

CLAIMS

1. A method for predicting an image, applied to a decoder, comprising:
determining prediction parameters of a current block in a bitstream;
determining matrix-based intra prediction (MIP) input samples of the current block based
5 on neighboring samples of the current block and the prediction parameters,
determine an MIP weight matrix of the current block based on the prediction parameters;
determining an MIP prediction sample ($\text{predMip}[x][y]$) having coordinates x, y of the
current block based on the MIP weight matrix, the MIP input samples, a shifting offset parameter
(fo), and a shifting number parameter (sW) using the following equation, wherein the shifting
10 offset parameter is 32 for blocks with different MIP mode identifiers and different size
identifiers, and the shifting number parameter is 6 for blocks with different MIP mode identifiers
and different size identifiers:

$$\begin{cases} \text{predMip}[x][y] = (((\sum_{i=0}^{\text{inSize}-1} \text{mWeight}[i][y \times \text{predSize} + x] \times p[i]) + \\ \text{oW}) >> 6) + \text{pTemp}[0] \\ \text{oW} = 32 - 32 \times (\sum_{i=0}^{\text{inSize}-1} p[i]) \end{cases}$$

where:

15 $p[i]$ is an i^{th} value in the MIP input samples,
 inSize is a number of values in the MIP input samples,
 mWeight is the MIP weight matrix of the current block,
 oW is a first offset value,
 $\text{pTemp}[]$ is a temporary reference array, and
20 predSize is used to determine a number of the MIP prediction sample; and
performing an upsampling process to the MIP prediction sample of the current block so as
to generate intra predicted samples ($\text{predSamples}[x][y]$) of the current block.

2. The method of claim 1, wherein the MIP prediction sample of the current block includes
25 prediction values for a portion of samples of the current block.

3. The method of claim 1, wherein the neighboring samples include at least one of a left-
neighboring sample or an above-neighboring sample.

30 4. The method of claim 1, further comprising:

determining the first offset value (oW) based on the MIP input samples, the shifting number parameter (sW), and the shifting offset parameter (fO).

5 5. The method of claim 1, wherein the prediction parameters include a size identifier (mipSizeId) of the current block.

10 6. The method of claim 5, further comprising:
performing a downsampling process to the neighboring samples to generate the temporary reference array (pTemp[x]) based on the size identifier.

15 7. The method of claim 6, further comprising:
determining a second constant value based on a bit depth (BitDepth) of the neighboring samples, in an event that the size identifier is in a predetermined range.

20 8. The method of claim 7, further comprising:
generating the MIP input samples (p[x]) based on the second constant value and the temporary reference array (pTemp[x]), the second constant value being “ $1 \ll (\text{BitDepth} - 1)$ ”.

25 9. A decoding apparatus for decoding a picture, comprising:
a parsing unit configured to parse a bitstream to determine prediction parameters of a current block; and
an intra prediction unit configured to
determine matrix-based intra prediction (MIP) input samples of the current block based on neighboring samples of the current block and the prediction parameters of the current block;
30 determine an MIP weight matrix of the current block based on the prediction parameters;
determine an MIP prediction sample (predMip[x][y]) having coordinates x, y of the current block based on the MIP weight matrix, the MIP input samples, a shifting offset parameter (fO), and a shifting number parameter (sW) using the following equation, wherein the shifting offset parameter is 32 for blocks with different MIP mode identifiers and different size identifiers, and the shifting number parameter is 6 for blocks with different MIP mode identifiers and different size identifiers:

$$\begin{cases} \text{predMip}[x][y] = (((\sum_{i=0}^{\text{inSize}-1} \text{mWeight}[i][y \times \text{predSize} + x] \times p[i]) + \\ \text{oW}) >> 6) + \text{pTemp}[0] \\ \text{oW} = 32 - 32 \times (\sum_{i=0}^{\text{inSize}-1} p[i]) \end{cases}$$

where:

$p[i]$ is an i^{th} value in the MIP input samples,

inSize is a number of values in the MIP input samples,

5 mWeight is the MIP weight matrix of the current block,

oW is a first offset value,

$\text{pTemp}[]$ is a temporary reference array, and

predSize is used to determine a number of the MIP prediction sample; and

10 perform an upsampling process to the MIP prediction sample so as to generate intra predicted samples of the current block.

10. A method for encoding a picture, applied to an encoder, comprising:

determining prediction parameters of a current block;

15 determining matrix-based intra prediction (MIP) input samples of the current block based on neighboring samples of the current block and the prediction parameters of the current block;

determining an MIP weight matrix of the current block based on the prediction parameters;

20 determining an MIP prediction sample ($\text{predMip}[x][y]$) having coordinates x, y of the current block based on the MIP weight matrix, the MIP input samples, a shifting offset parameter (fO), and a shifting number parameter (sW) using the following equation, wherein the shifting offset parameter is 32 for blocks with different MIP mode identifiers and different size identifiers, and the shifting number parameter is 6 for blocks with different MIP mode identifiers and different size identifiers:

$$\begin{cases} \text{predMip}[x][y] = (((\sum_{i=0}^{\text{inSize}-1} \text{mWeight}[i][y \times \text{predSize} + x] \times p[i]) + \\ \text{oW}) >> 6) + \text{pTemp}[0] \\ \text{oW} = 32 - 32 \times (\sum_{i=0}^{\text{inSize}-1} p[i]) \end{cases}$$

where:

25 $p[i]$ is an i^{th} value in the MIP input samples,

inSize is a number of values in the MIP input samples,

mWeight is the MIP weight matrix of the current block,

oW is a first offset value,

pTemp[] is a temporary reference array, and
predSize is used to determine a number of the MIP prediction sample; and
performing an upsampling process to the MIP prediction sample so as to generate intra
predicted samples of the current block.

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11. The method of claim 10, wherein the MIP prediction sample of the current block
includes prediction values for a portion of samples of the current block.

12. The method of claim 10, wherein the neighboring samples include at least one of a left-
10 neighboring sample or an above-neighboring sample.

13. The method of claim 10, further comprising:
determining the first offset value (oW) based on the MIP input samples, the shifting number
parameter (sW), and the shifting offset parameter (fO).

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14. The method of claim 10, wherein the prediction parameters include a size identifier
(mipSizeId) of the current block.

15. The method of claim 14, further comprising:
20 performing a downsampling process to the neighboring samples to generate the temporary
reference array (pTemp[x]) based on the size identifier.

16. The method of claim 15, further comprising:
determining a second constant value based on a bit depth (BitDepth) of the neighboring
25 samples, in an event that the size identifier is in a predetermined range.

17. The method of claim 16, further comprising:
generating the MIP input samples (p[x]) based on the second constant value and the
temporary reference array (pTemp[x]), the second constant value being “ $1 \ll (\text{BitDepth} - 1)$ ”.

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18. An encoding apparatus for encoding a picture, comprising:
a prediction unit configured to:
determine prediction parameters of a current block;

determine matrix-based intra prediction (MIP) input samples of the current block based on neighboring samples of the current block and the prediction parameters of the current block;

determine an MIP weight matrix of the current block based on the prediction parameters;

5 determine an MIP prediction sample (predMip[x][y]) having coordinates x, y of the current block based on the MIP weight matrix, the MIP input samples, a shifting offset parameter (fO), and a shifting number parameter (sW) using the following equation, wherein the shifting offset parameter is 32 for blocks with different MIP mode identifiers and different size identifiers, and the shifting number parameter is 6 for blocks with different MIP mode identifiers
10 and different size identifiers:

$$\begin{cases} \text{predMip}[x][y] = (((\sum_{i=0}^{\text{inSize}-1} \text{mWeight}[i][y \times \text{predSize} + x] \times p[i]) + \\ \text{oW}) >> 6) + \text{pTemp}[0] \\ \text{oW} = 32 - 32 \times (\sum_{i=0}^{\text{inSize}-1} p[i]) \end{cases}$$

where:

p[i] is an ith value in the MIP input samples,

inSize is a number of values in the MIP input samples,

15 mWeight is the MIP weight matrix of the current block,

oW is a first offset value,

pTemp[] is a temporary reference array, and

predSize is used to determine a number of the MIP prediction sample; and

perform an upsampling process to the MIP prediction sample so as to generate intra
20 predicted samples of the current block.

19. A computer-readable storage medium, having a computer program and a bitstream stored thereon, wherein the computer program, when executed by a processor, enables the processor to perform the steps of the method of any one of claims 10 to 17 to generate the
25 bitstream.