

[00341] A size of a block 2065 inside the image boundary 2035, the block 2065 being generated by performing binary splitting on the current block 2055 based on the third split boundary 2060, is 16x32, and the image decoding apparatus 100 may additionally perform binary splitting on the block 2065. Therefore, unlike FIG. 20A, a size of a block determined as a coding unit may be small, and decoding efficiency may be relatively increased.

[00342] When the image decoding apparatus 100 determines a size of the current block 2000 or 2030 to be 128x128, determines an allowable split type of the current block 2000 or 2030 to be binary split, and determines an allowable split depth of the current block 2000 or 2030 to be 3, a method of splitting the current block 2000 or 2030 at a picture boundary is described above with reference to FIGS. 20A and 20B, but the disclosure is not limited thereto, and a current block located at a picture boundary may be split according to pseudocode.

[00343] [Pseudocode]

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bottom_boundary // indication of whether current block is bottom boundary of picture (0 when located at boundary 0, 1 when not located)
right_boundary // indication of whether current block is right boundary of picture (0 when located at boundary 0, 1 when not located)
max_bt_size // maximum block size allowing binary-tree (and triple-tree)
min_bt_size // minimum block size
bt_depth // allowed binary-tree (and triple-tree) depth
wGth // width of current block
height // height of current block
abs(v) // value of absolute value of v
log2(v) // value of log where base number of v is 2
= width > max_bt_size || height > max_bt_size || abs(log2(width) - log2(min_bt_size)) > max_bt_depth || abs(log2(height) - log2(min_bt_size)) > max_bt_size
tree is applied
if(!bottom_boundary || !right_boundary) && flag) (here, abs() is omissible)
    split by using quad-tree (user-set particular size may be used, instead of min_bt_size)
else if(!bottom_boundary)
    split by using binary-tree in horizontal direction
else if(!right_boundary)
    split by using binary-tree in vertical direction
else
    explicit determination of split mode

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bottom_boundary // indication of whether current block is bottom
boundary of picture (0 when located at boundary 0, 1
when not located)
right_boundary // indication of whether current block is right boundary of
picture (0 when located at boundary 0, 1 when not
located)
max_bt_size // maximum block size allowing binary-tree (and triple-tree)
min_bt_size // minimum block size
bt_depth // allowed binary-tree (and triple-tree) depth
wGth // width of current block
height // height of current block
abs(v) // value of absolute value of v
log2(v) // value of log where base number of v is 2
(part for checking whether binary-tree is allowed)
= width > max_bt_size || height > max_bt_size ||
(part for checking whether minimum block size is obtainable
when allowed binary-tree is applied)
abs(log2(width) - log2(min_bt_size)) > max_bt_depth ||
abs(log2(height) - log2(min_bt_size)) > max_bt_size
if (!bottom_boundary || !right_boundary) && flag) (here abs() is
omissible)
split by using quad-tree (user-set particular size may be used, instead
of min_bt_size)
else if (!bottom_boundary)
    split by using binary-tree in horizontal direction
else if (!right_boundary)
    split by using binary-tree in vertical direction
else
    explicit determination of split mode

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[00344]

[00345][00344] For example, in a case where the image decoding apparatus 100 that follows pseudocode above recursively performs splitting based on an allowed split depth according to binary split with respect to a greater value of a height or a width of a current block, when a corresponding side becomes a particular size (or smaller) (here, the particular size may be a minimum block size, or a size that is set by a user), the image decoding apparatus 100 may recursively split (split based on a binary tree) the current block according to binary split. Except for the aforementioned case, the image decoding apparatus 100 may split the current block according to quad split. In detail, in a case where an allowed binary split depth (bt_depth) is 3, only when a greater value from among a height and a width of the current block is equal to or smaller than a minimum size(min_bt_size)x2x2x2 (i.e., a minimum size x 8), the current block may be recursively split according to binary split.

[00346][00345] With reference to FIGS. 20A and 20B, a method by which the image decoding apparatus 100 performs binary splitting or quad splitting, in consideration of a binary split depth, is described, but the disclosure is not limited thereto, and thus, one of ordinary skill in the art can easily understand that the image decoding apparatus 100 may binary split, tri split, or quad split a current block based on a binary (and tri) split depth, in a similar manner.

[00347][00346] The disclosure has been particularly shown and described with reference to embodiments thereof. In this regard, it will be understood by one of ordinary skill in the art that various changes in form and details may be made therein without departing from the scope of the disclosure. Therefore, the embodiments should be considered in a descriptive sense only and not for purposes of limitation. The scope of the disclosure is defined not by the detailed descriptions of the disclosure but by the following claims, and all differences within the scope will be construed as being included in the disclosure.

[00348][00347] Meanwhile, the aforescribed embodiments of the disclosure can be written as a program executable on a computer, and can be implemented in general-use digital computers that execute the program by using a computer-readable recording medium. Examples of the computer-readable recording medium include magnetic storage media (e.g., ROM, floppy disks, hard disks, etc.), optical recording media (e.g., CD-ROMs, or DVDs), or the like.

CLAIMS

1. An image decoding method comprising:
determining a plurality of obtaining one or more luma coding units in a luma image by hierarchically splitting the luma image, based on a split shape mode of blocks comprised in the luma image of a current image;
determining a plurality of coding units in a chroma image by hierarchically splitting the chroma image, based on a split shape mode of blocks in the chroma image of the current image; and
decoding the current image, based on the determined plurality of coding units in the luma image and the determined plurality of coding units in the chroma image, and
wherein the split shape mode is a mode based on at least one of a split direction and a split type of a luma block, and;
wherein decoding a luma image based on the determining of the plurality of obtained one or more luma coding units in the chroma image comprises;
when a size or an area of a chroma block from among a plurality of chroma blocks to be generated by splitting a current chroma block in the chroma image is equal to or is smaller than a preset size or a preset area, not allowing splitting of the current chroma block based on a split shape mode of the current chroma block, and
determining at least one coding unit comprised in the current chroma block.
2. The image decoding method of claim 1, wherein the split type indicates one of binary split, tri split, and quad split.
3. The image decoding method of claim 1, wherein the preset size is one of 4x2, 2x4, and 2x2.
4. The image decoding method of claim 1, wherein the preset area is one of 8 and 4.

—— 5. —— The image decoding method of claim 1, wherein, when the size or the area of the chroma block from among the plurality of chroma blocks to be generated by splitting the current chroma block in the chroma image is equal to or smaller than the preset size or the preset area, the not allowing of the splitting of the current chroma block based on the split shape mode of the current chroma block, and the determining of the at least one coding unit comprised in the current chroma block comprises:

determining whether the size or the area of the chroma block from among the plurality of chroma blocks to be generated by splitting the current chroma block in the chroma image is equal to or smaller than the preset size or the preset area, equal to an area predetermined according to whether a condition based on a size or an area first split type of the current chroma block and the split shape mode of the current chroma block is satisfied; and

in response to a result of the determining, determining to not to allow splitting of the current chroma block, based on the split shape mode of the current chroma block, and determining at least one coding unit comprised in the current chroma block.

—— 6. —— The image decoding method of claim 5, wherein the condition based on the size or the area of the current chroma block and the split shape mode of the current chroma block corresponds to a condition about whether a width or a height of the current chroma block is equal to or smaller than 4 when a chroma block according to the first split type of the current and obtaining one or more chroma block indicates quad-split.

—— 7. —— The image decoding method of claim 5, wherein the condition based on the size or the area of the current coding units included in the chroma block and the split shape mode of the current chroma block corresponds to based on a condition about whether the area of the current chroma block is equal to or smaller than 16 when a second split type of the current chroma block indicates binary split; and

—— 8. —— The image decoding method of claim 5, a chroma image based on the obtained one or more chroma coding units, and

wherein the condition based on the size or the area of the current chroma block and the split shape mode of the current chroma block corresponds to a condition about whether the area of the current chroma block is equal to or smaller than 32 when a first split type of the current chroma block indicates one of binary split, and tri split.

9. The image decoding method of claim 1, wherein the split shape mode of the blocks in the chroma image of the current image is independent from the split shape mode of the blocks comprised in the luma image of the current image.

10. The image decoding method of claim 1, wherein the split shape mode of the blocks in the chroma image of the current image is dependent on a split shape mode of blocks in the luma image of the current image, the blocks in the luma image corresponding to the blocks in the chroma image, and

a size of the blocks in the chroma image is determined based on a chroma sub sampling format of the current image and a size of the corresponding blocks in the luma image.

11. The image decoding method of claim 10, further comprising:

when a size of a block from among a plurality of blocks to be generated by splitting the current chroma block of the chroma image, based on the split shape mode of the current chroma block in the chroma image, is equal to or smaller than $2 \times N$ (where N is an integer equal to or greater than 2) or $N \times 2$,

determining to not allow splitting of the current chroma block based on the split shape mode of the current chroma block, and determining at least one coding unit comprised in the current chroma block.

12. The image decoding method of claim 1, wherein the determining of the plurality of coding units in the luma image by hierarchically splitting the luma image based on the split shape mode of the blocks comprised in the luma image of the current image comprises:

~~when a current luma block comprised in the luma image is located at a right boundary of a picture, obtaining, from a bitstream, a flag indicating a split type from among binary split and quad split; and~~

~~determining at least one coding unit comprised in the current luma block, based on the obtained flag.~~

~~13.~~ 2. An image decoding apparatus comprising:

~~at least one processor configured to determine a plurality of coding units in a luma image by hierarchically splitting the luma image, based on a split shape mode of blocks comprised in the luma image of a current image, determine a plurality of coding units in a chroma image by hierarchically splitting the chroma image, based on a split shape mode of blocks in the chroma image of the current image, and~~

~~decode the current image, based on the determined plurality of coding units in the luma image and the determined plurality of coding units in the chroma image, and wherein the split shape mode is a mode based on at least one processor configured to:~~

~~obtain one or more luma coding units, based on at least one of a split direction and a split type of a luma block, and~~

~~decode a luma image, based on the obtained one more luma coding units,~~

~~when the at least one processor determines the plurality of coding units in the chroma image, and when a size or an area of a chroma block from among a plurality of chroma blocks to be generated by splitting a current chroma block in the chroma image is equal to or is smaller than a preset size or a preset equal to an area, the at least one processor is configured to predetermined according to a first split type of the chroma block, determine not to allow splitting of the current chroma block based on according to the first split type and obtain one or more chroma coding units included in the chroma block based on a second split type of the chroma block, and~~

~~decode a chroma image, based on the obtained one or more chroma coding units,~~

wherein the first split shape mode type of the current chroma block, indicates one of binary split and determine at least one coding unit comprised in the current chroma block tri split.

———143. An image encoding method comprising:

~~determining a plurality of coding units in a luma image by hierarchically splitting the luma image, based on a split shape mode of blocks comprised in the luma image of a current image;~~

~~determining a plurality of coding units in a chroma image by hierarchically splitting the chroma image, based on a split shape mode of blocks comprised in the chroma image of the current image; and~~

~~encoding the current image, based on the determined plurality of coding units in the luma image and the determined plurality of coding units in the chroma image, and~~

~~wherein the split shape mode is a mode determining one or more luma coding units, based on at least one of a split direction and a split type of a luma block, and;~~

~~wherein encoding a luma image, based on the determining of the plurality of determined one or more luma coding units in the chroma image comprises;~~

~~when a size or an area of a chroma block from among a plurality of chroma blocks to be generated by splitting a current chroma block in the chroma image is equal to or smaller than a preset size or a preset equal to an area, not allowing splitting of the current chroma block based on a predetermined according to a first split shape mode type of the current chroma block, determining not to allow splitting of the chroma block according to the first split type and determining at least one or more chroma coding unit comprised in units included in the chroma block based on a second split type of the chroma block; and~~

~~encoding a chroma image, based on the current determined one or more chroma block coding units,~~

~~wherein the first split type of the chroma block indicates one of binary split and tri split.~~

154. A non-transitory computer-readable recording medium having recorded thereon a program for performing the image decoding method of claim 1.