

In particular, there is an ongoing demand for reducing the processor load in the context of intra prediction processing. In the art, it is known to employ Most Probable Mode (MPM) list for intra prediction mode coding. The MPM list reduces bits required for coding the current block's intra prediction mode. When the intra prediction mode of the current block corresponds to an entry of an MPM list, an index rather than the actual mode is coded whereby less bits are necessary. However, selecting the entries for the generation of an MPM list in view of the most efficient intra prediction coding is still a task. The proper selection of the entries heavily influences the efficiency of the intra prediction mode coding based on MPM list.

In view of this, it is an object underlying the present invention to provide for a technique for obtaining intra prediction mode based on MPM list that results in more efficient coding as compared to the art.

SUMMARY

Embodiments of the present application provide devices and methods for encoding and decoding according to the independent claims.

The foregoing and other objects are achieved by the subject matter of the independent claims. Further implementation forms are apparent from the dependent claims, the description and the figures.

According to a first aspect the invention relates to a method performed by a decoding device. The method includes: obtaining a value of a first indication information of a current block, the value of the first indication information indicating whether an intra prediction mode of the current block is comprised in a set of most probable modes; and obtaining a value of a reference index line of the current block. The set of most probable modes comprises 5 candidate intra prediction modes and Planar mode. When the value of the first indication information indicates the intra prediction mode of the current block is comprised in the set of most probable modes, and when the value of the reference index line indicates the closest neighboring reference line to the current block is used, the method further includes obtaining a value of a second indication information of the current block, the value of the second indication information of the current block indicating whether the intra prediction mode of

the current block is Planar mode or not.

In the conventional method, the decoding complexity for the MPM processing is high. Depending on the usage of Multiple Reference Line (MRL) and intra sub-partition coding mode (ISP) tools, three different MPM lists (6 entries) are constructed. In the aspects or any possible embodiments of the aspects of this invention, the MPM list (5 entries) construction is unified with reduced decoding complexity, regardless of whether using MRL or ISP coding tool.

Furthermore, planar mode is considered as a special mode due to its high frequency and a special flag is assigned to check whether the current mode is planar mode or not. Although it is not in the MPM list (with invented 5 entries), It is always checked when mpm flag is true. In other word, the mpm flag indicates whether the intra prediction mode of the current block is in a list of 6 entries, comprising of planar mode and the 5 MPM list entries. The 5 MPM list entries are constructed based on the intra prediction modes of left and above block).

As an implementation of the first aspect, the first indication information is indicated by a first flag, for example, `intra_luma_mpm_flag`. The value of the reference index line of the current block may be indicated by `intra_luma_ref_idx`. The second indication information may be indicated by a second flag, for example, `intra_luma_not_planar_flag`.

When MRL coding is not enabled, i.e., when the value of the reference index line indicates the closest neighboring reference line to the current block is used, the devices parses a bitstream to obtain the value of the second indication information. When MRL coding is enabled, the value of the second indication information is obtained by a default value. In this situation, Planar mode is excluded and its corresponding flag (i.e. `intra_luma_not_planar_flag`) is not parsed from the bitstream, but is inferred as a default value (e.g. a value of 1). In this case, a bit is saved to indicate the value of the planar flag (i.e, `intra_luma_not_planar`) when MRL is enabled).

According to a second aspect the invention relates to a method performed by an encoding apparatus. The method includes: determining whether an intra prediction mode of a current block is comprised in a set of most probable modes; and determining whether the closest neighboring reference line to the current block is used for intra prediction. The set of most probable modes comprises 5 candidate intra prediction modes and Planar mode. The method further includes encoding a bitstream, wherein the bitstream includes information to indicate whether the intra prediction mode of the current block is Planar mode when the intra

prediction mode of the current block is comprised in the set of most probable modes, and the closest neighboring reference line to the current block is used for intra prediction.

As an implantation of the second aspect, the bitstream includes a first flag indicating whether the intra prediction mode of the current block is comprised in the set of most probable modes, and a second flag indicating whether the intra prediction mode of the current block is Planar mode. As an example, the first flag is `intra_luma_mpm_flag`, and the second flag is `intra_luma_not_planar_flag`.

The method according to the first aspect of the invention can be performed by a decoding device according to the third aspect of the invention. The decoding device includes a first obtaining unit and a second obtaining unit. The first obtaining unit, configured to obtain a value of a reference index line of a current block, and a value of a first indication information of the current block, the value of the first indication information indicating whether an intra prediction mode of the current block is comprised in a set of most probable modes. The set of most probable modes comprises 5 candidate intra prediction modes and Planar mode. The second obtaining unit, configure to obtain a value of a second indication information of the current block when the value of the first indication information indicates the intra prediction mode of the current block is comprised in the set of most probable modes, and when the value of the reference index line indicates the closest neighboring reference line to the current block is used, wherein the value of the second indication information of the current block indicates whether the intra prediction mode of the current block is Planar mode.

Further features and implementation forms of the method according to the third aspect of the invention correspond to the features and implementation forms of the apparatus according to the first aspect of the invention.

The method according to the second aspect of the invention can be performed by an encoding device according to the fourth aspect of the invention. The encoding device includes a determining unit and an encoding unit. The determining unit, configured to determine whether an intra prediction mode of a current block is comprised in a set of most probable modes, and to determine whether the closest neighboring reference line to the current block is used for intra prediction. The set of most probable modes comprises 5 candidate intra prediction modes and Planar mode. The encoding unit, configured to encode a bitstream,

wherein the bitstream includes information to indicate whether the intra prediction mode of the current block is Planar mode when the intra prediction mode of the current block is comprised in the set of most probable modes, and the closest neighboring reference line to the current block is used for intra prediction.

Further features and implementation forms of the method according to the fourth aspect of the invention correspond to the features and implementation forms of the apparatus according to the second aspect of the invention.

According to a fifth aspect the invention relates to an apparatus for decoding a video stream includes a processor and a memory. The memory is storing instructions that cause the processor to perform the method according to the first aspect.

According to a sixth aspect the invention relates to an apparatus for encoding a video stream includes a processor and a memory. The memory is storing instructions that cause the processor to perform the method according to the second aspect.

According to a seventh aspect, a computer-readable storage medium having stored thereon instructions that when executed cause one or more processors configured to code video data is proposed. The instructions cause the one or more processors to perform a method according to the first or second aspect or any possible embodiment of the first or second aspect.

According to an eighth aspect, the invention relates to a computer program comprising program code for performing the method according to the first or second aspect or any possible embodiment of the first or second aspect when executed on a computer.

Planar mode has a high frequency used as an intra prediction mode. The coding efficiency of the coding process can be enhanced by employment of the information to indicate whether the intra prediction mode of the current block is Planar mode as compared to the art, when the intra prediction mode of the current block is comprised in the set of most probable modes, and the closest neighboring reference line to the current block is used for intra prediction.

For example, the application programs 510 can include applications 1 through N, which further include a video coding application that performs the methods described here.

The apparatus 500 can also include one or more output devices, such as a display 518. The display 518 may be, in one example, a touch sensitive display that combines a display with a touch sensitive element that is operable to sense touch inputs. The display 518 can be coupled to the processor 502 via the bus 512.

Although depicted here as a single bus, the bus 512 of the apparatus 500 can be composed of multiple buses. Further, the secondary storage 514 can be directly coupled to the other components of the apparatus 500 or can be accessed via a network and can comprise a single integrated unit such as a memory card or multiple units such as multiple memory cards. The apparatus 500 can thus be implemented in a wide variety of configurations.

Background Intra prediction mode coding

In current VTM 4.0, a 6-MPM (Most Probable Modes) list is constructed for intra prediction mode coding. The MPM list is introduced to reduce bits required for coding the current block's intra prediction mode. The 6-MPM list is constructed based on intra prediction modes of neighboring blocks of the current block. When intra prediction mode of the current block falls into the MPM list, an index rather than actual mode is coded, which can use less bits. When the intra prediction mode of the current block doesn't fall into the MPM list, truncated binarization is used for coding the intra prediction mode of the current block. MPM list provides a good prediction for intra prediction mode of the current block.

MPM list for multiple reference line (MRL).

In VTM 4.0, Multiple Reference Line (MRL) coding tool can use one of the multiple neighboring reference lines to predict the samples of the current block. When a value of MRL line index equal to 0 (i.e. the closest neighboring reference line is used, i.e. reference line 0 as shown in Fig. 6), a normal 6 MPM list containing planar and DC is used. When a value of MRL line index is not equal to 0, a 6-MPM list excluding planar (i.e. a value of 0) and DC (i.e. a value of 1) is used.

MPM list for intra sub-partition coding mode (ISP)

Intra sub-partition (ISP) coding mode is a tool newly adopted in VTM4.0 (JVET-M0102). Luma intra-predicted blocks are divided vertically or horizontally into 2 or 4 sub-partitions,

coding mode, each bin value is encoded by using the regular binary arithmetic coding engine, where the associated probability model is either determined by a fixed choice, based on the type of syntax element and the bin position or bin index (binIdx) in the binarized representation of the syntax element, or adaptively chosen from two or more probability models depending on the related side information.

Selection of the probability model is referred to as context modeling. Each probability model in CABAC is addressed using a unique context index (ctxIdx), either determined by a fixed assignment or computed by the context derivation logic by which, in turn, the given context model is specified.

Background about how to determine left and above neighbors.

The intra prediction mode coding of VVC depends on the intra prediction modes of its neighboring blocks. Namely The left and above blocks of the current block. Their position is shown in Figure 10.

Signaling of MPM index

A flag (i.e. MPM flag) is used to indicate whether the current block's intra prediction mode is in the MPM list or not. When MPM flag is true (i.e. a value of 1), then the intra prediction mode can be determined using a MPM index. The MPM index is coded using truncated unary code, as shown in the following Table 3 when the length of MPM list is 6. When MPM flag is not true, the intra prediction mode of current block is not in the MPM list, and the mode is coded using truncated binary code. Another example of MPM index when the MPM list is comprised of 5 modes is shown in Table 4. The bin string for coding index is called truncated unary code (not truncated binary code for coding non-MPM modes). Note that for truncated unary code the bin 0 and 1 are interchangeable without loss of generality. In one example, the MPM index when the MPM list is comprised of 5 modes can also be coded as shown in Table 5.

Table 3: MPM flag and MPM index coding when 6 entries in a MPM list

Intra prediction modes	MPM flag	MPM index	Bin string of MPM index
MPM modes (6)	1	0	0

intra_luma_mpm_idx corresponds to **MPM index** in Table 3 and use truncated unary code as shown in Table 3.

intra_luma_mpm_remainder represents truncated binary code of mode that is not in the MPM list.

In an embodiment 1, a syntax element **intra_luma_planar_flag** and **ctx** are disclosed.

According to one embodiment of the invention, a flag **intra_luma_planar_flag** is introduced.

If a value of the **intra_luma_mpm_flag** is true (for examples, the value is 1), the decoder parses an **intra_luma_planar_flag** to determine whether an intra prediction mode of a current block is a Planar mode or not. When a value of the **intra_luma_planar_flag** is 1, the intra prediction mode of current block is a Planar mode. When a value of the **intra_luma_planar_flag** is 0, the intra prediction mode of current block is NOT a Planar mode. If the **intra_luma_planar_flag** is not present (for example, this flag can't be parsed from a bitstream in case **intra_luma_mpm_flag is equal to 0**), a value of the **intra_luma_planar_flag** is inferred as 0.

If written in a style of VVC working draft specification, the intra prediction mode of the current block

IntraPredModeY[xCb][yCb] is derived by applying the following procedure:

- If **intra_luma_mpm_flag[xCb][yCb]** is equal to 1,
 - If **intra_luma_planar_flag[xCb][yCb]** is equal to 1, **intraPredModeY[xCb][yCb]** is set equal to **INTRA_PLANAR**.
 - Otherwise, the **IntraPredModeY[xCb][yCb]** is set equal to **candModeList[intra_luma_mpm_idx[xCb][yCb]]**.

If the intra prediction mode is not a planar mode (i.e a value of the **intra_luma_planar_flag** is 0), the decoder further parses a syntax element **intra_luma_mpm_idx**.

In one example, a value of the **intra_luma_planar_flag** is CABAC contexted coded (i.e. not CABAC by-pass coded), and decoder parses the flag using context based on whether current block is a normal intra block or not.

In one example, a value of the **intra_luma_planar_flag** is CABAC contexted coded (i.e. not CABAC by-pass coded), and decoder parse the flag using context based on whether current block is an intra block with multiple reference line (MRL) enabled or not.

In one example, a value of the **intra_luma_planar_flag** is CABAC contexted coded (i.e. not CABAC by-pass coded), and decoder parse the flag using context based on whether current block is an intra block with intra sub-partition (ISP) coding mode enabled or not.

In an example, the position of **intra_luma_planar_flag** is placed as in Table 7.

Table 7: syntax with intra_luma_planar_flag

if(intra_luma_ref_idx[x0][y0] == 0 && intra_subpartitions_mode_flag[x0][y0] == 0)	
intra_luma_mpm_flag [x0][y0]	ae(v)
if(intra_luma_mpm_flag[x0][y0]){	
intra_luma_planar_flag [x0][y0]	ae(v)
if (! intra_luma_planar_flag [x0][y0])	
intra_luma_mpm_idx [x0][y0]	ae(v)
}	
else	
intra_luma_mpm_remainder [x0][y0]	ae(v)

Embodiment 2: intra_luma_not_planar_flag and ctx

According to one embodiment of the invention, a syntax element intra_luma_not_planar_flag is introduced.

If a value of the intra_luma_mpm_flag is true (for example, the value is 1), the decoder parses intra_luma_not_planar_flag to determine whether the intra prediction mode of current block is a Planar mode or not. When a value of the intra_luma_not_planar_flag is 1, the intra prediction mode of current block is NOT a Planar mode; When a value of the intra_luma_not_planar_flag is 0, the intra prediction mode of current block is a Planar mode. If intra_luma_not_planar_flag is not present in a bitstream, a value of the intra_luma_not_planar_flag is inferred as 1. In an example, the position of intra_luma_not_planar_flag is placed as in Table 8.

If an intra prediction mode of a current block is not a planar mode (i.e a value of the intra_luma_not_planar_flag is 1), the decoder further parses a syntax element intra_luma_mpm_idx.

Written in a style of VVC working draft specification, the intra prediction mode of the current block

IntraPredModeY[xCb][yCb] is derived by applying the following procedure:

- If intra_luma_mpm_flag[xCb][yCb] is equal to 1,
 - If intra_luma_not_planar_flag[xCb][yCb] is equal to 0, intraPredModeY[xCb][yCb] is set equal to INTRA_PLANAR.
 - Otherwise, the IntraPredModeY[xCb][yCb] is set equal to candModeList[intra_luma_mpm_idx[xCb][yCb]].

In one example, a value of the intra_luma_not_planar_flag is CABAC contexted coded (i.e. not CABAC by-pass coded), and decoder parse the flag using context based on whether current block is a normal intra block or not.

Step 1303, the device encodes a bitstream, wherein the bitstream includes information to indicate whether the intra prediction mode of the current block is Planar mode when the intra prediction mode of the current block is comprised in the set of most probable modes, and the closest neighboring reference line to the current block is used for intra prediction, and send the encoded bitstream to a decoding device.

The bitstream includes a first flag indicating whether the intra prediction mode of the current block is comprised in the set of most probable modes, and a second flag indicating whether the intra prediction mode of the current block is Planar mode. As described above, as an example, the first flag is `intra_luma_mpm_flag`. When the value of `intra_luma_mpm_flag` equals to 1, the intra prediction mode of the current block is comprised in the set of most probable modes.

The value of the second indication information is context adaptive binary arithmetic coding (CABAC) context decoded. The second indication information may be indicated by a second flag, for example, `intra_luma_not_planar_flag`. The device parses the second flag using context based on whether the current block is an intra block with intra sub-partition (ISP) coding mode enabled or not.

The bitstream may also include an indication to indicate the value of the reference index line of the current block. The value of the reference index line of the current block is indicated by `intra_luma_ref_idx`, for example. When the value of the reference index line of the current block equals to 0, i.e., `intra_luma_ref_idx[ x0 ][ y0 ] = 0`, the closest neighboring reference line to the current block is used.

Detailed information of this embodiment 1300 is shown in the above-mentioned embodiments.

FIG. 14 illustrates embodiments of a decoding device 1400. The decoding device 1400 may be video decoder 30 of Figure 1A, or decoder 30 of Figure 3. The decoding device 1400 can be used to implement the embodiment 1200 and the other embodiments described above.

The device includes a first obtaining unit 1401 and a second obtaining unit 1402. The first obtaining unit 1401, configured to obtain a value of a reference index line of a current block, and a value of a first indication information of the current block, the value of the first indication information indicating whether an intra prediction mode of the current block is comprised in a set of most probable modes. The set of most probable modes comprises 5 candidate intra prediction modes and Planar mode. The second obtaining unit 1402, configured to obtain a value of a second indication information of the current block when the value of the first indication information indicates the intra prediction mode of the current block is

comprised in the set of most probable modes, and when the value of the reference index line indicates the closest neighboring reference line to the current block is used, wherein the value of the second indication information of the current block indicates whether the intra prediction mode of the current block is Planar mode.

The device 1400 further includes a parsing unit 1403 (not shown in Fig. 14). The parsing unit 1403 configured to parse the second flag using context based on whether the current block is an intra block with intra sub-partition (ISP) coding mode enabled or not.

FIG. 15 illustrates embodiments of an encoding device 1500 for intra prediction. The encoding device 1500 may be video encoder 20 of Figure 1A, or encoder 20 of Figure 2. The encoding device 1500 can be used to implement the embodiment 1300 and the other embodiments described above.

The device 1500 includes a determining unit 1501 and an encoding unit 1502. The determining unit 1501, configured to determine whether an intra prediction mode of a current block is comprised in a set of most probable modes, and to determine whether the closest neighboring reference line to the current block is used for intra prediction. The set of most probable modes comprises 5 candidate intra prediction modes and Planar mode. The encoding unit 1502, configured to encode a bitstream, wherein the bitstream includes information to indicate whether the intra prediction mode of the current block is Planar mode when the intra prediction mode of the current block is comprised in the set of most probable modes, and the closest neighboring reference line to the current block is used for intra prediction.

Following is an explanation of the applications of the encoding method as well as the decoding method as shown in the above-mentioned embodiments, and a system using them.

FIG. 16 is a block diagram showing a content supply system 3100 for realizing content distribution service. This content supply system 3100 includes capture device 3102, terminal device 3106, and optionally includes display 3126. The capture device 3102 communicates with the terminal device 3106 over communication link 3104. The communication link may include the communication channel 13 described above. The communication link 3104 includes but not limited to WIFI, Ethernet, Cable, wireless (3G/4G/5G), USB, or any kind of combination thereof, or the like.

The capture device 3102 generates data, and may encode the data by the encoding method as shown in the above embodiments. Alternatively, the capture device 3102 may distribute the data to a streaming server (not shown in the Figures), and the server encodes the data and transmits the encoded data to the terminal device 3106. The capture device 3102 includes but not limited to camera, smart phone or Pad, computer or laptop, video conference system, PDA, vehicle mounted device, or a combination of any of them, or the like. For example, the

CLAIMS

1. A method of intra prediction implemented by a decoding device, comprising:
obtaining a value of a first indication information of a current block, the value of the first
indication information indicating whether an intra prediction mode of the current block is
5 comprised in a set of most probable modes, wherein the set of most probable modes
comprises 5 candidate intra prediction modes and Planar mode;
obtaining a value of a reference index line of the current block;
when the value of the first indication information indicates the intra prediction mode of the
current block is comprised in the set of most probable modes, and when the value of the
10 reference index line indicates the closest neighboring reference line to the current block is
used, obtaining a value of a second indication information of the current block, the value of
the second indication information of the current block indicating whether the intra prediction
mode of the current block is Planar mode or not.
- 15 2. The method of claim 1, wherein the value of the second indication information is context
adaptive binary arithmetic coding (CABAC) context decoded.
3. The method of claim 1 or 2, wherein the first indication information is indicated by a first
flag, and the second indication information is indicated by a second flag.
- 20 4. The method of claim 3, wherein the first flag is `intra_luma_mpm_flag`, and the second flag
is `intra_luma_not_planar_flag`.
5. The method of claim 4, wherein when the value of `intra_luma_mpm_flag` equals to 1, the
25 intra prediction mode of the current block is comprised in the set of most probable modes,
and

when the value of the reference index line of the current block equals to 0, the closest neighboring reference line to the current block is used.

6. The method of any one of claims 3-5, wherein the method further comprises:

5 parse the second flag using context based on whether the current block is an intra block with intra sub-partition (ISP) coding mode enabled or not.

7. The method of any one of claims 1-6, wherein when the value of the second indication information of the current block indicates the intra prediction mode of the current block is not

10 Planar mode, and when one or more of the following conditions are true, a candidate intra prediction mode `candIntraPredModeX` is set equal to `INTRA_PLANAR`:

– The variable `availableX` is equal to `FALSE`;

– `CuPredMode[ xNbX ][ yNbX ]` is not equal to `MODE_INTRA`; or

– `X` is equal to `B` and `yCb – 1` is less than

15 $((yCb \gg CtbLog2SizeY) \ll CtbLog2SizeY)$.

wherein `X` being replaced by either neighbor block `A` or `B`, a luma location (xCb, yCb) specifying the top-left sample of the current luma coding block relative to the top-left luma sample of the current picture, the location $(xNbA, yNbA)$ of the neighbor `A` is set equal to $(xCb - 1, yCb + cbHeight - 1)$, the location $(xNbB, yNbB)$ of the neighbor `B` is set equal

20 to $(xCb + cbWidth - 1, yCb - 1)$, a variable `cbWidth` specifying the width of the current coding block in luma samples, a variable `cbHeight` specifying the height of the current coding block in luma samples, `CuPredMode` representing a current prediction mode, `SizeY` representing the size of `Y` components of a coding tree block.

25 8. The method of any one of claims 1-7, wherein when an intra prediction mode of a left

neighbor block and an intra prediction mode of an above neighbor block are both non-angular modes, the MPM list comprises:

candModeList[0] = INTRA_DC

candModeList[1] = INTRA_ANGULAR50

5 candModeList[2] = INTRA_ANGULAR18

candModeList[3] = INTRA_ANGULAR46

candModeList[4] = INTRA_ANGULAR54.

9. The method of any one of claims 1-8, wherein the step of obtaining the value of the second indication information comprise:

parsing a bitstream to obtain the value of the second indication information.

10. The method of any one of claims 1-8, when Multiple Reference Line (MRL) coding is enabled, the value of the second indication information is obtained by a default value.

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11. A method of intra prediction implemented by an encoding device, comprising:

determining whether an intra prediction mode of a current block is comprised in a set of most probable modes, wherein the set of most probable modes comprises 5 candidate intra prediction modes and Planar mode;

20 determining whether the closest neighboring reference line to the current block is used for intra prediction;

encoding a bitstream, wherein the bitstream includes information to indicate whether the intra prediction mode of the current block is Planar mode when the intra prediction mode of the current block is comprised in the set of most probable modes, and the closest neighboring

25 reference line to the current block is used for intra prediction.

12. The method of claim 11, wherein the bitstream includes a first flag indicating whether the intra prediction mode of the current block is comprised in the set of most probable modes, and a second flag indicating whether the intra prediction mode of the current block is Planar mode.

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13. The method of claim 12, wherein the first flag is `intra_luma_mpm_flag`, and the second flag is `intra_luma_not_planar_flag`.

14. The method of claim 13, wherein when the value of `intra_luma_mpm_flag` equals to 1,
10 the intra prediction mode of the current block is comprised in the set of most probable modes, and
when a value of the reference index line of the current block equals to 0, the closest neighboring reference line to the current block is used for intra prediction.

15 15. The method of any one of claims 11-14, wherein the information to indicate whether the intra prediction mode of the current block is context adaptive binary arithmetic coding (CABAC) context encoded.

16. The method of claim 15, wherein the context includes whether the current block is an
20 intra block with intra sub-partition (ISP) coding mode enabled.

17. A decoding device for intra prediction, the device comprising:
a first obtaining unit, configured to obtain a value of a reference index line of a current block,
and a value of a first indication information of the current block, the value of the first
25 indication information indicating whether an intra prediction mode of the current block is comprised in a set of most probable modes, wherein the set of most probable modes

comprises 5 candidate intra prediction modes and Planar mode;

a second obtaining unit, configured to obtain a value of a second indication information of the current block when the value of the first indication information indicates the intra prediction mode of the current block is comprised in the set of most probable modes, and when the value of the reference index line indicates the closest neighboring reference line to the current block is used, wherein the value of the second indication information of the current block indicates whether the intra prediction mode of the current block is Planar mode.

18. The device of claim 17, wherein the value of the second indication information is context adaptive binary arithmetic coding (CABAC) context decoded.

19. The device of claim 17 or 18, wherein the first indication information is indicated by a first flag, and the second indication information is indicated by a second flag.

20. The device of claim 19, wherein the first flag is `intra_luma_mpm_flag`, and the second flag is `intra_luma_not_planar_flag`.

21. The device of claim 20, wherein when the value of `intra_luma_mpm_flag` equals to 1, the intra prediction mode of the current block is comprised in the set of most probable modes, and

when the value of the reference index line of the current block equals to 0, the closest neighboring reference line to the current block is used.

22. The device of any one of claims 19-21, wherein the device further comprises:

a parsing unit, configured to parse the second flag using context based on whether the current block is an intra block with intra sub-partition (ISP) coding mode enabled or not.

23. The device of any one of claims 19-22, wherein the second obtaining unit is configured to obtain the value of the second indication information by parsing a bitstream.

24. The device of any one of claims 19-22, wherein the second obtaining unit is configured to
5 set a default value as the value of the second indication information when Multiple Reference Line (MRL) coding is enabled.

25. An encoding device for intra prediction, comprising:

a determining unit, configured to determine whether an intra prediction mode of a current
10 block is comprised in a set of most probable modes, and to determine whether the closest neighboring reference line to the current block is used for intra prediction, wherein the set of most probable modes comprises 5 candidate intra prediction modes and Planar mode;

an encoding unit, configured to encode a bitstream, wherein the bitstream includes information to indicate whether the intra prediction mode of the current block is Planar mode
15 when the intra prediction mode of the current block is comprised in the set of most probable modes, and the closest neighboring reference line to the current block is used for intra prediction.

26. The device of claim 25, wherein the bitstream includes a first flag indicating whether the
20 intra prediction mode of the current block is comprised in the set of most probable modes, and a second flag indicating whether the intra prediction mode of the current block is Planar mode.

27. The device of claim 26, wherein the first flag is intra_luma_mpm_flag, and the second
25 flag is intra_luma_not_planar_flag.

28. The device of claim 27, wherein when the value of intra_luma_mpm_flag equals to 1, the intra prediction mode of the current block is comprised in the set of most probable modes, and

when a value of the reference index line of the current block equals to 0, the closest
5 neighboring reference line to the current block is used for intra prediction.

29. The device of any one of claims 25-28, wherein the information to indicate whether the intra prediction mode of the current block is context adaptive binary arithmetic coding (CABAC) context encoded.

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30. The device of claim 29, wherein the context includes whether the current block is an intra block with intra sub-partition (ISP) coding mode enabled.

31. A decoder (30) comprising processing circuitry for carrying out the method according to
15 any one of claims 1 to 10.

32. An encoder (20) comprising processing circuitry for carrying out the method according to any one of claims 11 to 16.

20 33. A computer program product comprising a program code for performing the method according to any one of claims 1 to 16.

34. A decoder for intra prediction, comprising:

one or more processors; and

25 a non-transitory computer-readable storage medium coupled to the processors and storing programming for execution by the processors, wherein the programming, when executed by

the processors, configures the decoder to carry out the method according to any one of claims 1 to 10.

35. An encoder for intra prediction, comprising:

- 5 one or more processors; and
- a non-transitory computer-readable storage medium coupled to the processors and storing programming for execution by the processors, wherein the programming, when executed by the processors, configures the decoder to carry out the method according to any one of claims 11 to 16.