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| **Joint Collaborative Team on 3D Video Coding Extensions**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  10th Meeting: Strasbourg, FR, 18–24 Oct. 2014 | Document: JCT3V-J0053 |

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| --- | --- | --- | --- |
| *Title:* | **Simplification on CABAC context models for single depth mode** | | |
| *Status:* | Input Document | | |
| *Purpose:* | Proposal | | |
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**Abstract**

In the Sapporo meeting, single depth mode is adopted for depth intra coding. The mode reconstructs the current coding unit as a smooth area with a single depth sample value. For the depth sample, two neighboring pixels are selected as candidates and candidate index is signaled to indicate the selected sample value with CABAC. This contribution presents a simplified method to encode the candidate index of single depth mode without CABAC contexts. The proposed method reportedly shows 0.03% and 0.06% BD-rate loss under the CTC and AI configuration, respectively.

# Introduction

In the 3D-HEVC, single depth mode is employed for depth intra coding [1]. It reconstructs the current coding unit (CU) as a single sample value without residual coding. To indicate the sample value, two candidate samples are selected among the neighboring pixels and a candidate index is signaled. Due to coding efficiency the candidate index is encoded based on the CABAC context model,

At the last meeting, the single depth mode for depth intra coding is adopted. In this method, a depth block can be represented by one sample value and the sample value is derived from one of designated neighbor samples. To make the representative sample, the fixed neighbor samples are compared to remove the candidates with the duplicated values. After the pruning process, the first two available samples are regarded as final candidates, then the index is signaled to the decoder. The context model is shown in Table 1.

Table 1. Values of initValue for candidate\_idx\_flag

|  |  |  |  |
| --- | --- | --- | --- |
| Initialization variable | ctxIdx of candidate\_idx\_flag ctxIdx | | |
| 0 | 1 | 2 |
| initValue | 137 | 137 | 137 |

# Proposed method

This contribution encodes the index flag of single depth mode using bypass coded bins without context models. Due to removing the context coded bins in the index coding the proposed method is able to improve the throughput of decoder.

# Experimental result

The proposed method reportedly shows 0.03% and 0.06% BD-rate loss under the CTC and AI configuration, respectively [2].

Table 1. The proposed method vs. HTM-12.0 in CTC configuration



Table 2. The proposed method vs. HTM-12.0 in All Intra configuration



# Conclusion

This contribution proposes to simplify the CABAC context models of single depth mode. The CABAC context models of sample candidate index were removed for throughput and computational complexity. The experimental results show 0.03% and 0.06% loss of BD-rate comparing with HTM-12.0 under CTC and AI configurations.

# Proposed working draft

The newly added parts compared to 3D-HEVC working draft 3 are highlighted in green and the removed parts are marked with ~~strikethrough~~.

Table ‑ – Association of ctxIdx and syntax elements for each initializationType in the initialization process

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Syntax structure** | **Syntax element** | **ctxTable** | **initType** | | |
| **0** | **1** | **2** |
| cu\_extension( ) intra\_mode\_ext( ) | depth\_intra\_mode\_flag |  | 0 | 1 | 2 |
|  |  |  |  |  |
| depth\_dc\_flag |  | 0 | 1 | 2 |
| depth\_dc\_abs |  | 0 | 1 | 2 |
| iv\_res\_pred\_weight\_idx |  |  | 0..2 | 3..5 |
| ic\_flag |  |  | 0 | 1 |
| dbbp\_flag |  | 0 | 1 | 2 |
| sdc\_flag |  | 0 | 1 | 2 |
| dim\_not\_present\_flag |  | 0 | 1 | 2 |
| ~~single\_sample\_idx~~ |  | ~~0~~ | ~~1~~ | ~~2~~ |

~~Table ‑120 – Values of initValue for single\_sample\_idx~~

|  |  |  |  |
| --- | --- | --- | --- |
| **~~Initialization variable~~** | **~~ctxIdx of single\_sample\_idx ctxIdx~~** | | |
| **~~0~~** | **~~1~~** | **~~2~~** |
| **~~initValue~~** | ~~137~~ | ~~137~~ | ~~137~~ |

Table ‑ –Assignment of ctxInc to syntax elements with context coded bins

| **Syntax element** | **binIdx** | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **0** | **1** | **2** | **3** | **4** | **>=5** |
| wedge\_full\_tab\_idx | bypass | bypass | bypass | bypass | bypass | bypass |
| depth\_dc\_flag | 0 | na | na | na | na | na |
| depth\_dc\_abs | 0 | 0 | 0 | bypass | bypass | bypass |
| depth\_dc\_sign\_flag | bypass | 0 | 0 | 0 | 0 | 0 |
| iv\_res\_pred\_weight\_idx | 0, 1 | 2 | na | na | na | na |
| ic\_flag | 0 | na | na | na | na | na |
| dbbp\_flag | 0 | na | na | na | na | na |
| depth\_intra\_mode\_flag | 0 | na | na | na | na | na |
| sdc\_flag | 0 | na | na | na | na | na |
| dim\_not\_present\_flag | 0 | na | na | na | na | na |
| single\_sample\_idx | ~~0~~ bypass | na | na | na | na | na |

# References

1. Y. Chen, J. Lin,Y. Huang, S. Lei “3D-CE2: Single depth intra mode for 3D-HEVC,” 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, Sapporo, JP, July 2014.
2. K. Müller, A. Vetro, “Common test conditions of 3DV Core Experiments” 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, San Jose, USA, Jan. 2014.

# Patent rights declaration(s)

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