CLAIMS

1. A method of video processing, comprising:

determining, for a conversion between a video block of a video and a bitstream of the video, that a first intra mode is applied on the video block of the video, wherein the first intra mode includes a matrix vector multiplication operation and followed by an upsampling operation to generate prediction samples for the video block; and

performing the conversion based on the prediction samples;

wherein the upsampling operation comprises a horizontal upsampling operation and a vertical upsampling operation, and the horizontal upsampling operation and the vertical upsampling operation are performed in a fixed order which is independent on a width and a height of the video block;

the prediction samples are determined according to ((upHor − dX) * predSamples[xHor][yHor] + dX * predSamples[xHor + upHor][yHor] + offsetHor) / upHor in the horizontal upsampling operation, and

the prediction samples are determined according to ((upVer − dY) * predSamples[xVer][yVer] + dY * predSamples[xVer][yVer + upVer] + offsetVer) / upVer in the vertical upsampling operation;

wherein upHor is a function of the width of the video block and a pre-defined value based on the width and the height of the video block,

wherein upVer is a function of the height of the video block and the pre-defined value based on the width and the height of the video block,

wherein offsetHor and offsetVer are integers,

wherein 1 <= dX <= upHor-1,

wherein 1 <= dY <= upVer-1, and

wherein xHor are positions based on the upHor and yHor are positions based on the upVer.

2. The method of claim 1, wherein the horizontal upsampling operation is performed before the vertical upsampling operation.

3. The method of claim 2, wherein the width of the video block is greater than the height of the video block.

4. The method of any one of claims 1-3, wherein the matrix vector multiplication operation is followed by a transposing operation prior to the upsampling operation.

5. The method of claim 4, wherein the transposing operation converts a sample block having a width of a first value and a height of a second value to the sample block having the width of the second value and the height of the first value, and

wherein the sample block is obtained by performing the matrix vector multiplication operation.

6. The method of claim 4, wherein a first syntax element indicating whether to apply the transposing operation is included in the bitstream.

7. The method of any one of claims 1-6, wherein inputting samples of the matrix vector multiplication operation are obtained by performing a downsampling operation on boundary reference samples of the video block based on the width and the height of the video block.

8. The method of any one of claims 1-7, wherein a second syntax element indicating whether to apply the first intra mode is included in the bitstream.

9. The method of any one of claims 1-8, wherein the conversion includes encoding the video block into the bitstream.

10. The method of any one of claims 1-8, wherein the conversion includes decoding the video block from the bitstream.

11. An apparatus for processing video data comprising a processor and a non-transitory memory with instructions thereon, wherein the instructions upon execution by the processor, cause the processor to:

determine, for a conversion between a video block of a video and a bitstream of the video, that a first intra mode is applied on the video block of the video, wherein the first intra mode includes a matrix vector multiplication operation and followed by an upsampling operation to generate prediction samples for the video block; and

perform the conversion based on the prediction samples;

wherein the upsampling operation comprises a horizontal upsampling operation and a vertical upsampling operation, and the horizontal upsampling operation and the vertical upsampling operation are performed in a fixed order which is independent on a width and a height of the video block;

the prediction samples are determined according to ((upHor − dX) * predSamples[xHor][yHor] + dX * predSamples[xHor + upHor][yHor] + offsetHor) / upHor in the horizontal upsampling operation, and

the prediction samples are determined according to ((upVer − dY) * predSamples[xVer][yVer] + dY * predSamples[xVer][yVer + upVer] + offsetVer) / upVer in the vertical upsampling operation;

wherein upHor is a function of the width of the video block and a pre-defined value based on the width and the height of the video block,

wherein upVer is a function of the height of the video block and the pre-defined value based on the width and the height of the video block,

wherein offsetHor and offsetVer are integers,

wherein 1 <= dX <= upHor-1,

wherein 1 <= dY <= upVer-1, and

wherein xHor are positions based on the upHor and yHor are positions based on the upVer.

12. The apparatus of claim 11, wherein the horizontal upsampling operation is performed before the vertical upsampling operation.

13. The apparatus of claim 12, wherein the width of the video block is greater than the height of the video block.

14. The apparatus of any one of claims 11-13, wherein the matrix vector multiplication operation is followed by a transposing operation prior to the upsampling operation.

15. The apparatus of claim 14, wherein the transposing operation converts a sample block having a width of a first value and a height of a second value to the sample block having the width of the second value and the height of the first value, and

wherein the sample block is obtained by performing the matrix vector multiplication operation.

16. The apparatus of any one of claims 11-15, wherein inputting samples of the matrix vector multiplication operation are obtained by performing a downsampling operation on boundary reference samples of the video block based on the width and the height of the video block.

17. A non-transitory computer-readable storage medium storing instructions that cause a processor to:

determine, for a conversion between a video block of a video and a bitstream of the video, that a first intra mode is applied on the video block of the video, wherein the first intra mode includes a matrix vector multiplication operation and followed by an upsampling operation to generate prediction samples for the video block; and

perform the conversion based on the prediction samples;

wherein the upsampling operation comprises a horizontal upsampling operation and a vertical upsampling operation, and the horizontal upsampling operation and the vertical upsampling operation are performed in a fixed order which is independent on a width and a height of the video block;

the prediction samples are determined according to ((upHor − dX) * predSamples[xHor][yHor] + dX * predSamples[xHor + upHor][yHor] + offsetHor) / upHor in the horizontal upsampling operation, and

the prediction samples are determined according to ((upVer − dY) * predSamples[xVer][yVer] + dY * predSamples[xVer][yVer + upVer] + offsetVer) / upVer in the vertical upsampling operation;

wherein upHor is a function of the width of the video block and a pre-defined value based on the width and the height of the video block,

wherein upVer is a function of the height of the video block and the pre-defined value based on the width and the height of the video block,

wherein offsetHor and offsetVer are integers,

wherein 1 <= dX <= upHor-1,

wherein 1 <= dY <= upVer-1, and

wherein xHor are positions based on the upHor and yHor are positions based on the upVer.

18. A non-transitory computer-readable recording medium storing a bitstream of a video which is generated by a method performed by a video processing apparatus, wherein the method comprises:

determining, that a first intra mode is applied on a video block of the video, wherein the first intra mode includes a matrix vector multiplication operation and followed by an upsampling operation to generate prediction samples for the video block; and

generating the bitstream based on the determining;

wherein the upsampling operation comprises a horizontal upsampling operation and a vertical upsampling operation, and the horizontal upsampling operation and the vertical upsampling operation are performed in a fixed order which is independent on a width and a height of the video block;

the prediction samples are determined according to ((upHor − dX) * predSamples[xHor][yHor] + dX * predSamples[xHor + upHor][yHor] + offsetHor) / upHor in the horizontal upsampling operation, and

the prediction samples are determined according to ((upVer − dY) * predSamples[xVer][yVer] + dY * predSamples[xVer][yVer + upVer] + offsetVer) / upVer in the vertical upsampling operation;

wherein upHor is a function of the width of the video block and a pre-defined value based on the width and the height of the video block,

wherein upVer is a function of the height of the video block and the pre-defined value based on the width and the height of the video block,

wherein offsetHor and offsetVer are integers,

wherein 1 <= dX <= upHor-1,

wherein 1 <= dY <= upVer-1, and

wherein xHor are positions based on the upHor and yHor are positions based on the upVer.