

CLAIMS

1. A method for encoding attributes of points of a point cloud to generate a bitstream of compressed point cloud data, wherein the point cloud's geometry is represented by a voxel-based structure with a plurality of nodes having parent-child relationships by recursively splitting a volumetric space containing the point cloud into sub-volumes each associated with a node of the voxel-based structure, comprising the steps:

Determining a true transform coefficient by applying Region-Adaptive Hierarchical Transform, RAHT, to the attributes of a present node;

Determining a difference between the attributes of a present parent node and each node of a first set of nodes sharing a face or an edge with the present node, wherein the present parent node is the parent node of the present node;

Selecting a second set from the first set of parent nodes according to the difference, wherein preferably the second set of parent nodes includes the present parent node;

Determining a predicted value for the attributes of the present node according to the attributes of the second set of parent nodes;

Determining a predicted transform coefficient by applying RAHT to the predicted value of the attributes of the present node;

Determining a residual from the true transform coefficient and the predicted transform coefficient; and

Encoding the residual to produce encoded data of attributes of the point cloud for the bitstream.

2. A method for decoding a bitstream of compressed point cloud data to generate attributes of points in a reconstructed point cloud, wherein the point cloud's geometry is represented by an voxel-based structure with a plurality of nodes having parent-child relationships by recursively splitting a volumetric space containing the point cloud into sub-volumes each associated with a node of the voxel-bases structure, comprising the steps:

Decoding a residual of attributes of a present node of the point cloud from the bitstream;

Determining a difference between the attributes of a present parent node and each node of a first set of nodes sharing a face or an edge with the present node, wherein the present parent node is the parent node of the present node;

Selecting a second set from the first set of parent nodes according to the difference, wherein preferably the second set of parent nodes includes the present parent node;

Determining a predicted value for the attributes of the present node according to the attributes of the second set of parent nodes;

Determining a predicted transform coefficient by applying RAHT to the predicted value of the attributes of the present node; and

Determining from the residual and the predicted transform coefficient the attributes of the present node by applying an inverse RAHT.

3. Method according to claims 1 or 2, characterized in that determining the difference between the attributes of the present parent node and each node of the first set of nodes includes:

Determining the maximum difference among each of the parent nodes in the first set of parent nodes and the present parent node;
Providing a first threshold; and
If the maximum difference is smaller than the first threshold, selecting all parent nodes of the first set of parent nodes.

4. Method according to any of claims 1 to 3, characterized in that determining the difference between the attributes of the present parent node and each node of the first set of nodes includes:
Determining the difference between each of the parent nodes in the first set of parent nodes and the present parent node;
Providing a second threshold; and
Selecting parent nodes of the first set of parent nodes if the respective difference is smaller than the second threshold.
5. Method according to any of claims 1 to 4, characterized in that the first threshold and/or the second threshold are fixed.
6. Method according to any of claims 1 to 5, characterized in that the first threshold and/or the second threshold are determined according to the distribution of the attributes within the complete point cloud.
7. Method according to any of claims 1 to 6, characterized in that the first threshold and/or the second threshold are determined according to the first set of parent nodes.
8. Method according to any of claims 1 to 7, characterized in that the second threshold is a percentage of the first threshold.
9. Method according to any of claims 1 to 8, characterized in that the first threshold and the second threshold are equal or different.

10. Method according to any of claims 1 to 9, characterized in that the first threshold and/or the second threshold are determined according to the relation between attributes of the present node and the attributes of parent nodes of the first set of parent nodes.
11. Method according to any of claims 1 to 9, characterized in that the first threshold and/or the second threshold are included into the bitstream.
12. Method according to claim 11, characterized in that the first threshold and/or the second threshold is included into the bitstream only at the top of at least one subtree for which the first and/or second thresholds shall be used and are inherited by all nodes in the subtree for which there is no explicit signaling of another first or second threshold.
13. An encoder for encoding attributes of points of a point cloud to generate a bitstream of compressed point cloud data, wherein the point cloud's geometry is represented by a voxel-based structure with a plurality of nodes having parent-child relationships by recursively splitting a volumetric space containing the point cloud into sub-volumes each associated with a node of the voxel-based structure, the encoder comprising:
 - a processor and
 - a memory storage device, wherein in the memory storage device instructions executable by the processor are stored that, when executed, cause the processor to perform the method according to any of claims 1 and 3 to 11 when dependent on claim 1.
14. A decoder for decoding a bitstream of compressed point cloud data to generate attributes of points of a reconstructed point cloud, wherein the point cloud's geometry is represented by a voxel-based structure with a plurality of nodes having parent-child relationships by recursively splitting a volumetric space containing the point cloud into sub-volumes each

associated with a node of the voxel-bases structure, the decoder comprising:

a processor and

a memory storage device, wherein in the memory storage device instructions executable by the processor are stored that, when executed, cause the processor to perform the method according to any of claims 2 to 11.

15. A non-transitory computer-readable storage medium storing processor-executed instructions that, when executed by a processor, cause the processor to perform the method according to any one of claims 1 to 11.