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| **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**  2nd Meeting: Shanghai, CN, 13–19 Oct. 2012 | Document: JCT3V-B0145 |

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| *Title:* | **HTM 4.0 Coding Performance Evaluation** | | |
| *Status:* | Input Document | | |
| *Purpose:* | Information | | |
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# Abstract

This contribution reports the result of coding performance evaluation of the HTM 4.0 on JCT-3V (3DV), selected MVC, and two stereo 3DTV sequences. On dependent views of the JCT-3V sequences, it achieves about 60% BD-rate savings over simulcast on average. For MVC sequences, the corresponding BD-rate savings range from 20% to 40% except for a few sequences. Lastly, on two sample stereo broadcast sequences, the gains were around 45%.

# Introduction

The 3D-HEVC aims to achieve higher compression efficiency by capitalizing on inter-view correlation by such means as DCP (Disparity Compensated Prediction) and Motion Information Reuse. This contribution reports how much bit-savings could be achieved for coding of dependent views using the HTM 4.0 over simulcast.

# Test Conditions

The CTC (Common Test Condition) was used throughout the experiments for evaluating the performance of the HTM 4.0. The anchor was generated by simulcast coding of all the views with the base QP assignments that match that of the CTC. For example, the base QP of a dependent view was set to that of the base view plus 3.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| POC | V0 | | V1 | |
| Pic. Type | T / D | Pic. Type | T / D |
| 0 | I | 25 / 34 | P | +3 / +3 |
| 1 | B | 29 / 38 | B | +3 / +3 |
| 2 | B | 28 / 37 | B | +3 / +3 |
| 3 | B | 29 / 38 | B | +3 / +3 |
| 4 | B | 27 / 36 | B | +3 / +3 |
| 5 | B | 29 / 38 | B | +3 / +3 |
| 6 | B | 28 / 37 | B | +3 / +3 |
| 7 | B | 29 / 38 | B | +3 / +3 |
| 8 | P | 26 / 35 | P | +3 / +3 |

Table 1. QP setting for coding experiments

|  |  |  |  |
| --- | --- | --- | --- |
| **Sequences** | **Image Property[[1]](#footnote-2)** | **Camera Arrangement** | **View Pairs** |
| Ballroom  Exit | 640x480, 25fps  (rectified) | 8 cameras with 20cm spacing; 1D/parallel | 0-1  0-1 |
| Uli | 1024x768, 25fps  (non-rectified) | 8 cameras with 20cm spacing; 1D/parallel convergent | 0-1 |
| Race1 | 640x480, 30fps  (non-rectified) | 8 cameras with 20cm spacing; 1D/parallel | 0-1 |
| Flamenco2 | 640x480, 30fps  (non-rectified) | 5 cameras with 20cm spacing; 2D/parallel (Cross) | 1-3 |
| Breakdancers | 1024x768, 15fps  (non-rectified) | 8 cameras with 20cm spacing; 1D/arc | 0-1 |
| Rena | 640x480, 30fps  (rectified) | 100 cameras with 5cm spacing; 1D/parallel | 38-42 |
| Akko&Kayo | 640x480, 30fps  (non-rectified) | 100 cameras with 5cm horizontal and 20 cm vertical spacing; 2D array | 46-50 |

Table 2. MVC Test Sequences



Figure 1. 1080p Sequences Racing 1 (left), Racing 2 (right)

# Results

## HTM4.0 vs. Simulcast on JCT-3V Test Sequences

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | video 0 | video 1 | video 2 | video only | Synthesized  only | coded & synthesized |
| Balloons | 0.0% | -63.2% | -59.4% | -38.6% | -40.2% | -40.3% |
| Kendo | 0.0% | -60.3% | -56.3% | -36.4% | -42.5% | -42.3% |
| Newspapercc | 0.0% | -62.2% | -59.9% | -37.9% | -43.4% | -41.1% |
| GhostTownFly | 0.0% | -83.8% | -83.1% | -54.5% | -56.7% | -55.9% |
| PoznanHall2 | 0.0% | -58.3% | -57.9% | -37.2% | -43.9% | -41.7% |
| PoznanStreet | 0.0% | -72.5% | -72.3% | -45.2% | -43.0% | -43.4% |
| UndoDancer | 0.0% | -78.1% | -79.6% | -51.4% | -61.1% | -57.4% |
| 1024x768 | 0.0% | -61.9% | -58.5% | -37.6% | -42.0% | -41.2% |
| 1920x1088 | 0.0% | -73.2% | -73.2% | -47.1% | -51.2% | -49.6% |
| average | 0.0% | -68.3% | -66.9% | -43.0% | -47.3% | -46.0% |

Table 3. Coding Results using JCT-3V Sequences

|  |  |
| --- | --- |
|  |  |
| HTM 4.0 vs. Simulcast (V1) | HTM 4.0 vs. Simulcast (Coded & Synthesized) |

Figure 2. RD-Performance (GT\_Fly)

|  |  |
| --- | --- |
|  |  |
| HTM 4.0 vs. Simulcast (V1) | HTM 4.0 vs. Simulcast (Coded & Synthesized) |

Figure 3. RD-Performance (Poznan\_Hall2)

## HTM4.0 vs. Simulcast on Selected MVC Test Sequences

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | video 0 | video 1 | Rectification | baseline |
| Ballrooms | 0.0% | -25.0% | O | 20cm |
| Exit | 0.0% | -3.6% | O | 20cm |
| Uli | 0.0% | 3.1% | X | 20cm, convergent |
| Race1 | 0.0% | 4.8% | X | 20cm |
| Flamenco2 | 0.0% | -46.8% | X | 20cm |
| Breakdancers | 0.0% | -19.1% | X | 20cm, arc |
| Rena | 0.0% | -21.5% | O | 20cm |
| Akko\_Kayo | 0.0% | -34.2% | X | 20cm |

## Table 4. Coding Results using MVC Sequences

## HTM4.0 vs. Simulcast on Selected Stereo Broadcast Sequences

|  |  |  |  |
| --- | --- | --- | --- |
|  | video 0 | video 1 | video only |
| Racing1 | 0.0% | -47.8% | -21.2% |
| Racing2 | 0.0% | -44.6% | -20.2% |

# Table 5. Coding Results using stereo broadcast sequences

# Summary

This contribution reported how much bit-savings could be achieved for coding of dependent views using the HTM 4.0 over simulcast. On dependent views of the JCT-3V sequences, it achieves about 60% BD-rate savings over simulcast on average. For MVC sequences, the corresponding BD-rate savings range from 20% to 40% except for a few sequences. Lastly, on two sample stereo broadcast sequences, the gains were around 45%.

1. [↑](#footnote-ref-2)