

CLAIMS

1. A method of processing video data, comprising:

determining, for a first conversion between a block of a video and a bitstream of the video, a unified manner in which a padding process is applied for a first filtering process, wherein the padding process is applied to generate one or more virtual samples for a sample of the block that is located in proximity to boundaries of multiple kinds of video regions;

performing the first conversion based on the determining;

determining, for a second conversion between a picture of a video that comprises one or more coding tree blocks and a bitstream of the video, whether a virtual boundary handling is enabled for a coding tree block within the picture for a first filtering process based on a relationship between a bottom boundary of the coding tree block and a bottom boundary of the picture; and

determining the second conversion based on the determining;

wherein the virtual boundary handling is enabled, in a case that a) the bottom boundary of the coding tree block is not the bottom boundary of the picture containing the coding tree block and b) the bottom boundary of the coding tree block is a bottom boundary of a slice and the first filtering process across boundaries of slices is disabled,

wherein the first filtering process comprises:

determining at least one filtering index for the block;

deriving a filtering coefficient set based on the at least one filtering index; and

performing a filtering operation based on the filtering coefficient set, and

wherein the padding process is invoked only once for the first filtering process.

2. The method of claim 1, wherein the first filtering process further comprises:

determining whether a sample of the block positioned within a distance from a boundary of the block is a boundary sample according to a component identity of the block,

wherein the sample is a bottom boundary sample of the block in case a distance between the sample and a bottom boundary is smaller than a threshold T1 and the block is a luma block, and

wherein the sample is a bottom boundary sample of the block in case a distance between the sample and the bottom boundary is smaller than a threshold T2 and the block is a chroma block.

3. The method of claim 2, wherein T1 and T2 are different.
4. The method of claim 3, wherein T1=4 and T2=2.
5. The method of claim 3, wherein T1 and T2 are different in case a color format of the video is 4:2:0, 4:2:2, or 4:4:4.
6. The method of claim 1, wherein the virtual boundary handling is enabled in a case that a) the bottom boundary of the coding tree block is not the bottom boundary of the picture containing the coding tree block and b) the bottom boundary of the coding tree block is a bottom boundary of a brick and the first filtering process across boundaries of bricks is disabled.
7. The method of claim 1, wherein the virtual boundary is used to determine the at least one filtering index, and wherein samples outside the virtual boundary are not used to determine the at least one filtering index.
8. The method of claim 1, wherein the boundaries of the multiple kinds of video regions comprise at least one of: a slice boundary, a brick boundary, a tile boundary, a sub-picture boundary, or 360-degree boundary.
9. The method of claim 1, wherein the boundaries of multiple kinds of video regions comprise a virtual boundary or an actual boundary.
10. The method of claim 1, wherein a number of lines to apply the padding process is determined based on a location of the sample relative to at least one of the boundaries.
11. The method of claim 1, wherein the boundaries of multiple kinds of video regions comprise a horizontal boundary or a vertical boundary.

12. The method of claim 1, wherein the first filtering process is an adaptive loop filtering process.

13. The method of claim 1, wherein the first conversion includes encoding the video into the bitstream.

14. The method of claim 1, wherein the first conversion includes decoding the bitstream into the video.

15. 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 first conversion between a block of a video and a bitstream of the video, a unified manner in which a padding process is applied for a first filtering process, wherein the padding process is applied to generate one or more virtual samples for a sample of the block that is located in proximity to boundaries of multiple kinds of video regions;

perform the first conversion based on the determining;

determine, for a second conversion between a picture of a video that comprises one or more coding tree blocks and a bitstream of the video, whether a virtual boundary handling is enabled for a coding tree block within the picture for a first filtering process based on a relationship between a bottom boundary of the coding tree block and a bottom boundary of the picture; and

perform the second conversion based on the determining,

wherein the virtual boundary handling is enabled, in a case that a) the bottom boundary of the coding tree block is not the bottom boundary of the picture containing the coding tree block and b) the bottom boundary of the coding tree block is a bottom boundary of a slice and the first filtering process across boundaries of slices is disabled,

wherein the first filtering process comprises:

determining at least one filtering index for the block;

deriving a filtering coefficient set based on the at least one filtering index; and

performing a filtering operation based on the filtering coefficient set, and

wherein the padding process is invoked only once for the first filtering process.

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

- determine, for a first conversion between a block of a video and a bitstream of the video, a unified manner in which a padding process is applied for a first filtering process, wherein the padding process is applied to generate one or more virtual samples for a sample of the block that is located in proximity to boundaries of multiple kinds of video regions;

- perform the first conversion based on the determining,

- determine, for a second conversion between a picture of a video that comprises one or more coding tree blocks and a bitstream of the video, whether a virtual boundary handling is enabled for a coding tree block within the picture for a first filtering process based on a relationship between a bottom boundary of the coding tree block and a bottom boundary of the picture; and

- perform the second conversion based on the determining,

- wherein the virtual boundary handling is enabled, in a case that a) the bottom boundary of the coding tree block is not the bottom boundary of the picture containing the coding tree block and b) the bottom boundary of the coding tree block is a bottom boundary of a slice and the first filtering process across boundaries of slices is disabled,

- wherein the first filtering process comprises:

- determining at least one filtering index for the block;

- deriving a filtering coefficient set based on the at least one filtering index; and

- performing a filtering operation based on the filtering coefficient set,

- wherein the padding process is invoked only once for the first filtering process.

17. A method for storing a bitstream of a video, comprising:

- determining a unified manner in which a padding process is applied for a first filtering process, wherein the padding process is applied to generate one or more virtual samples for a sample of a block of a video that is located in proximity to boundaries of multiple kinds of video regions;

determining whether a virtual boundary handling is enabled for a coding tree block within a picture for a first filtering process based on a relationship between a bottom boundary of the coding tree block and a bottom boundary of the picture;

generating the bitstream based on the determinations; and

storing the bitstream in a non-transitory computer-readable recording medium,

wherein the virtual boundary handling is enabled, in a case that a) the bottom boundary of the coding tree block is not the bottom boundary of the picture containing the coding tree block and b) the bottom boundary of the coding tree block is a bottom boundary of a slice and the first filtering process across boundaries of slices is disabled,

wherein the first filtering process comprises:

determining at least one filtering index for the block;

deriving a filtering coefficient set based on the at least one filtering index; and

performing a filtering operation based on the filtering coefficient set, and

wherein the padding process is invoked only once for the first filtering process.