

JCT3V-G0073 – CE3 related: Simplification of DV Derivation and Default DV Improvement

Min Woo Park

Multimedia Platform Lab.
DMC R&D Center
Samsung Electronics

Introduction

- ❖ This contribution is follow up of JCT3V-F0143
- ❖ In this proposal, we additionally propose the method in case when camera parameters are unavailable
- ❖ Current DV Derivation Process
 - NBDV derivation
 - Search for DV from 2 temporal DCP neighboring blocks
 - Search for DV from 2 spatial DCP neighboring blocks
 - Search for DV from 2 spatial MCP neighboring blocks (**DV-MCP process**)
 - If DV is unavailable, DV is set to (0, 0) by default
 - DV-MCP process needs
 - additional storage to keep DVs and their availability flags of spatial neighboring blocks
 - large number of operations, especially comparisons (based on Spec.)
 - ⊕ Whole NBDV derivation process: 101 comparisons
 - ⊕ For DV-MCP process: 59 comparisons

Proposed Method

- ❖ To simplify NBDV derivation
 - It is proposed to remove DV-MCP process from the NBDV derivation
- ❖ To improve Default DV performance
 - It is proposed to change default DV and to use default DV for ARP
 - When camera parameters are available
 - Default DV is set to DV corresponding to the depth value 128
 - When camera parameters are unavailable
 - Default DV is set to $(-128, 0)$ or $(128, 0)$ according to the view direction
- ❖ Proposed NBDV derivation
 - Search for DV from 2 temporal DCP neighboring blocks
 - Search for DV from 2 spatial DCP neighboring blocks
 - ~~■ Search for DV from 2 spatial MCP neighboring blocks (DV-MCP process)~~
 - If DV is unavailable,
 - If camera parameters are available, DV is set to DV of the depth value 128
 - Otherwise, DV is set to $(-128, 0)$ or $(128, 0)$ according to the view direction
 - DV is set as available

Simulation Results

❖ Based on CTC with HTM9.0r1

	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%	0.08%	0.22%	0.05%	0.02%	-0.04%	99.1%	93.3%	96.9%
Kendo	0.00%	-0.07%	-0.08%	-0.03%	0.00%	-0.09%	100.4%	107.6%	102.2%
Newspaper_CC	0.00%	-0.30%	0.10%	-0.02%	-0.02%	-0.02%	100.0%	104.3%	102.5%
GT_Fly	0.00%	-0.05%	-0.07%	-0.01%	-0.01%	-0.03%	100.1%	108.2%	99.7%
Poznan_Hall2	0.00%	0.13%	0.10%	0.05%	0.02%	0.09%	101.1%	102.5%	95.4%
Poznan_Street	0.00%	0.07%	0.08%	0.04%	0.04%	0.03%	100.8%	107.7%	101.2%
Undo_Dancer	0.00%	0.07%	-0.02%	0.02%	0.02%	0.00%	99.8%	101.4%	99.6%
Shark	0.00%	-0.03%	-0.23%	-0.02%	-0.03%	-0.02%	99.2%	109.4%	98.3%
1024x768	0.00%	-0.10%	0.08%	0.00%	0.00%	-0.05%	99.8%	101.7%	100.5%
1920x1088	0.00%	0.04%	-0.03%	0.02%	0.01%	0.01%	100.2%	105.8%	98.9%
average	0.00%	-0.01%	0.01%	0.01%	0.00%	-0.01%	100.1%	104.3%	99.5%

no coding loss

→ 0.01% bit-saving
for synthesized views

❖ Based on non-CTC (BVSP and DoNBDV off)

	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%	-0.29%	-0.81%	-0.20%	-0.19%	-0.24%	100.0%	101.7%	102.5%
Kendo	0.00%	-0.43%	-0.41%	-0.12%	-0.10%	-0.26%	99.5%	95.1%	100.0%
Newspaper_CC	0.00%	0.36%	1.11%	0.27%	0.21%	0.28%	100.1%	101.3%	99.2%
GT_Fly	0.00%	0.66%	0.33%	0.11%	0.10%	0.08%	100.3%	100.6%	101.8%
Poznan_Hall2	0.00%	-0.50%	-1.24%	-0.37%	-0.35%	-0.23%	102.0%	111.4%	103.2%
Poznan_Street	0.00%	0.75%	0.58%	0.20%	0.21%	0.16%	100.4%	105.2%	98.5%
Undo_Dancer	0.00%	-0.19%	-0.11%	-0.02%	-0.02%	-0.06%	100.3%	94.1%	99.7%
Shark	0.00%	0.40%	0.50%	0.11%	0.11%	0.07%	100.5%	103.8%	100.8%
1024x768	0.00%	-0.12%	-0.04%	-0.02%	-0.03%	-0.07%	99.9%	99.3%	100.6%
1920x1088	0.00%	0.23%	0.01%	0.01%	0.01%	0.00%	100.7%	103.0%	100.8%
average	0.00%	0.10%	-0.01%	0.00%	0.00%	-0.02%	100.4%	101.6%	100.7%

no coding loss

→ This test assumes that
the camera parameters
are unavailable at DV
derivation process

→ 0.02% gain
for synthesized views

Conclusions

- ❖ We propose to remove DV-MCP and to improve Default DV
 - Additional storage for DV derivation is completely removed
 - Comparison operations are reduced by 58%
 - No coding loss on both CTC and non-CTC
 - 0.01% bit saving for synthesized views on CTC
 - 0.02% bit saving for synthesized views on non-CTC
- ❖ We recommend to adopt the proposed method into next 3D-HEVC WD

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