High-Level Syntax Designs for Point Cloud Coding

~~CROSS-REFERENCE TO RELATED APPLICATIONS~~

[0001] ~~This patent application claims the benefit of U.S. Provisional Patent Application No. 62/690,132, filed June 26, 2018, by Ye-Kui Wang, et al., and titled "High-Level Syntax Designs for Point Cloud Coding," which is hereby incorporated by reference~~.

TECHNICAL FIELD

[0002] The present disclosure is generally related to point cloud coding, and is specifically related to the high-level syntax for point cloud coding.

BACKGROUND

[0003] The point cloud is employed in a wide variety of applications including entertainment industry, intelligent automobile navigation, geospatial inspection, three dimensional (3D) modeling of real world objects, visualization etc. Considering the non-uniform sampling geometry of the point cloud, compact representations for storage and transmission of such data is useful. Compared with the other 3D presentations, the irregular point cloud is more general and applicable for a wider range of sensors and data acquisition strategies. For example, when performing a 3D presentation in a virtual reality world or remote renderings in a tele-presence environment, the rendering of virtual figures and real-time instructions are processed as dense point cloud data set.

SUMMARY

[0004] A first aspect relates to a method of point cloud coding (PCC) implemented by a video decoder. The method includes receiving an encoded bitstream including a data unit header and a data unit, the data unit header containing a type indicator specifying a type of content carried in a payload of the data unit; and decoding the encoded bitstream.

[0005] A second aspect relates to a method of point cloud coding (PCC) implemented by a video encoder. The method includes generating an encoded bitstream including a data unit header and a data unit, the data unit header containing a type indicator specifying a type of content carried in a payload of the data unit; and transmitting the encoded bitstream toward a decoder.

CLAIMS

What is claimed is:

1. A method of point cloud coding (PCC) implemented by a video decoder, comprising:

receiving an encoded bitstream including a data unit header and a data unit, the data unit header containing a type indicator specifying a type of content carried in a payload of the data unit; and

decoding the encoded bitstream.

2. A method of point cloud coding (PCC) implemented by a video encoder, comprising:

generating an encoded bitstream including a data unit header and a data unit, the data unit header containing a type indicator specifying a type of content carried in a payload of the data unit; and

transmitting the encoded bitstream toward a decoder.

3. The method of any of claims 1 to 2, wherein the data unit header is a PCC network abstraction layer (NAL) unit header.

4. The method of any of claims 1 to 2, wherein the data unit is a PCC NAL unit.

5. The method of any of claims 1 to 4, wherein the type indicator specifies that the type of content is a geometry component.

6. The method of any of claims 1 to 4, wherein the type indicator specifies that the type of content is a texture component.

7. The method of any of claims 1 to 4, wherein the type indicator specifies that the type of content is a geometry component or a texture component.

8. The method of any of claims 1 to 7, wherein the type indicator specifies that the type of content is auxiliary information.

9. The method of any of claims 1 to 8, wherein the type indicator specifies that the type of content is an occupancy map.

10. The method of any of claims 1 to 9, wherein the payload comprises a High Efficiency Video Coding (HEVC) NAL unit.

11. The method of any of claims 1 to 9, wherein the payload comprises an Advanced Video Coding (AVC) NAL unit.

12. The method of any of claims 1 to 11, wherein the type indicator comprises five bits.

13. The method of any of claims 1 to 11, wherein the type indicator comprises seven bits.

14. The method of any of claims 1 to 5 and 7, wherein the geometry component comprises a set of coordinates associated with a point cloud frame.

15. The method of claim 14, wherein the set of coordinates are Cartesian coordinates.

16. The method of any of claims 1 to 4 and 6 to 7, wherein the texture component comprises a set of luma sample values of a point cloud frame.

17. A coding apparatus, comprising:

a receiver configured to receive a picture to encode or to receive a bitstream to decode;

a transmitter coupled to the receiver, the transmitter configured to transmit the bitstream to a decoder or to transmit a decoded image to a display;

a memory coupled to at least one of the receiver or the transmitter, the memory configured to store instructions; and

a processor coupled to the memory, the processor configured to execute the instructions stored in the memory to perform the method in any of claims 1 to 16.

18. The coding apparatus of claim 17, further comprising a display configured to display an image.

19. A system, comprising:

an encoder; and

a decoder in communication with the encoder, wherein the encoder or the decoder includes the coding apparatus of any of claims 17 to 18.

20. A means for coding, comprising:

receiving means configured to receive a picture to encode or to receive a bitstream to decode;

transmission means coupled to the receiving means, the transmission means configured to transmit the bitstream to a decoder or to transmit a decoded image to a display means;

storage means coupled to at least one of the receiving means or the transmission means, the storage means configured to store instructions; and

processing means coupled to the storage means, the processing means configured to execute the instructions stored in the storage means to perform the method in any of claims 1 to 16.

CLAIMS

1. A method of point cloud decoding (PCC) implemented by a video decoder, comprising:

receiving an encoded bitstream including a data unit comprising a data unit header, the data unit header containing a type indicator specifying a type of content carried in a payload of the data unit; and

decoding the encoded bitstream.

2. The method of claim 1, wherein the data unit header is a Video-based Coding unit header.

3. The method of claim 1, wherein the data unit header is a PCC network abstraction layer (NAL) unit header.

4. The method of claim 1, wherein the data unit is a PCC NAL unit.

5. The method of claim 1, wherein the data unit is a Video-based Coding unit.

6. The method of any one of claims 1 to 5, wherein the type indicator specifies that the type of content is a geometry component.

7. The method of any one of claims 1 to 5, wherein the type indicator specifies that the type of content is a texture component.

8. The method of any one of claims 1 to 5, wherein the type indicator specifies that the type of content is a geometry component or a texture component.

9. The method of any one of claims 1 to 5, wherein the type indicator specifies that the type of content is auxiliary information.

10. The method of any one of claims 1 to 5, wherein the type indicator specifies that the type of content is an occupancy map.

11. The method of any one of claims 1 to 10, wherein the type indicator is five bits.

12. The method of any one of claims 1 to 10, wherein the type indicator is seven bits.

13. The method of claim 6 or 8, wherein the geometry component comprises a set of coordinates associated with a point cloud frame.

14. The method of claim 13, wherein the set of coordinates are Cartesian coordinates.

15. The method of claim 7 or 8, wherein the texture component comprises a set of luma sample values of a point cloud frame.

16. A method of point cloud coding (PCC) implemented by a video encoder, comprising:

generating an encoded bitstream including a data unit comprising a data unit header the data unit header containing a type indicator specifying a type of content carried in a payload of the data unit; and

transmitting the encoded bitstream toward a decoder.

17. The method of claim 16, wherein the data unit header is a Video-based Coding unit header.

18. The method of claim 16, wherein the data unit header is a PCC network abstraction layer (NAL) unit header.

19. The method of claim 16, wherein the data unit is a PCC NAL unit.

20. The method of claim 16, wherein the data unit is a Video-based Coding unit.

21. The method of any one of claims16 to 20, wherein the type indicator specifies that the type of content is a geometry component.

22. The method of any one of claims 16 to 20, wherein the type indicator specifies that the type of content is a texture component.

23. The method of any one of claims 16 to 20, wherein the type indicator specifies that the type of content is a geometry component or a texture component.

24. The method of any one of claims 16 to 20, wherein the type indicator specifies that the type of content is auxiliary information.

25. The method of any one of claims 16 to 20, wherein the type indicator specifies that the type of content is an occupancy map.

26. The method of any one of claims 16 to 25, wherein the type indicator is five bits.

27. The method of any one of claims 16 to 25, wherein the type indicator is seven bits.

28. The method of claim 21 or 23, wherein the geometry component comprises a set of coordinates associated with a point cloud frame.

29. The method of claim 28, wherein the set of coordinates are Cartesian coordinates.

30. The method of claim 22 or 23, wherein the texture component comprises a set of luma sample values of a point cloud frame.

31. A decoding apparatus, comprising:
a receiver configured to receive a bitstream to decode;
a transmitter coupled to the receiver, the transmitter configured to transmit a decoded image to a display;
a memory coupled to at least one of the receiver or the transmitter, the memory configured to store instructions; and
a processor coupled to the memory, the processor configured to execute the instructions stored in the memory to perform the method in any one of claims 1 to 15.

32. The decoding apparatus of claim 31, further comprising a display configured to display an image.

33. An encoding apparatus, comprising:
a receiver configured to receive a picture to encode;
a transmitter coupled to the receiver, the transmitter configured to transmit the bitstream to a decoder;
a memory coupled to at least one of the receiver or the transmitter, the memory configured to store instructions; and

a processor coupled to the memory, the processor configured to execute the instructions stored in the memory to perform the method in any one of claims 16 to 30.