

JCT3V-G0074 – CE2 related: Simplification of DV Derivation for Depth Coding

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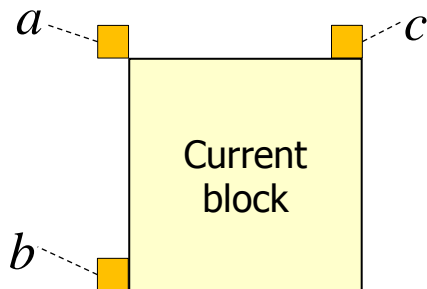
Contents

- ❖ **Test 1:** Simplification of DV Derivation for Depth Coding
- ❖ **Test 2:** Test 1 + Removal of DV Candidates
- ❖ **Test 3:** Test 1 + Removal of DV & Shifted IVMV Candidates

Simplification of DV Derivation

- ❖ Currently, DV for depth coding is derived using neighboring reconstructed pixels
 - This has a potential problem with pipeline processing because of dependency of neighboring blocks
- ❖ To solve this, it is proposed to derive DV only using depth value 128
 - This completely removes the dependency of neighboring blocks

Current



$$\text{Depth} = (5a + 5b + 6c + 8) \gg 4$$

$$DV = \text{conv}(\text{Depth})$$



Proposed

$$DV = \text{conv}(128)$$

Simplification of DV Derivation

❖ Simulation Results (based on CTC with HTM 9.0r1) – **Test 1**

- No coding loss
- Depth value 128 is sufficient for the depth coding

	video 0	video 1	video 2	video PSNR / video bitrate	video PSNR / total bitrate	synth PSNR / total bitrate	enc time	dec time	ren time
Balloons	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	99.1%	98.5%	93.6%
Kendo	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	99.9%	97.8%	101.7%
Newspaper_CC	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	107.4%	103.6%
GT_Fly	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.7%	97.8%
Poznan_Hall2	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	99.8%	91.1%	93.2%
Poznan_Street	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.3%	99.4%	101.4%
Undo_Dancer	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	99.2%	100.3%	99.9%
Shark	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	99.8%	108.6%	98.4%
1024x768	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	99.7%	101.2%	99.7%
1920x1088	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	99.8%	100.0%	98.1%
average	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	99.8%	100.5%	98.7%

Removal of DV Candidates

- ❖ It is proposed to remove DV candidates from depth merge list
- ❖ Simulation Results (w/ Simplification of DV Derivation) – **Test 2**
 - No coding loss
 - DV candidates does not give any coding benefit

	video 0	video 1	video 2	video PSNR / video bitrate	video PSNR / total bitrate	synth PSNR / total bitrate	enc time	dec time	ren time
Balloons	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	99.7%	96.4%	95.0%
Kendo	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.5%	101.0%	102.9%
Newspaper_CC	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.7%	105.8%	105.9%
GT_Fly	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	99.9%	103.5%	100.5%
Poznan_Hall2	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	100.0%	93.3%	93.2%
Poznan_Street	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.6%	101.9%	101.6%
Undo_Dancer	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	99.7%	100.5%	99.9%
Shark	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	99.5%	109.5%	98.6%
1024x768	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.3%	101.1%	101.3%
1920x1088	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	99.9%	101.7%	98.8%
average	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.1%	101.5%	99.7%

Removal of DV & Shifted IVMV Candidates

- ❖ It is proposed to remove DV & Shifted IVMV candidates from depth merge list
- ❖ Simulation Results (w/ Simplification of DV Derivation) – **Test 3**
 - 0.06% loss for synthesized views
 - Coding benefit of shifted IVMV is also marginal

	video 0	video 1	video 2	video PSNR / video bitrate	video PSNR / total bitrate	synth PSNR / total bitrate	enc time	dec time	ren time
Balloons	0.00%	0.00%	0.00%	0.00%	0.02%	-0.03%	99.0%	90.8%	93.9%
Kendo	0.00%	0.00%	0.00%	0.00%	0.03%	0.03%	100.4%	101.2%	102.7%
Newspaper_CC	0.00%	0.00%	0.00%	0.00%	0.00%	0.06%	99.1%	101.0%	100.6%
GT_Fly	0.00%	0.00%	0.00%	0.00%	-0.02%	0.06%	100.0%	110.6%	98.8%
Poznan_Hall2	0.00%	0.00%	0.00%	0.00%	-0.02%	0.23%	100.4%	102.5%	92.5%
Poznan_Street	0.00%	0.00%	0.00%	0.00%	0.01%	0.04%	100.8%	108.2%	102.6%
Undo_Dancer	0.00%	0.00%	0.00%	0.00%	-0.02%	0.07%	99.9%	101.5%	101.1%
Shark	0.00%	0.00%	0.00%	0.00%	-0.03%	0.03%	99.6%	106.8%	99.1%
1024x768	0.00%	0.00%	0.00%	0.00%	0.02%	0.02%	99.5%	97.7%	99.0%
1920x1088	0.00%	0.00%	0.00%	0.00%	-0.01%	0.09%	100.1%	105.9%	98.8%
average	0.00%	0.00%	0.00%	0.00%	0.00%	0.06%	99.9%	102.8%	98.9%

Conclusions

- ❖ We propose to simply DV derivation for depth coding and to remove DV & shifted IVMV candidates
 - **Test 1** (Simplification of DV Derivation)
 - no coding loss
 - **Test 2** (Removal of DV Candidates w/ Test 1)
 - no coding loss
 - **Test 3** (Removal of DV & Shifted IVMV Candidates w/ Test 1)
 - 0.06% coding loss
- ❖ We recommend to adopt the proposed methods into next 3D-HEVC WD

Thanks **Sharp** for the cross checking (JCT3V-G0170).

