CLAIMS

[1] An image decoding device comprising:

a variable length decoding unit for specifying coded data associated with each of coding blocks into which an image is divided hierarchically from coded data multiplexed into a bitstream, and for variable-length-decoding the coded data to acquire a coding mode associated with said each of the coding blocks;

a prediction image generating unit for carrying out a prediction process corresponding to said coding mode on the coding block specified by said variable length decoding unit to generate a prediction image; and

a decoded image generating unit for adding a pre-compressed difference image which is generated from data which are acquired by decoding the coded data associated with said each of the coding blocks which is specified by said variable length decoding unit and the prediction image generated by said prediction image generating unit to generate a decoded image, wherein

when there are two or more partitions adjacent to top or left of a partition currently being processed, said variable length decoding unit defines a first one of partitions running in a direction away from a top left side of said partition as each of partitions adjacent to top and left of said partition, and variable-length-decodes coded data associated with said partition to acquire a flag indicating whether or not an intra prediction parameter for said partition is identical to that for the partition adjacent to top or left of said partition, and, when said flag indicates that the intra prediction parameter for said partition is identical to that for said

adjacent partition, variable-length-decodes said coded data to acquire information for specifying said adjacent partition, otherwise variable-length-decodes said coded data to acquire the intra prediction parameter for said partition.

[2] An image decoding device comprising:

a variable length decoding unit for specifying coded data associated with each of coding blocks into which an image is divided hierarchically from coded data multiplexed into a bitstream, and for variable-length-decoding the coded data to acquire a coding mode associated with said each of the coding blocks;

a prediction image generating unit for carrying out a prediction process corresponding to said coding mode on the coding block specified by said variable length decoding unit to generate a prediction image; and

a decoded image generating unit for adding a pre-compressed difference image which is generated from data which are acquired by decoding the coded data associated with said each of the coding blocks which is specified by said variable length decoding unit and the prediction image generated by said prediction image generating unit to generate a decoded image, wherein

said variable length decoding unit includes a unit for variable-length-decoding coded data associated with a partition currently being processed to acquire a flag indicating whether or not an intra prediction parameter for said partition is identical to either of two or three intra prediction parameter candidates including an intra prediction parameter for a partition adjacent to said partition, and for, when said flag indicates that the intra prediction parameter

for said partition is identical to either of said intra prediction parameter candidates, variable-length-decoding said coded data to acquire information for specifying which one of said intra prediction parameter candidates is identical to the intra prediction parameter for said partition, otherwise variable-length-decoding said coded data to acquire the intra prediction parameter for said partition, and, when a number of said intra prediction parameter candidates is two, defines an intra prediction parameter for a partition adjacent to top of said partition and an intra prediction parameter for a partition adjacent to left of said partition as said intra prediction parameter candidates.

[3] An image coding device comprising:

a variable length encoding unit for variable-length-encoding a coding mode corresponding to each of coding blocks into which an image is divided hierarchically to generate a bitstream into which coded data of said coding mode is multiplexed, wherein

when variable-length-encoding an intra prediction parameter which is used when said image coding device carries out a prediction process corresponding to said coding mode to generate a prediction image, in addition to said coding mode, to multiplex coded data of said intra prediction parameter into said bitstream, and there are two or more partitions adjacent to top or left of a partition which is generated through said division, said variable length encoding unit defines a first one of partitions running in a direction away from a top left side of said partition as each of partitions adjacent to top and left of said partition, and variable-length-encodes a flag indicating ~~whether or not an intra prediction parameter for said~~

partition is identical to that for the partition adjacent to top or left of said partition, and, when said flag indicates that the intra prediction parameter for said partition is identical to that for the partition adjacent to top or left of said partition, variable-length-encodes information for specifying which intra prediction parameter of those for the partition adjacent to top of said partition and those for the partition adjacent to left of said partition is identical to that for said partition, otherwise variable-length-encodes the intra prediction parameter for said partition.

[4] An image coding device comprising: a variable length encoding unit for variable-length-encoding a coding mode corresponding to each of coding blocks into which an image is divided hierarchically to generate a bitstream into which coded data of said coding mode is multiplexed, wherein

said variable length encoding unit includes a unit for, when variable-length-encoding an intra prediction parameter which are used when said image coding device carries out a prediction process corresponding to said coding mode to generate a prediction image, in addition to said coding mode, to multiplex coded data of said intra prediction parameter into said bitstream, variable-length-encoding a flag indicating whether or not an intra prediction parameter for a partition which is generated through said division is identical to either of two or three intra prediction parameter candidates including an intra prediction parameter for a partition adjacent to said partition, and for, when said flag indicates that the intra prediction parameter for said partition is identical to either of said intra prediction parameter candidates, variable-length-encoding information for specifying which one

of said intra prediction parameter candidates is identical to the intra prediction parameter for said partition, otherwise variable-length-encoding the intra prediction parameter for said partition, and, when a number of said intra prediction parameter candidates is two, defines an intra prediction parameter for a partition adjacent to top of said partition and an intra prediction parameter for a partition adjacent to left of said partition as said intra prediction parameter candidates.

[5] An image coding device comprising: a variable length encoding unit for variable-length-encoding a coding mode corresponding to each of coding blocks into which an image is divided hierarchically to generate a bitstream into which coded data of said coding mode is multiplexed, wherein

when variable-length-encoding an intra prediction parameter which is used when said image coding device carries out a prediction process corresponding to said coding mode to generate a prediction image, in addition to said coding mode, to multiplex coded data of said intra prediction parameter into said bitstream, said variable length encoding unit variable-length-encodes a flag indicating whether an intra prediction parameter for a partition generated through said division is identical to that for a partition adjacent to said partition, and, when said intra prediction parameter for said partition is identical to that for an adjacent partition, variable-length-encodes information for specifying said adjacent partition, otherwise variable-length-encodes the intra prediction parameter for said partition.

[6] The image coding device according to claim 5, wherein the image coding device includes: an encoding controlling unit for

determining a maximum size of a coding block which is a unit to be processed at a time when a prediction process is carried out, and also determining a hierarchy number upper limit for hierarchical partitioning of the coding block, and for selecting a coding mode corresponding to each of coding blocks into which the coding block having the maximum size is divided hierarchically from one or more available coding modes; a block dividing unit for dividing an inputted image into coding blocks each having the maximum size determined by said encoding controlling unit, 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; a prediction image generating unit for carrying out a prediction process corresponding to the coding mode selected by said encoding controlling unit on said each of coding blocks into which each of said coding blocks having the maximum size is divided by said block dividing unit to generate a prediction image; a difference image generating unit for generating a difference image between said each of the coding blocks into which each of said coding blocks having the maximum size is divided by said block dividing unit, and the prediction image generated by said prediction image generating 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 coding mode selected by said encoding controlling unit to generate a bitstream into which coded data of said compressed data and coded data of said coding mode are multiplexed.

[7] The image coding device according to claim 6, wherein when the coding mode selected by the encoding controlling unit is an intra prediction mode, the prediction image generating unit carries out an intra-frame prediction process using pixels adjacent to said each of the coding blocks or pixels adjacent to a higher layer coding block to which said each of the coding blocks belongs to generate a prediction image.

[8] The image coding device according to claim 7, wherein when the coding block which is generated through the division by the block dividing unit is further divided into partitions, the encoding controlling unit selects a coding mode corresponding to the coding block to which each of the partitions belongs or a coding mode corresponding to each of the partitions, and, when the coding mode selected by said encoding controlling unit is an intra prediction mode, the prediction image generating unit carries out an intra-frame prediction process using pixels adjacent to said each of the partitions or pixels adjacent to a higher layer partition to which said each of the partitions belongs to generate a prediction image.

[9] The image coding device according to claim 8, wherein when a higher layer coding block or a higher layer partition exists, an intra coding mode using pixels adjacent to a higher layer coding block or a higher layer partition is prepared in the one or more available coding modes, and, when an intra prediction mode is selected by said encoding controlling unit, the prediction image generating unit carries out an intra-frame prediction process using pixels adjacent to a higher layer coding block or a higher layer partition to which said each of the coding blocks or the partitions belongs to generate a prediction image.

[10] An image decoding device comprising:

a variable length decoding unit for specifying coded data associated with each of coding blocks into which an image is divided hierarchically from coded data multiplexed into a bitstream, and for variable-length-decoding the coded data to acquire a coding mode associated with said each of the coding blocks;

a prediction image generating unit for carrying out a prediction process corresponding to said coding mode on the coding block specified by said variable length decoding unit to generate a prediction image; and

a decoded image generating unit for adding a pre-compressed difference image which is generated from data which are acquired by decoding the coded data associated with said each of the coding blocks which is specified by said variable length decoding unit and the prediction image generated by said prediction image generating unit to generate a decoded image, wherein

said variable length decoding unit variable-length-decodes coded data associated with a partition to acquire a flag indicating whether or not an intra prediction parameter for said partition is identical to that for a partition adjacent to said partition, and, when said flag indicates that the intra prediction parameter for said partition is identical to that for a partition adjacent to said partition, variable-length-decodes said coded data to acquire information for specifying said adjacent partition, otherwise variable-length-decodes said coded data to acquire the intra prediction parameter for said partition.

[11] The image decoding device according to claim 10, said

image decoding device includes 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.

[12] The image decoding device according to claim 10, wherein when the coding mode selected by the encoding controlling unit is an intra prediction mode, the prediction image generating unit carries out an intra-frame prediction process using pixels adjacent to the coding block which is specified by said variable length decoding unit or pixels adjacent to a higher layer coding block to which said coding block belongs to generate a prediction image.

[13] The image decoding device according to claim 12, wherein when the coding block which is generated through the hierarchical division is further divided into partitions, the variable length decoding unit specifies coded data associated with each of said partitions from the coded data multiplexed into the bitstream and variable-length-decodes said coded data to acquire compressed data and a coding mode associated with said each of the partitions, and, when the coding mode variable-length-decoded by said variable length decoding unit is an intra prediction mode, the prediction image generating unit carries out an intra-frame prediction process using pixels adjacent to said each of the partitions or pixels adjacent to a higher layer partition to which said each of the partitions belongs to generate a prediction image.

[14] An image coding method comprising: a variable length encode processing step of a variable length encoding unit variable-length-encoding a coding mode corresponding to each of coding blocks into which an image is divided hierarchically

to generate a bitstream into which coded data of said coding mode is multiplexed, wherein

said variable length encode processing step includes a step of, when variable-length-encoding an intra prediction parameter which is used when carrying out a prediction process corresponding to said coding mode to generate a prediction image, in addition to said coding mode, to multiplex coded data of said intra prediction parameter into said bitstream, variable-length-encoding a flag indicating whether an intra prediction parameter for a partition generated through said division is identical to that for a partition adjacent to said partition, and, when said intra prediction parameter for said partition is identical to that for an adjacent partition, variable-length-encodes information for specifying said adjacent partition, otherwise variable-length-encoding the intra prediction parameter for said partition.

[15] An image decoding method comprising:

a variable length decode processing step of a variable length decoding unit specifying coded data associated with each of coding blocks into which an image is divided hierarchically from coded data multiplexed into a bitstream, and variable-length-decoding the coded data to acquire a coding mode associated with said each of the coding blocks;

a prediction image generation processing step of a prediction image generating unit carrying out a prediction process corresponding to said coding mode on the coding block specified in said variable length decode processing step to generate a prediction image; and

a decoded image generation processing step of a decoded image generating unit adding a pre-compressed difference image

which is generated from data which are acquired by decoding the coded data associated with said each of the coding blocks which is specified in said variable length decode processing step and the prediction image generated in said prediction image generation processing step to generate a decoded image, wherein

said variable length decode processing step includes a step of variable-length-decoding coded data associated with a partition to acquire a flag indicating whether or not an intra prediction parameter for said partition is identical to that for a partition adjacent to said partition, and, when said flag indicates that the intra prediction parameter for said partition is identical to that for a partition adjacent to said partition, variable-length-decoding said coded data to acquire information for specifying said adjacent partition, otherwise variable-length-decoding said coded data to acquire the intra prediction parameter for said partition.

CLAIMS

[1] A video coding device comprising:

a variable length coding unit for performing a variable length coding on a coding mode associated with each of hierarchically divided coding blocks to generate a bit stream in which a coded data of said coding mode is multiplexed,

in addition to said coding mode said variable length coding unit performing a variable length coding on an intra prediction parameter used to generate a prediction image by performing a prediction process corresponding to said coding mode and multiplexing coded data of said intra prediction parameter in said bit stream

said variable length coding unit performing a variable length coding on an intra merge flag indicating whether or not said intra prediction parameter for a partition is identical to an intra prediction parameter for a neighboring partition located above or to the left of said partition,

wherein when there are two or more neighboring partitions located above or to the left of said partition, a first partition in a direction away from top left of said partition is regarded as each of neighboring partitions located above and to the left of said partition;

wherein when said intra prediction parameter for said partition is identical to said intra prediction parameter for said neighboring partition located above or to the left of said partition, said variable length coding unit performs a variable length coding on an intra merge direction specifying one of neighboring partitions located above and to the left of said partition of which intra prediction parameter is identical to said intra prediction parameter, and

when said intra prediction parameter for said partition is not identical to said intra prediction parameter for said neighboring partition located above or to the left of said partition, said variable length coding unit performs a variable length coding on said intra prediction parameter for said partition.