Performance Evaluation of MV–HEVC

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Objective

- Verification test for the HEVC–based coding of multi–view video as compared to Simulcast HEVC and AVC multi–view coding.
Used Encoders

- MVC: AVC–based multiview video coding (non–base view is coded using inter–view prediction)
- Simulcast HEVC: each view is coded independently
- MV–HEVC: HEVC–based multiview video coding (non–base view is coded using inter–view prediction)
Common Conditions for Encoding

- Inter-view coding structure
  - 2 view case: left–right (in coding order)
  - I–P inter-view prediction for MVC and MV–HEVC

- Temporal prediction structure: GOP 8, intra every 24 frames (random access at ~1sec)

- Full resolution texture coding

- Codec software: JM v18.6 for MVC, and 3D–HTM v14.1 for Simulcast HEVC and MV–HEVC
## Test Sequences

<table>
<thead>
<tr>
<th>Seq. ID</th>
<th>Name of Test Sequence</th>
<th>View number (left–right)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S03</td>
<td>Undo_Dancer</td>
<td>3–5</td>
</tr>
<tr>
<td>S04</td>
<td>GT_Fly</td>
<td>5–3</td>
</tr>
<tr>
<td>S13</td>
<td>Band06</td>
<td>0–1</td>
</tr>
<tr>
<td>S14</td>
<td>BMX</td>
<td>0–1</td>
</tr>
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</table>
## Encoder Configurations

<table>
<thead>
<tr>
<th>Test Sequence</th>
<th>QP values (Independent view/dependent view)</th>
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<tbody>
<tr>
<td></td>
<td>MVC</td>
</tr>
<tr>
<td></td>
<td>R1</td>
</tr>
<tr>
<td>S03:Undo_Dancer</td>
<td>23/25</td>
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<tr>
<td>S04:GT_Fly</td>
<td>23/24</td>
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<tr>
<td>S14:BMX</td>
<td>22/24</td>
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</table>
## Results

### PSNR analysis

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>S03: Undo_Dancer</td>
<td>R1</td>
<td>9330.47</td>
<td>38.82</td>
<td>9276.81</td>
<td>38.79</td>
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<td>R2</td>
<td>4175.72</td>
<td>35.82</td>
<td>4018.01</td>
<td>35.90</td>
<td>2316.68</td>
<td>35.70</td>
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<td></td>
<td>R3</td>
<td>2216.05</td>
<td>33.39</td>
<td>1836.04</td>
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<td>850.69</td>
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<td>497.01</td>
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<td>7437.65</td>
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<td>R2</td>
<td>3771.89</td>
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<td>2110.64</td>
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<td>R3</td>
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<td>R4</td>
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<td>732.18</td>
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<td>772.22</td>
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<td>537.46</td>
<td>35.03</td>
</tr>
</tbody>
</table>
Results

Subjective test

GT_Fly

BMX

MOS

bitrate [kbps]

MVC
Simulcast HEVC
MV-HEVC

MOS

bitrate [kbps]

MVC
Simulcast HEVC
MV-HEVC
# Results

## Bitrate Savings

<table>
<thead>
<tr>
<th>Test Sequence</th>
<th>Bit rate difference [ % ]</th>
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<th></th>
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</thead>
<tbody>
<tr>
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<td>( MV–HEVC – MVC ) / MVC</td>
<td>R1</td>
<td>R2</td>
<td>R3</td>
<td>R4</td>
<td>Average</td>
<td>R1</td>
<td>R2</td>
<td>R3</td>
<td>R4</td>
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<td>S03: Undo_Dancer</td>
<td>-29.8</td>
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<td>42.3</td>
<td>-42.3</td>
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<tr>
<td>S04: GT_Fly</td>
<td>-36.6</td>
<td>44.0</td>
<td>57.6</td>
<td>-62.4</td>
<td>-50.2</td>
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<td>34.8</td>
<td>-45.1</td>
<td>-36.4</td>
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<td>S13: Band06</td>
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<td>Average</td>
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<td>-27.3</td>
<td>33.5</td>
<td>-36.7</td>
<td>-34.8</td>
<td>-33.1</td>
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</table>
Conclusions

- MV-HEVC codec achieves comparable quality relative to the Simulcast HEVC codec with approximately 30% less bitrate or the MVC codec with approximately 50% less bitrate, on average.
Reference