitstream into which the encoded data of said compressed data, the encoded data of said encoding mode, encoded data of said intra prediction parameters or said inter prediction parameters, encoded data of said quantization parameter, and encoded data of said transformation block size information are multiplexed.

[15] A moving image encoding method comprising:

an intra prediction processing step of, when an intra encoding mode is selected as an encoding mode corresponding to one of coding blocks into which an inputted image is divided carrying out an intra-frame prediction process on each block which is a unit for prediction process of said coding block;

wherein

said intra prediction process step includes a step of generating an intermediate predicted value from reference samples according to an intra prediction parameter, setting a value which is obtained by filtering the intermediate predicted value as a final predicted value only at specific positions in said block, and setting the intermediate predicted value as a final predicted value at any other positions in said block.

[16] A moving image decoding device comprising:

an intra prediction processing step of, when an encoding mode associated with a coding block is an intra encoding mode, carrying out an intra-frame prediction process on each block which is a unit for prediction process of said coding block;

wherein

said intra prediction processing step includes a step of generating an intermediate predicted value from reference samples according to an intra prediction parameter, setting a

value which is obtained by filtering the intermediate predicted value as a final predicted value only at specific positions in said block, and setting the intermediate predicted value as a final predicted value at any other positions in said block.

[17] A moving image decoding device comprising an intra prediction unit for carrying out an intra-frame prediction process to generate a prediction image when an encoding mode associated with a variable-length-decoded coding block is an intra encoding mode.

CLAIMS

1. An image decoding device comprising:

an intra prediction unit for carrying out an intra-frame prediction process on a block which is a unit for a prediction process of a coding block to generate a prediction image when a coding mode for said coding block is an intra coding mode;

wherein said intra prediction unit generates an intermediate prediction value from reference samples according to an intra prediction parameter indicating a type of intra prediction, said intra prediction unit providing a value which is obtained by filtering said intermediate prediction value as a final prediction value for a pixel in a predetermined position in said block and providing said intermediate prediction value as a final prediction value for a pixel in another position in said block.

2. An image encoding device comprising:

an intra prediction unit for carrying out an intra-frame prediction process on a block which is a unit for a prediction process of a coding block obtained by dividing an input image to generate a prediction image when a coding mode for said coding block is an intra coding mode;

wherein said intra prediction unit generates an intermediate prediction value from reference samples according to an intra prediction parameter indicating a type of intra prediction, said intra prediction unit providing a value which is obtained by filtering the intermediate prediction value as a final prediction value for a pixel in

a predetermined position in said block and providing said intermediate prediction value as a final prediction value for a pixel in another position in said block.

3. An image encoding method comprising:

an intra prediction processing step of carrying out an intra-frame prediction process on a block which is a unit for a prediction process of a coding block obtained by dividing an input image to generate a prediction image when a coding mode for said coding block is an intra coding mode;

wherein said intra prediction processing step includes a process of generating an intermediate prediction value from reference samples according to an intra prediction parameter indicating a type of intra prediction, said intra prediction processing step including providing a value which is obtained by filtering said intermediate prediction value as a final prediction value for a pixel in a predetermined position in said block and providing said intermediate prediction value as a final prediction value for a pixel in another position in said block.

4. An image decoding method comprising:

an intra prediction processing step of carrying out an intra-frame prediction process on a block which is a unit for a prediction process of a coding block to generate a prediction image when a coding mode for said coding block is an intra coding mode;

wherein said intra prediction processing step includes a process of generating an intermediate prediction value from reference samples according to an intra prediction

parameter indicating a type of intra prediction, said intra prediction processing step including providing a value which is obtained by filtering said intermediate prediction value as a final prediction value for a pixel in a predetermined position in said block and providing said intermediate prediction value as a final prediction value for a pixel in another position in said block.