

CLAIMS

1. A method of processing video data, comprising:

determining, for a conversion between a picture of a video that comprises one or more coding tree blocks and a bitstream of the video, whether a line buffer virtual boundary 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 performing the conversion based on the determining, wherein the first filtering process comprises:

determining at least one filtering index for the coding tree 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 line buffer virtual boundary is enabled in case the bottom boundary of the coding tree block is not the bottom boundary of the picture containing the coding tree block, wherein the determining is only dependent on the relationship between the bottom boundary of the coding tree block and the bottom boundary of the picture, and is independent of other boundaries of the coding tree block and the picture, and

wherein the determining is independent of a relationship between the bottom boundary of the coding tree block and a bottom boundary of a brick, a relationship between the bottom boundary of the coding tree block and a bottom boundary of a slice, or a relationship between the bottom boundary of the coding tree block and bottom virtual boundaries of the picture.

2. The method of claim 1, wherein the line buffer virtual boundary is used to determine the at least one filtering index, and wherein samples outside the line buffer virtual boundary are not used to determine the at least one filtering index.

3. The method of claim 1 or 2, wherein the line buffer virtual boundary is used in the filtering operation which uses a diamond shape filter, wherein in the filtering operation, a symmetrical padding is performed on two sides of the virtual boundary.

4. The method of any of claims 1-3, further comprising:
determining a unified manner in which a padding process is applied for the first filtering process, wherein the padding process is applied to generate one or more virtual samples for a sample of the coding tree block that is located in proximity to boundaries of multiple kinds of video regions,
wherein the padding process is invoked only once for the first filtering process.
5. The method of claim 4, 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.
6. The method of claim 4 or 5, wherein the boundaries of multiple kinds of video regions comprise a virtual boundary or an actual boundary.
7. The method of any of claims 4-6, 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.
8. The method of any of claims 4-7, wherein the boundaries of multiple kinds of video regions comprise a horizontal boundary or a vertical boundary.
9. The method of any of claims 1-8, wherein the first filtering process is an adaptive loop filtering process.
10. The method of any of claims 1-9, wherein the conversion includes encoding the video into the bitstream.
11. The method of any of claims 1-9, wherein the conversion includes decoding the bitstream into the video.

12. 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 picture of a video that comprises one or more coding tree blocks and a bitstream of the video, whether a line buffer virtual boundary 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 conversion based on the determination,

wherein the first filtering process comprises:

determining at least one filtering index for the coding tree 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 line buffer virtual boundary is enabled in case the bottom boundary of the coding tree block is not the bottom boundary of the picture containing the coding tree block,

wherein the determining is only dependent on the relationship between the bottom boundary of the coding tree block and the bottom boundary of the picture, and is independent of other boundaries of the coding tree block and the picture, and

wherein the determining is independent of a relationship between the bottom boundary of the coding tree block and a bottom boundary of a brick, a relationship between the bottom boundary of the coding tree block and a bottom boundary of a slice, or a relationship between the bottom boundary of the coding tree block and bottom virtual boundaries of the picture.

13. The apparatus of claim 12,

wherein the line buffer virtual boundary is used to determine the at least one filtering index, and wherein samples outside the line buffer virtual boundary are not used to determine the at least one filtering index, and

wherein the line buffer virtual boundary is used in the filtering operation which uses a diamond shape filter, wherein in the filtering operation, a symmetrical padding is performed on two sides of the virtual boundary.

14. The apparatus of claim 12, wherein the instructions further cause the processor to:
- determine a unified manner in which a padding process is applied for the first filtering process, wherein the padding process is applied to generate one or more virtual samples for a sample of the coding tree block that is located in proximity to boundaries of multiple kinds of video regions,
 - wherein the padding process is invoked only once for the first filtering process;
 - 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;
 - wherein the boundaries of multiple kinds of video regions comprise a virtual boundary or an actual boundary;
 - 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;
 - wherein the boundaries of multiple kinds of video regions comprise a horizontal boundary or a vertical boundary; and
 - wherein the first filtering process is an adaptive loop filtering process.
15. A non-transitory computer-readable storage medium storing instructions that cause a processor to:
- determine, for a conversion between a picture of a video that comprises one or more coding tree blocks and a bitstream of the video, whether a line buffer virtual boundary 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 conversion based on the determination,
- wherein the first filtering process comprises:
- determining at least one filtering index for the coding tree 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 line buffer virtual boundary is enabled in case the bottom boundary of the coding tree block is not the bottom boundary of the picture containing the coding tree block,

wherein the determining is only dependent on the relationship between the bottom boundary of the coding tree block and the bottom boundary of the picture, and is independent of other boundaries of the coding tree block and the picture, and

wherein the determining is independent of a relationship between the bottom boundary of the coding tree block and a bottom boundary of a brick, a relationship between the bottom boundary of the coding tree block and a bottom boundary of a slice, or a relationship between the bottom boundary of the coding tree block and bottom virtual boundaries of the picture.

16. The non-transitory computer-readable recording medium of claim 15,

wherein the line buffer virtual boundary is used to determine the at least one filtering index, and wherein samples outside the line buffer virtual boundary are not used to determine the at least one filtering index, and

wherein the line buffer virtual boundary is used in the filtering operation which uses a diamond shape filter, wherein in the filtering operation, a symmetrical padding is performed on two sides of the virtual boundary.

17. 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 whether a line buffer virtual boundary is enabled for a coding tree block within a picture of a video 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

generating the bitstream based on the determining,

wherein the first filtering process comprises:

determining at least one filtering index for the coding tree 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 line buffer virtual boundary is enabled in case the bottom boundary of the coding tree block is not the bottom boundary of the picture containing the coding tree block,

wherein the determining is only dependent on the relationship between the bottom boundary of the coding tree block and the bottom boundary of the picture, and is independent of other boundaries of the coding tree block and the picture, and

wherein the determining is independent of a relationship between the bottom boundary of the coding tree block and a bottom boundary of a brick, a relationship between the bottom boundary of the coding tree block and a bottom boundary of a slice, or a relationship between the bottom boundary of the coding tree block and bottom virtual boundaries of the picture.

18. The non-transitory computer-readable recording medium of claim 17,

wherein the line buffer virtual boundary is used to determine the at least one filtering index, and wherein samples outside the line buffer virtual boundary are not used to determine the at least one filtering index, and

wherein the line buffer virtual boundary is used in the filtering operation which uses a diamond shape filter, wherein in the filtering operation, a symmetrical padding is performed on two sides of the virtual boundary.