

A VIDEO ENCODER, A VIDEO DECODER AND CORRESPONDING METHODS

TECHNICAL FIELD

[0002] The present disclosure is generally related to video coding, and is specifically related to sub-picture management in video coding.

BACKGROUND

[0003] The amount of video data needed to depict even a relatively short video can be substantial, which may result in difficulties when the data is to be streamed or otherwise communicated across a communications network with limited bandwidth capacity. Thus, video data is generally compressed before being communicated across modern day telecommunications networks. The size of a video could also be an issue when the video is stored on a storage device because memory resources may be limited. Video compression devices often use software and/or hardware at the source to code the video data prior to transmission or storage, thereby decreasing the quantity of data needed to represent digital video images. The compressed data is then received at the destination by a video decompression device that decodes the video data. With limited network resources and ever increasing demands of higher video quality, improved compression and decompression techniques that improve compression ratio with little to no sacrifice in image quality are desirable.

SUMMARY

[0004] In an embodiment, the disclosure includes a method implemented in a decoder, the method comprising: receiving, by a receiver of the decoder, a bitstream comprising one or more sub-pictures partitioned from a picture such that a first sub-picture comprises a sub-picture width that includes an incomplete coding tree unit (CTU) when the first sub-picture includes a right boundary that coincides with the right boundary of the picture; parsing, by a processor of the decoder, the bitstream to obtain the one or more sub-pictures; decoding, by the processor,

CLAIMS

What is claimed is:

1. A method implemented in a decoder, the method comprising:
receiving, by a receiver of the decoder, a bitstream comprising data of one or more sub-pictures partitioned from a picture such that a first sub-picture comprises a sub-picture width that includes an incomplete coding tree unit (CTU) when the first sub-picture includes a right boundary that coincides with the right boundary of the picture;
decoding, by the processor, the one or more sub-pictures to create a video sequence from the bitstream.
2. The method of claim 1, wherein a second sub-picture comprises a sub-picture height that includes an integer number of complete CTUs when the second sub-picture includes a bottom boundary that does not coincide with a bottom boundary of the picture.
3. The method of any of claims 1-2, wherein a third sub-picture comprises a sub-picture width that includes an integer number of complete CTUs when the third sub-picture includes a right boundary that does not coincide with a right boundary of the picture.
4. The method of any of claims 1-3, wherein a fourth sub-picture comprises a sub-picture height that includes an incomplete CTU when the fourth sub-picture includes a bottom boundary that coincides with the bottom boundary of the picture.
5. A method implemented in a decoder, the method comprising:
receiving, by a receiver of the decoder, a bitstream comprising data of one or more sub-pictures partitioned from a picture such that each sub-picture includes a sub-picture width that is an integer multiple of a coding tree unit (CTU) size when the each sub-picture includes a right boundary that does not coincide with a right boundary of the picture;
decoding, by the processor, the one or more sub-pictures to create a video sequence from the bitstream.
6. The method of claim 5, wherein each sub-picture includes a sub-picture height that is an integer multiple of the CTU size when the each sub-picture includes a bottom boundary that does not coincide with a bottom boundary of the picture.

7. The method of any of claims 5-6, wherein at least one of the sub-pictures includes a sub-picture width that is not an integer multiple of the CTU size when the each sub-picture includes a right boundary that coincides with the right boundary of the picture.
8. The method of any of claims 5-7, wherein at least one of the sub-pictures includes a sub-picture height that is not an integer multiple of the CTU size when the each sub-picture includes a bottom boundary that coincides with the bottom boundary of the picture.
9. The method of any of claims 5-8, wherein the picture includes a picture width that is not an integer multiple of the CTU size.
10. The method of any of claims 5-9, wherein the picture includes a picture height that is not an integer multiple of the CTU size.
11. The method of any of claims 5-10, wherein the CTU size is measured in units of luma samples.
12. A method implemented in an encoder, the method comprising:
 - partitioning, by a processor of the encoder, a picture into a plurality of sub-pictures such that each sub-picture includes a sub-picture width that is an integer multiple of a coding tree unit (CTU) size when the each sub-picture includes a right boundary that does not coincide with a right boundary of the picture;
 - encoding, by the processor, one or more of the sub-pictures into a bitstream.
13. The method of claim 12, the method further comprising:
 - storing, in a memory of the encoder, the bitstream for communication toward a decoder.
14. The method of any of claims 12-13, wherein each sub-picture includes a sub-picture height that is an integer multiple of the CTU size when the each sub-picture includes a bottom boundary that does not coincide with a bottom boundary of the picture.

15. The method of any of claims 12-14, wherein at least one of the sub-pictures includes a sub-picture width that is not an integer multiple of the CTU size when the each sub-picture includes a right boundary that coincides with the right boundary of the picture.

16. The method of any of claims 12-15, wherein at least one of the sub-pictures includes a sub-picture height that is not an integer multiple of the CTU size when the each sub-picture includes a bottom boundary that coincides with the bottom boundary of the picture.

17. The method of any of claims 12-16, wherein the picture includes a picture width that is not an integer multiple of the CTU size.

18. The method of any of claims 12-17, wherein the picture includes a picture height that is not an integer multiple of the CTU size.

19. The method of any of claims 12-18, wherein the CTU size is measured in units of luma samples.

20. A video coding device comprising:

a processor, a memory, a receiver coupled to the processor, and a transmitter coupled to the processor, the processor, memory, receiver, and transmitter configured to perform the method of any of claims 1-19.

21. A non-transitory computer readable medium comprising a computer program product for use by a video coding device, the computer program product comprising computer executable instructions stored on the non-transitory computer readable medium such that when executed by a processor cause the video coding device to perform the method of any of claims 1-19.

22. A decoder comprising:

a receiving unit, configured to receive a bitstream comprising data of one or more sub-pictures partitioned from a picture such that each sub-picture includes a sub-picture width that is an integer multiple of a coding tree unit (CTU) size when the each sub-picture includes a right boundary that does not coincide with a right boundary of the picture;

a generating unit, configured to generate the one or more sub-pictures to create a video sequence from the bitstream.

23. The decoder of claim 22, wherein the decoder is further configured to perform the method of any of claims 1-11.
24. An encoder comprising:
a partitioning unit, configured to partition a picture into a plurality of sub-pictures such that each sub-picture includes a sub-picture width that is an integer multiple of a coding tree unit (CTU) size when the each sub-picture includes a right boundary that does not coincide with a right boundary of the picture;
an encoding unit, configured to encode one or more of the sub-pictures into a bitstream.
25. The encoder of claim 24, the encoder further comprising:
a storing unit, configured to store the bitstream for communication toward a decoder.
26. The encoder of any of claims 24-25, wherein the encoder is further configured to perform the method of any of claims 12-19.
27. A non-transitory storage medium which includes an encoded bitstream, the bitstream comprising one or more sub-pictures partitioned from a picture such that a first sub-picture comprises a sub-picture width that includes an incomplete coding tree unit (CTU) when the first sub-picture includes a right boundary that coincides with the right boundary of the picture.
28. A device for coding, comprising:
receiving unit, configured to receive a bitstream to decode;
transmission unit coupled to the receiving unit, the transmission unit, configured to transmit a decoded image to a display unit;
storage unit coupled to at least one of the receiving unit or the transmission unit, the storage unit, configured to store instructions; and
processing unit coupled to the storage unit, the processing unit, configured to execute the instructions stored in the storage unit to perform the method in any of claims 1 to 15.
29. An decoder comprising processing circuitry for carrying out the method according to claims 1 to 11.

30. A encoder comprising processing circuitry for carrying out the method according to any of claims 12 to 19.

31. A computer program product comprising program code for performing the method according to any of claims 1 to 19 when executed on a computer or a processor.

32. A non-transitory computer-readable medium carrying a program code which, when executed by a computer device, causes the computer device to perform the method of any one of claims 1 to 19.