A VIDEO ENCODER, A VIDEO DECODER AND CORRESPONDING METHODS

[0001]

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 a sequence parameter set (SPS), one or more sub-pictures partitioned from a picture, and one or more slice headers associated with one or more slices; parsing, by a processor of the decoder, the SPS to obtain sub-picture identifiers (IDs) for the one or more sub-pictures; parsing, by the processor, the slice headers to obtain a current sub-picture ID associated with a current sub-picture, the

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 a sequence parameter set (SPS), one or more sub-pictures partitioned from a picture, and one or more slice headers associated with one or more slices;

decoding, by a processor of the decoder, the SPS to obtain sub-picture identifiers (IDs) for the one or more sub-pictures; and

decoding, by the processor, the slice header to obtain a current sub-picture ID associated with a current sub-picture, the current sub-picture ID indicating the slice is included in the current sub-picture from the one or more sub-pictures;

generating, by the processor, the current sub-picture based on the current sub-picture ID to create a video sequence.

2. The method of claim 1, wherein the SPS further comprises a sub-picture size for each sub-picture partitioned from the picture.

3. The method of any of claims 1-2, wherein the SPS further comprises a sub-picture location for each sub-picture partitioned from the picture.

4. The method of any of claims 1-3, wherein decoding the current sub-picture includes:

matching the slices to the current sub-picture based on the current sub-picture ID; and

positioning the slices based on the sub-picture size and the sub-picture location for the current sub-picture.

5. The method of any of claims 1-4, wherein the sub-picture location includes an offset distance between a top-left sample of the current sub-picture and a top-left sample of the picture.

6. The method of any of claims 1-5, wherein the sub-picture size includes a sub-picture height in luma samples and a sub-picture width in luma samples.

7. The method of any of claims 1-6, wherein the SPS further comprises an indication that one or more of the sub-pictures are motion constrained sub-pictures.

8. A method implemented in an encoder, the method comprising:

partitioning, by a processor of the encoder, a picture into a plurality of sub-pictures;

partitioning, by the processor, each of the plurality of sub-pictures into one or more slices;

encoding into a bitstream, by the processor, a sequence parameter set (SPS) comprising sub-picture identifiers (IDs) for the plurality of sub-pictures partitioned from the picture;

encoding into the bitstream, by the processor, slice headers comprising the sub-picture IDs to indicate the slices are included in indicated sub-pictures;

encoding, by the processor, one or more of the plurality of sub-pictures into the bitstream.

9. The method of claim 8, the method further comprising:

storing, in a memory of the encoder, the bitstream for communication toward a decoder.

10. The method of any of claims 8-9, wherein the SPS further comprises a sub-picture size for each of the plurality of sub-pictures.

11. The method of any of claims 8-9, wherein the SPS further comprises a sub-picture location for each of the plurality of sub-pictures.

12. The method of any of claims 8-11, wherein the sub-picture location includes an offset distance between a top-left sample of a corresponding sub-picture and a top-left sample of the picture.

13. The method of any of claims 8-12, wherein the sub-picture size includes a sub-picture height in luma samples and a sub-picture width in luma samples.

14. The method of any of claims 8-13, wherein the SPS further comprises an indication that one or more of the sub-pictures are motion constrained sub-pictures.

15. The method of any of claims 8-14, wherein a union of the plurality of sub-pictures covers a total area of the picture without gap and without overlap.

16. 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 1-15.

17. 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 1-15.

18. A decoder comprising:

a receiving unit, configured to receive a bitstream comprising a sequence parameter set (SPS), one or more sub-pictures partitioned from a picture, and one or more slice headers associated with one or more slices;

a decoding unit, configured to:

decoding the SPS to obtain sub-picture identifiers (IDs) for the one or more sub-pictures; and

decoding the slice headers to obtain a current sub-picture ID associated with a current sub-picture, the current sub-picture ID indicating the slices are included in the current sub-picture from the one or more sub-pictures;

a generating unit, configured to generate the current sub-picture based on the current sub-picture ID to create a video sequence.

19. The decoder of claim 18, wherein the decoder is further configured to perform the method of any of claims 1-7.

20. An encoder comprising:

a partitioning unit, configured to:

partitioning a picture into a plurality of sub-pictures; and

partitioning each of the plurality of sub-pictures into one or more slices;

an encoding unit, configured to:

encoding into a bitstream a sequence parameter set (SPS) comprising sub-picture identifiers (IDs) for the plurality of sub-pictures partitioned from the picture;

encoding into the bitstream slice headers comprising sub-picture IDs indicating the slices are included in indicated sub-pictures; and

encoding one or more of the plurality of sub-pictures into the bitstream.

21. The encoder of claim 20, the encoder further comprising:

a storing unit, configured to store the bitstream for communication toward a decoder.

22. The encoder of any of claims 20-21, wherein the encoder is further configured to perform the method of any of claims 8-15.

23. A non-transitory storage medium which includes an encoded bitstream, the bitstream comprising one or more sub-pictures partitioned from a picture, and comprising one or more slice headers associated with one or more slices and a sequence parameter set (SPS) comprising sub-picture identifiers (IDs) for the plurality of sub-pictures partitioned from the picture.

24 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.

25. An decoder comprising processing circuitry for carrying out the method according to claims 1 to 7.

26. A encoder comprising processing circuitry for carrying out the method according to any of claims 8 to 15.

27. A computer program product comprising program code for performing the method according to any of claims 1 to 15 when executed on a computer or a processor.

28. 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 15.