VIDEO PARAMETER SET CONSTRAINTS FOR SUBPICTURE SUB-BITSTREAM EXTRACTION

CROSS-REFERENCE TO RELATED APPLICATIONS

[001] ~~Under the applicable patent law and/or rules pursuant to the Paris Convention, this application is made to timely claim~~ This application is based on International Patent Application No. PCT/US2021/036363, filed on June 8, 2021, which claims the priority to and benefits of U.S. Provisional Patent Application No. 63/036,908, filed on June 9, 2020. ~~For all purposes under the law, the entire disclosure of the aforementioned application is incorporated by reference as part of the disclosure of this application.~~ All the aforementioned patent applications are hereby incorporated by reference in their entireties.

TECHNICAL FIELD

[002] This patent document relates to image and video data processing.

BACKGROUND

[003] Digital video accounts for the largest bandwidth use on the internet and other digital communication networks. As the number of connected user devices capable of receiving and displaying video increases, it is expected that the bandwidth demand for digital video usage will continue to grow.

SUMMARY

[004] The present document discloses techniques that can be used by video encoders and decoders for processing coded representation of a video or an image.

[005] In one example aspect, a method of processing video data is disclosed. The method includes performing a conversion between a video and a bitstream of the video, wherein the bitstream comprises multiple layers comprising one or more subpictures according to a rule; wherein the rule specifies that, during a subpicture sub-bitstream extraction process by which an output bitstream is extracted from the bitstream, a supplemental enhancement information network abstraction layer unit, SEI NAL unit, that includes a scalable nested SEI message that is not applicable to the output bitstream is omitted in the output bitstream.

[006] In one example aspect, a method of processing video data is disclosed. The method includes performing a conversion between a video and a bitstream of the video, wherein the bitstream comprises multiple layers comprising one or more pictures comprising one or more subpictures according to a rule; wherein the rule specifies that a first subpicture index that

CLAIMS

1. A method of processing video data, comprising:

performing a conversion between a video and a bitstream of the video,

wherein the bitstream comprises one or more layers comprising one or more sublayers comprising one or more pictures comprising one or more subpictures according to a rule,

wherein the rule specifies a rewriting operation selectively performed on one or more syntax structures during a subpicture sub-bitstream extraction process by which an output target sub-bitstream is extracted from the bitstream,

wherein the one or more syntax elements include information of the output target sub-bitstream.

2. The method of claim 1, wherein the one or more syntax structures include: (a) a first syntax structure that indicates a coding level to which the output target sub-bitstream conforms, and (b) a second syntax structure that indicates coding levels to which sublayer sequences in the output target sub-bitstream having index values 0 to tIdTarget-1 conform, where tIdTarget is an integer representing a highest temporal layer identifier of sublayers in the output target sub-bitstream.

3. The method of claim 1, wherein the one or more syntax elements include: (a) a first syntax structure that is indicative of a coded picture buffer size of each sublayer sequence in the output target sub-bitstream, and (b) a second syntax structure that indicates a bitrate value of each sublayer sequence in the output target sub-bitstream.

4. The method of claim 1, wherein the one or more syntax elements include: (a) a first syntax structure that is indicative of whether each sublayer sequence in the output target sub-bitstream is handled as having a constant bitrate.

5. The method of claims 1-2, wherein the first syntax structure and the second syntax structure are included in a video parameter set references by the output target sub-bitstream.

1. A method of processing video data, comprising:

performing a conversion between a video and a bitstream of the video,

wherein the bitstream comprises one or more layers comprising one or more sublayers comprising one or more pictures comprising one or more subpictures according to a rule,

wherein the rule specifies a rewriting operation selectively performed on one or more syntax elements during a subpicture sub-bitstream extraction process by which an output target sub-bitstream is extracted from the bitstream,

wherein the one or more syntax elements include information of the output target sub-bitstream.

2. The method of claim 1, wherein the one or more syntax elements include: (a) a first syntax element that indicates a coding level to which the output target sub-bitstream conforms, and (b) a second syntax element that indicates coding levels to which sublayer sequences in the output target sub-bitstream having index values 0 to tIdTarget-1 conform, where tIdTarget is an integer representing a target highest temporal layer identifier of sublayers in the output target sub-bitstream.

3. The method of claim 1 or 2, wherein the one or more syntax elements include: (a) a third syntax element that is indicative of a coded picture buffer (CPB) size of each sublayer sequence in the output target sub-bitstream, and (b) a fourth syntax element that indicates a bit rate value of each sublayer sequence in the output target sub-bitstream, wherein the each sublayer sequence has an index value k, k in the range of 0 to tIdTarget, inclusive, where tIdTarget is an integer representing a target highest temporal layer identifier of sublayers in the output target sub-bitstream.

4. The method of any one of claims 1-3, wherein the one or more syntax elements include: a fifth syntax element that is indicative of whether a sublayer sequence with a target highest temporal layer identifier tIdTarget in the output target sub-bitstream is handled as having a constant bit rate.

6. The method of claims 1-2, wherein, in case that the output target sub-bitstream comprises a single layer, the first syntax structure and the second syntax structure are included in a sequence parameter set referenced by the output target sub-bitstream.

7. The method of any of above claims, wherein the video comprises a 360-degree video.

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

9. The method of any of claims 1 to 7, wherein the conversion comprises decoding the bitstream to generate pixel values of the video.

10. A video decoding apparatus comprising a processor configured to implement a method recited in one or more of claims 1 to 9.

11. A video encoding apparatus comprising a processor configured to implement a method recited in one or more of claims 1 to 9.

12. A method of storing a bitstream representing a video to a computer-readable recording medium, comprising:
generating the bitstream from the video according to a method described in any one or more of claims 1 to 9; and
storing the bitstream in the computer-readable recording medium.

13. A computer readable medium that stores the bitstream generated according to any one or more of claims 1 to 9.

14. A computer program product having computer code stored thereon, the code, when executed by a processor, causes the processor to implement a method recited in any of claims 1 to 9.

15. A method, apparatus or system described in the present document.

5. The method of any one of claims 1-4, wherein when present, the one or more syntax elements are included in a video parameter set referenced by the output target sub-bitstream.

6. The method of any one of claims 1-5, wherein, in case that the output target sub-bitstream comprises a single layer, the one or more syntax elements are included in a sequence parameter set referenced by the output target sub-bitstream.

7. The method of any one of claims 1-6, wherein the video comprises a 360-degree video.

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

9. The method of any one of claims 1-7, wherein the conversion comprises decoding the bitstream to generate pixel values of the video.

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:

perform a conversion between a video and a bitstream of the video,

wherein the bitstream comprises one or more layers comprising one or more sublayers comprising one or more pictures comprising one or more subpictures according to a rule,

wherein the rule specifies a rewriting operation selectively performed on one or more syntax elements during a subpicture sub-bitstream extraction process by which an output target sub-bitstream is extracted from the bitstream,

wherein the one or more syntax elements include information of the output target sub-bitstream.

11. The apparatus of claim 10, wherein the one or more syntax elements include: (a) a first syntax element that indicates a coding level to which the output target sub-bitstream conforms, and (b) a second syntax element that indicates coding levels to which sublayer sequences in the output target

sub-bitstream having index values 0 to tIdTarget-1 conform, where tIdTarget is an integer representing a target highest temporal layer identifier of sublayers in the output target sub-bitstream.

12. The apparatus of claim 10 or 11, wherein the one or more syntax elements include: (a) a third syntax element that is indicative of a coded picture buffer (CPB) size of each sublayer sequence in the output target sub-bitstream, and (b) a fourth syntax element that indicates a bit rate value of each sublayer sequence in the output target sub-bitstream, wherein the each sublayer sequence has an index value k, k in the range of 0 to tIdTarget, inclusive, where tIdTarget is an integer representing a target highest temporal layer identifier of sublayers in the output target sub-bitstream.

13. The apparatus of any one of claims 10-12, wherein the one or more syntax elements include: a fifth syntax element that is indicative of whether a sublayer sequence with a target highest temporal layer identifier tIdTarget in the output target sub-bitstream is handled as having a constant bit rate.

14. The apparatus of any one of claims 10-13, wherein when present, the one or more syntax elements are included in a video parameter set referenced by the output target sub-bitstream, and

wherein, in case that the output target sub-bitstream comprises a single layer, the one or more syntax elements are included in a sequence parameter set referenced by the output target sub-bitstream.

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

perform a conversion between a video and a bitstream of the video,

wherein the bitstream comprises one or more layers comprising one or more sublayers comprising one or more pictures comprising one or more subpictures according to a rule,

wherein the rule specifies a rewriting operation selectively performed on one or more syntax elements during a subpicture sub-bitstream extraction process by which an output target sub-bitstream is extracted from the bitstream,

wherein the one or more syntax elements include information of the output target sub-bitstream.

16. The non-transitory computer-readable storage medium of claim 15, wherein the one or more syntax elements include: (a) a first syntax element that indicates a coding level to which the output target sub-bitstream conforms, and (b) a second syntax element that indicates coding levels to which sublayer sequences in the output target sub-bitstream having index values 0 to tIdTarget-1 conform, where tIdTarget is an integer representing a target highest temporal layer identifier of sublayers in the output target sub-bitstream,

wherein the one or more syntax elements include: (a) a third syntax element that is indicative of a coded picture buffer (CPB) size of each sublayer sequence in the output target sub-bitstream, and (b) a fourth syntax element that indicates a bit rate value of each sublayer sequence in the output target sub-bitstream, wherein the each sublayer sequence has an index value k, k in the range of 0 to tIdTarget, inclusive, where tIdTarget is an integer representing a target highest temporal layer identifier of sublayers in the output target sub-bitstream, and

wherein the one or more syntax elements include: a fifth syntax element that is indicative of whether a sublayer sequence with a target highest temporal layer identifier tIdTarget in the output target sub-bitstream is handled as having a constant bit rate.

17. The non-transitory computer-readable storage medium of claim 15 or 16, wherein when present, the one or more syntax elements are included in a video parameter set referenced by the output target sub-bitstream, and

wherein, in case that the output target sub-bitstream comprises a single layer, the one or more syntax elements are included in a sequence parameter set referenced by the output target sub-bitstream.

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:

generating the bitstream of the video,

wherein the bitstream comprises one or more layers comprising one or more sublayers comprising one or more pictures comprising one or more subpictures according to a rule,

wherein the rule specifies a rewriting operation selectively performed on one or more syntax elements during a subpicture sub-bitstream extraction process by which an output target sub-bitstream is extracted from the bitstream,

wherein the one or more syntax elements include information of the output target sub-bitstream.

19. The non-transitory computer-readable recording medium of claim 18, wherein the one or more syntax elements include: (a) a first syntax element that indicates a coding level to which the output target sub-bitstream conforms, and (b) a second syntax element that indicates coding levels to which sublayer sequences in the output target sub-bitstream having index values 0 to tIdTarget-1 conform, where tIdTarget is an integer representing a target highest temporal layer identifier of sublayers in the output target sub-bitstream,

wherein the one or more syntax elements include: (a) a third syntax element that is indicative of a coded picture buffer (CPB) size of each sublayer sequence in the output target sub-bitstream, and (b) a fourth syntax element that indicates a bit rate value of each sublayer sequence in the output target sub-bitstream, wherein the each sublayer sequence has an index value k, k in the range of 0 to tIdTarget, inclusive, where tIdTarget is an integer representing a target highest temporal layer identifier of sublayers in the output target sub-bitstream, and

wherein the one or more syntax elements include: a fifth syntax element that is indicative of whether a sublayer sequence with a target highest temporal layer identifier tIdTarget in the output target sub-bitstream is handled as having a constant bit rate.

20. The non-transitory computer-readable recording medium of claim 18 or 19, wherein when present, the one or more syntax elements are included in a video parameter set referenced by the output target sub-bitstream, and

wherein, in case that the output target sub-bitstream comprises a single layer, the one or more syntax elements are included in a sequence parameter set referenced by the output target sub-bitstream.