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| *Title:* | **3D-CE5.a related: Simplification of the Inter-view candidate derivation** | | |
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| *Purpose:* | Proposal | | |
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# Abstract

In the AVC-based 3D video coding, ATM-5.1r2, the inter-view candidate in Skip/Direct mode is derived from the motion vectors (MVs) of two different corresponding blocks in the reference view. To derive the inter-view candidate, the MV of list 0 is inferred from a corresponding block located by a disparity vector derived for list 0, and the MV of list 1 is inferred from another corresponding block located by a different disparity vector derived for list 1. In this contribution, we propose to derive the inter-view candidate from a single corresponding block located by a disparity vector derived for list 0 and list 1 to reduce the memory access bandwidth for the inter-view motion data fetch. The experimental results reportedly show that this proposed simplification brings no coding loss compared to ATM-5.1r2.

# Introduction

In the AVC-based 3D video coding, ATM-5.1r2 [1], a priority based motion vector predictor (MVP) is used for Skip and Direct modes [2]. The MVP is derived based on a predefined order: the inter-view candidate and three spatial candidates from the neighboring blocks A, B, and C (D is used only when C is unavailable) as shown in Figure 1. The disparity vector (DV) is used to locate the inter-view corresponding block in order to derive the inter-view candidate. The DV can be derived from the neighboring blocks or the depth value of the central point. Specifically, if one of the neighboring blocks has a DV, this DV is used. Otherwise, the DV converted from the depth value of the central point within the associated depth block is used.

In Figure 1, to locate a corresponding block for list 0, DVL0 is derived from the List0 DVs of the neighboring blocks in the order: L0 DV of A, L0 DV of B, L0 DV of C. If no DV is available from neighboring blocks, DVL0 is converted from the depth value of the central point. On the other hand, DVL1 is derived from the List1 DVs of the neighboring blocks in the order: L1 DV of A, L1 DV of B, L1 DV of C. If no DV is available from neighboring blocks, DVL1 is converted from the depth value of the central point.

Based on the above DV derivation method, List0 MV and List1 MV of the inter-view candidate are independently inferred from two different corresponding blocks in the reference view. To be specific, List0 MV is derived as the List0 MV of the corresponding block located by DVL0 and List1 MV is derived as the List1 MV of the corresponding block located by DVL1.



**Figure 1. Inter-view candidate derivation**

# Proposed Method

In this contribution, we propose to use a single DV to infer both list 0 MV and list 1 MV for inter-view candidate as shown in Figure 2. The DV is derived from the List0 or List 1 DVs of neighboring blocks in the order: L0 DV of A, L0 DV of B, L0 DV of C, L1 DV of A, L1 DV of B, L1 DV of C. If no DV is available from neighboring blocks, the DV is converted from the depth value of the central point. Therefore, only one single corresponding block is located and the inter-view candidate is directly derived from that corresponding block, instead of deriving the MV of each list independently from different corresponding block.



**Figure 2. Simplified inter-view candidate derivation**

# Experimental Results

The proposed simplification is integrated into ATM-5.1r2 [1] and the simulations are run under the common test conditions [3]. The results of using a single corresponding block to derive the inter-view candidate are illustrated in Table 1. The experimental results show that this proposed simplification brings no coding loss while the complexity of the inter-view candidate derivation and memory access bandwidth for inter-view motion data access are reduced.

Table 1 Results of using single corresponding block to derive the inter-view candidate



In current DV derivation, if none of the neighboring block has a DV, the depth values of the central pixel within the associated depth block is converted to a DV. However, this conversion is different from the one used in direction-separate motion vector prediction, which uses the maximum depth value of four corner depth samples within the associated depth block. In this experiment, the DV converted from depth is unified to use the maximum depth value of four corner depth samples within the associated depth block. The proposed simplification and the unified depth to DV conversion are both integrated into ATM-5.1r2 and the simulation results are shown in Table 2. The experimental results show that the combined methods can bring about 0.2% BD-rate saving along with the benefit of reduced memory access bandwidth and unified depth to DV conversion.

Table 2 Results of the combination of using single corresponding block and the unified depth to DV conversion



# Conclusion

In this contribution, we propose to derive the inter-view candidate directly from one single corresponding block, instead of deriving the MV of each list independently from different corresponding block. The results reportedly showed that the proposed simplification brings no coding loss while the complexity of the inter-view candidate derivation and memory access bandwidth for inter-view motion data fetch are reduced.

# Patent rights declaration (s)

**MediaTek Inc. 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).**

# References

[1] ATM-5.1r2, <http://mpeg3dv.research.nokia.com/svn/mpeg3dv/tags/3DV-ATMv5.1r2/>

[2] Jian-Liang Lin, Yi-Wen Chen, Yu-Lin Chang, Yu-Pao Tsai, Yu-Wen Huang, and Shawmin Lei “3D-CE5.a results on motion vector competition-based Skip/Direct mode with explicit signaling”, 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, JCT3V-A0045, July 2012, Stockholm.

[3] Dmytro Rusanovskyy, Karsten Müller, Anthony 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, JCT3V-A1100, July 2012, Stockholm.