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Abstract

The geometry and attribute coding in the current (draft7) G-PCC specification [1] are independent of the orientation of the x, y, and z axes. For the most part, the specification numbers the axes as 0, 1, and 2. This contribution proposes a mechanism to globally map the output axes labels to the internal axes.

Introduction

In [2, m49126] it is presented that there exists a compression gain when permuting the order of the x, y, z axes for the purposes of attribute coding. This proposed method used a constant ordering for geometry coding, but introduced the possibility of an alternative ordering for the purpose of attribute coding (which could presumably vary per attribute).

Additionally, the native data format of some systems may prefer one permutation of the x, y, z axes over another.

It is therefore proposed to add a field to the sequence parameter set that identifies one of six possible permutations of $\{x, y, z\}$ to be used to label the three components of the position (geometry) information.

In this design, there is no need to introduce any additional decoding steps to remap the axes.

Syntax

```
sequence_parameter_set() {
 ...
    geometry_axis_order = u(3)
 ...
}
```

geometry_axis_order specifies the correspondence between the X, Y, and Z output axes and the indexes of the output array PointPos according to Table 1.

NB: entries 1 and 7, and 0 and 4 are identical to avoid undefined behaviour.

Table 1 – Mapping of output X, Y, and Z axes to indicies k of PointPos[i][k] according to geometry_axis_order

geometry_axis_order	X	Y	Z
0	2	1	0
1	0	1	2
2	0	2	1
3	2	0	1
4	2	1	0
5	1	2	0
6	1	0	2
7	0	1	2

References

[1] 3DG, "G-PCC Improvements," ISO/IEC JTC1/SC29/WG11, 127th meeting, Gothenburg, Tech. Rep. w18669, Jul. 2019.

[2] W. Zhang, S. Zhang, L. Yang, N. Dai, F. Yang, yuanfang Yu, and Y. Liu, "[G-PCC][new proposal] The effect of RAHT transform order on the attribute coding performance," ISO/IEC JTC1/SC29/WG11, 127th meeting, Gothenburg, Tech. Rep. m49126, Jul. 2019.