|  |  |
| --- | --- |
| **Joint Collaborative Team on 3D Video Coding Extension Development**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  4th Meeting: Incheon, KR, 20–26 Apr. 2013 | Document: JCT3V- D0069 |

|  |  |  |  |
| --- | --- | --- | --- |
| *Title:* | **Non-CE: Simplified Inter Mode Coding of Depth** | | |
| *Status:* | Input Document | | |
| *Purpose:* | Proposal | | |
| *Author(s) or Contact(s):* | Hongbin Liu ([hongbin.liu@lge.com](mailto:hongbin.liu@lge.com))  Jie Jia ([jie.jia@lge.com](mailto:jie.jia@lge.com))  Junghak Nam ([junghak.nam@lge.com](mailto:junghak.nam@lge.com)) |  |  |
| *Source:* | LG Electronics | | |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Abstract

This contribution proposes simplified inter mode coding of depth. Instead of coding residual for all pixels in a CU (coding unit), only one residual value is encoded for each PU (prediction unit) of the CU. Proposed method is only applied to non-skip inter modes since skip mode already encodes only one residual value for the entire coding unit. To indicate whether proposed method is employed, one flag is coded for each inter-coded depth CU excluding skipped depth CU.

It is reported that there is -0.6% coding gain on synthesized view and there is also minor coding gain (-0.1%) on texture.

# Proposed Method

Enlightened by SDC (simplified depth coding) in 3D-HEVC [1], this contribution proposes simplified inter mode coding for depth, in which an alternative approach for coding residual signal is proposed. The basic idea is to encode only one residual for each PU of inter-coded depth CU (excluding skipped depth CU). For each PU, the difference between average value of original signal and average value of prediction signal is used as the residual for all pixels in the PU, and is signalled to the decoder.

Encoder will perform rate distortion optimized selection between approach in 3D-HEVC and proposed approach when encoding residual signal for inter-coded depth CU (excluding skipped depth CU), and one flag will be encoded to indicate which approach is selected.

# Results

Proposed method is integrated into 3DV-HTM 6.0 software and compared with it following common test condition [2]. Result is shown in Table 1. As shown in Table 1, there is -0.6% coding gain on synthesized view and -0.1% coding gain on video. From the video PSNR/total bitrate column, it can also be seen that the total bit rate of depth is increased.

Table 3: performance comparison with HTM-6.0 (CTC)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | video 0 | video 1 | video 2 | video PSNR / video bitrate | video PSNR / total bitrate | synth PSNR / total bitrate | enc time | dec time |
| Balloons | 0.0% | -0.1% | 0.1% | 0.0% | 0.2% | -0.3% | 104.7% | 100.8% |
| Kendo | 0.0% | 0.0% | 0.0% | 0.0% | 0.4% | -0.3% | 104.2% | 101.0% |
| Newspaper\_CC | 0.0% | 0.0% | 0.2% | 0.0% | 0.5% | -0.3% | 104.5% | 101.0% |
| GT\_Fly | 0.0% | -0.5% | -0.5% | -0.1% | 0.4% | -0.8% | 106.9% | 100.6% |
| Poznan\_Hall2 | 0.0% | -0.5% | -0.3% | -0.2% | 0.3% | -1.2% | 103.2% | 100.9% |
| Poznan\_Street | 0.0% | -0.1% | 0.0% | 0.0% | 0.2% | -0.2% | 104.3% | 101.2% |
| Undo\_Dancer | 0.0% | -0.3% | -0.4% | -0.1% | 0.2% | -0.9% | 105.0% | 100.9% |
| 1024x768 | 0.0% | -0.1% | 0.1% | 0.0% | 0.4% | -0.3% | 104.5% | 100.9% |
| 1920x1088 | 0.0% | -0.3% | -0.3% | -0.1% | 0.3% | -0.8% | 104.8% | 100.9% |
| **average** | **0.0%** | **-0.2%** | **-0.1%** | **-0.1%** | **0.3%** | **-0.6%** | **104.7%** | **100.9%** |

# Reference

[1] G. Tech, K. Wegner, Y. Chen, S.Yea, “3D-HEVC Test Model 3”, Doc. JCT3V-C1005, Geneva, Swizerland, 17–23 Jan. 2013.

[2] D. Rusanovskyy, K. Müller, A. Vetro, “Common Test Conditions of 3DV Core Experiments”, Doc. JCT3V-C1100, Geneva, Swizerland, 17–23 Jan. 2013.

# Patent rights declaration(s)

**LG Electronics / LG Electronics (China) R&D Center may have current or pending patent rights relating to the technology described in this contribution and, conditioned on reciprocity, is prepared to grant licenses under reasonable and non-discriminatory terms as necessary for implementation of the resulting ITU-T Recommendation | ISO/IEC International Standard (per box 2 of the ITU-T/ITU-R/ISO/IEC patent statement and licensing declaration form).**