CROSS-COMPONENT ADAPTIVE LOOP FILTER

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is based on International Patent Application No. PCT/CN2020/126332, filed on November 4, 2020, which claims the priority to and benefits of International Patent Application No. PCT/CN2019/115321, filed on November 4, 2019. All the aforementioned patent applications are hereby incorporated by reference in their entireties.

TECHNICAL FIELD

[0002] This patent document relates to video coding and decoding techniques, devices and systems.

BACKGROUND

[0003] Currently, efforts are underway to improve the performance of current video codec technologies to provide better compression ratios or provide video coding and decoding schemes that allow for lower complexity or parallelized implementations. Industry experts have recently proposed several new video coding tools and tests are currently underway for determining their effectivity.

SUMMARY

[0004] Devices, systems and methods related to digital video coding, and specifically, to management of motion vectors are described. The described methods may be applied to existing video coding standards (e.g., High Efficiency Video Coding (HEVC) or Versatile Video Coding) and future video coding standards or video codecs.

[0005] In one representative aspect, the disclosed technology may be used to provide a method for video processing. This method includes determining, for a conversion between a current video unit of a video comprising one or more video blocks and a bitstream representation of the video, a padding process used for padding unavailable samples during application of a cross-component adaptive loop filtering (CC-ALF) tool to at least some video blocks of the current video unit according to a rule; and performing the conversion based on the determining, and wherein the rule specifies that the padding process is also used for padding unavailable samples during application of an adaptive loop filtering (ALF) tool to one or more video blocks of the current video unit.

CLAIMS

What is claimed is:

1. A method of processing video data, comprising:

determining, for a conversion between a current video unit of a video comprising one or more samples and a bitstream of the video, a padding process used for padding unavailable samples during application of a cross-component adaptive loop filtering (CC-ALF) tool to at least some samples of the current video unit, wherein the current video unit corresponds to a current coding tree unit; and

performing the conversion based on the determining;

wherein the CC-ALF tool is applied to a first color component of the current video unit and includes correcting sample values of a first component of the current video unit using sample values of a second component of the current video unit; and

wherein when a first unavailable sample is located in a below-right coding tree unit of the current video unit and a below coding tree unit of the current video unit and a right coding tree unit of the current video unit are both available, padding the first unavailable sample with its nearest neighboring sample located in the below coding tree unit.

2. The method of claim 1, wherein the below-right coding tree unit is located in a second slice that is different from a first slice in which the current video unit is located, the below coding tree unit and the right coding tree unit are both located in the first slice.

3. The method of claim 1 or 2, wherein when a second unavailable sample is located in an above-left coding tree unit of the current video unit and an above coding tree unit of the current video unit and a left coding tree unit of the current video unit are both available, padding the second unavailable sample with its nearest neighboring sample located in the above coding tree unit.

4. The method of claim 3, wherein the above-left coding tree unit is located in a second slice that is different from a first slice in which the current video unit is located, the above coding tree unit and the left coding tree unit are both located in the first slice.

5. The method of any of claims 1-4, wherein the padding process corresponds to a mirrored padding that is applied on the unavailable samples at one or more ALF virtual boundaries associated with the usage of the CC-ALF tool.

6. The method of any of claims 1-4, wherein the padding process corresponds to a one-side padding that is applied on the unavailable samples at one of: a slice, a tile, a picture, a sub-picture, or a 360-degree virtual boundary associated with the application of the CC-ALF.

7. The method of any of claims 1-4, wherein the padding process corresponds to a one-side padding that is applied on one or more boundaries except at one or more ALF virtual boundaries associated with the application of the CC-ALF.

8. The method of any of claims 1-7, wherein the conversion includes encoding the video into the bitstream.

9. The method of any of claims 1-7, wherein the conversion includes decoding the video from the bitstream.

10. 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 current video unit of a video comprising one or more samples and a bitstream of the video, a padding process used for padding unavailable samples during application of a cross-component adaptive loop filtering (CC-ALF) tool to at least some samples of the current video unit, wherein the current video unit corresponds to a current coding tree unit; and

perform the conversion based on the determination;

wherein the CC-ALF tool is applied to a first color component of the current video unit and includes correcting sample values of a first component of the current video unit using sample values of a second component of the current video unit; and

wherein when a first unavailable sample is located in a below-right coding tree unit of the current video unit and a below coding tree unit of the current video unit and a right coding

tree unit of the current video unit are both available, padding the first unavailable sample with its nearest neighboring sample located in the below coding tree unit.

11. The apparatus of claim 10, wherein the below-right coding tree unit is located in a second slice that is different from a first slice in which the current video unit is located, the below coding tree unit and the right coding tree unit are both located in the first slice.

12. The apparatus of claim 10, wherein when a second unavailable sample is located in an above-left coding tree unit of the current video unit and an above coding tree unit of the current video unit and a left coding tree unit of the current video unit are both available, padding the second unavailable sample with its nearest neighboring sample located in the above coding tree unit; and

wherein the above-left coding tree unit is located in a second slice that is different from a first slice in which the current video unit is located, the above coding tree unit and the left coding tree unit are both located in the first slice.

13. The apparatus of claim 10, wherein the padding process corresponds to a mirrored padding that is applied on the unavailable samples at one or more ALF virtual boundaries associated with the usage of the CC-ALF tool; or

wherein the padding process corresponds to a one-side padding that is applied on the unavailable samples at one of: a slice, a tile, a picture, a sub-picture, or a 360-degree virtual boundary associated with the application of the CC-ALF; or

wherein the padding process corresponds to a one-side padding that is applied on one or more boundaries except at one or more ALF virtual boundaries associated with the application of the CC-ALF.

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

determine, for a conversion between a current video unit of a video comprising one or more samples and a bitstream of the video, a padding process used for padding unavailable samples during application of a cross-component adaptive loop filtering (CC-ALF) tool to at

least some samples of the current video unit, wherein the current video unit corresponds to a current coding tree unit; and

perform the conversion based on the determination;

wherein the CC-ALF tool is applied to a first color component of the current video unit and includes correcting sample values of a first component of the current video unit using sample values of a second component of the current video unit; and

wherein when a first unavailable sample is located in a below-right coding tree unit of the current video unit and a below coding tree unit of the current video unit and a right coding tree unit of the current video unit are both available, padding the first unavailable sample with its nearest neighboring sample located in the below coding tree unit.

15. The non-transitory computer-readable storage medium of claim 14, wherein the below-right coding tree unit is located in a second slice that is different from a first slice in which the current video unit is located, the below coding tree unit and the right coding tree unit are both located in the first slice.

16. The non-transitory computer-readable storage medium of claim 14, wherein when a second unavailable sample is located in an above-left coding tree unit of the current video unit and an above coding tree unit of the current video unit and a left coding tree unit of the current video unit are both available, padding the second unavailable sample with its nearest neighboring sample located in the above coding tree unit; and

wherein the above-left coding tree unit is located in a second slice that is different from a first slice in which the current video unit is located, the above coding tree unit and the left coding tree unit are both located in the first slice.

17. The non-transitory computer-readable storage medium of claim 14, wherein the padding process corresponds to a mirrored padding that is applied on the unavailable samples at one or more ALF virtual boundaries associated with the usage of the CC-ALF tool; or

wherein the padding process corresponds to a one-side padding that is applied on the unavailable samples at one of: a slice, a tile, a picture, a sub-picture, or a 360-degree virtual boundary associated with the application of the CC-ALF; or

wherein the padding process corresponds to a one-side padding that is applied on one or more boundaries except at one or more ALF virtual boundaries associated with the application of the CC-ALF.

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, for a current video unit of a video comprising one or more samples, a padding process used for padding unavailable samples during application of a cross-component adaptive loop filtering (CC-ALF) tool to at least some samples of the current video unit, wherein the current video unit corresponds to a current coding tree unit; and

generating the bitstream based on the determining;

wherein the CC-ALF tool is applied to a first color component of the current video unit and includes correcting sample values of a first component of the current video unit using sample values of a second component of the current video unit; and

wherein when a first unavailable sample is located in a below-right coding tree unit of the current video unit and a below coding tree unit of the current video unit and a right coding tree unit of the current video unit are both available, padding the first unavailable sample with its nearest neighboring sample located in the below coding tree unit.

19. The non-transitory computer-readable recording medium of claim 18, wherein the below-right coding tree unit is located in a second slice that is different from a first slice in which the current video unit is located, the below coding tree unit and the right coding tree unit are both located in the first slice;

wherein when a second unavailable sample is located in an above-left coding tree unit of the current video unit and an above coding tree unit of the current video unit and a left coding tree unit of the current video unit are both available, padding the second unavailable sample with its nearest neighboring sample located in the above coding tree unit; and

wherein the above-left coding tree unit is located in a second slice that is different from a first slice in which the current video unit is located, the above coding tree unit and the left coding tree unit are both located in the first slice.

20. The non-transitory computer-readable recording medium of claim 18, wherein the padding process corresponds to a mirrored padding that is applied on the unavailable samples at one or more ALF virtual boundaries associated with the usage of the CC-ALF tool; or

wherein the padding process corresponds to a one-side padding that is applied on the unavailable samples at one of: a slice, a tile, a picture, a sub-picture, or a 360-degree virtual boundary associated with the application of the CC-ALF; or

wherein the padding process corresponds to a one-side padding that is applied on one or more boundaries except at one or more ALF virtual boundaries associated with the application of the CC-ALF.