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| *Title:* | **non-SCE3: Combined inter-layer prediction: sharpness and region-based cross-color filters** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Proposal | | |
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| *Source:* | Huawei | | |

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# Abstract

In the proposed contribution, we consider the combination of two inter-layer filtering methods for the scalable extension of the HEVC standard. The proposal combines sharpness and inter-layer cross-color filters presented in [5] and , respectively.

The simulation results show **3.3%** and **2.1%** BD rate savings for Luma and 13.0-22.4% and 12.2-24.6% BD rate savings for Chroma on average for “All Intra” test for AI-2x and AI-1.5x, respectively, compared with anchors. The Class A test sequences show **4.9%** of BD rate savings. The encoding times are 113.8% and 110.6%, and the decoding times are 127.2% and 126.6%, respectively. For “Random access” test, it shows 2.0% and 1.3% of BD rate saving for RA-2x and RA-1.5x, respectively.

# Introduction

The main goal of this proposal is to show that these two methods of prediction are orthogonal and the results are additive in the sense of BR-rate reduction,which has been confirmed by the results which are shown below.

# Results

The proposed method has been implemented based on SHM3.01 and simulated under the common test conditions. summarizes the experimental results. It reportedly shows 3.3% and 2.1% BD rate savings for Luma and 13.0-22.4% and 12.2-24.6% BD rate savings for Chroma on average for “All Intra” test for AI-2x and AI-1.5x, respectively, compared with anchors. The Class A test sequences shows 4.9% of BD rate savings. Encoding times are 113.8% and 110.6%, and decoding times are 127.2% and 126.6%, respectively. For “Random access” test it shows 2.0% and 1.3% of BD rate saving for RA-2x and RA-1.5x, respectively.

Table 1. Experimental results for AI, RA, LDB and LDP configuration

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|  | **AI HEVC 2x** | | | **AI HEVC 1.5x** | | |  |  |  |
|  | Y | U | V | Y | U | V |  |  |  |
| Class A | -4.9% | -16.8% | -20.4% |  |  |  |  |  |  |
| Class B | -2.7% | -11.5% | -23.1% | -2.1% | -12.2% | -24.6% |  |  |  |
| **Overall (Test vs Ref)** | -3.3% | -13.0% | -22.4% | -2.1% | -12.2% | -24.6% |  |  |  |
| **Overall (Test vs single layer)** | 9.0% | 0.2% | -9.8% | 8.2% | -3.2% | -15.7% |  |  |  |
| **Overall (Ref vs single layer)** | 12.8% | 14.9% | 14.6% | 10.5% | 9.8% | 9.3% |  |  |  |
| **EL only (Test vs Ref)** | -5.7% | -16.0% | -25.7% | -4.3% | -16.5% | -30.4% |  |  |  |
| Enc Time[%] | 113.8% | | | 110.6% | | |  |  |  |
| Dec Time[%] | 127.2% | | | 126.6% | | |  |  |  |
| BL Match | Matched | | | Matched | | |  |  |  |

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|  | **RA HEVC 2x** | | | **RA HEVC 1.5x** | | | **RA HEVC SNR** | | |
|  | Y | U | V | Y | U | V | Y | U | V |
| Class A | -3.5% | -21.7% | -23.3% |  |  |  | -1.7% | -15.2% | -18.4% |
| Class B | -1.4% | -13.1% | -24.4% | -1.3% | -14.6% | -26.7% | -0.9% | -12.1% | -23.4% |
| **Overall (Test vs Ref)** | -2.0% | -15.6% | -24.1% | -1.3% | -14.6% | -26.7% | -1.1% | -13.0% | -22.0% |
| **Overall (Test vs single layer)** | 16.6% | 11.9% | 1.0% | 14.7% | 10.2% | -3.8% | 13.1% | 14.8% | 5.7% |
| **Overall (Ref vs single layer)** | 19.0% | 33.1% | 31.8% | 16.2% | 28.9% | 29.2% | 14.4% | 32.1% | 34.2% |
| **EL only (Test vs Ref)** | -3.2% | -17.2% | -25.9% | -1.7% | -16.6% | -29.5% | -1.5% | -14.4% | -23.7% |
| Enc Time[%] | 112.3% | | | 110.3% | | | 107.3% | | |
| Dec Time[%] | 145.3% | | | 139.5% | | | 137.8% | | |
| BL Match | Matched | | | Matched | | | Matched | | |

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|  | **LD-B HEVC 2x** | | | **LD-B HEVC 1.5x** | | | **LD-B HEVC SNR** | | |
|  | Y | U | V | Y | U | V | Y | U | V |
| Class A | -2.6% | -19.2% | -20.0% |  |  |  | -1.5% | -13.9% | -17.7% |
| Class B | -0.8% | -8.8% | -16.8% | -0.9% | -11.9% | -23.5% | -0.7% | -8.8% | -19.8% |
| **Overall (Test vs Ref)** | -1.3% | -11.8% | -17.8% | -0.9% | -11.9% | -23.5% | -0.9% | -10.3% | -19.2% |
| **Overall (Test vs single layer)** | 26.6% | 21.6% | 14.9% | 23.7% | 17.3% | 4.7% | 23.2% | 20.6% | 12.7% |
| **Overall (Ref vs single layer)** | 28.3% | 38.9% | 39.7% | 24.8% | 33.2% | 36.0% | 24.3% | 34.7% | 39.5% |
| **EL only (Test vs Ref)** | -2.1% | -12.8% | -18.7% | -1.3% | -13.0% | -24.9% | -1.3% | -11.2% | -20.4% |
| Enc Time[%] | 108.7% | | | 107.0% | | | 105.4% | | |
| Dec Time[%] | 143.0% | | | 137.4% | | | 134.9% | | |
| BL Match | Matched | | | Matched | | | Matched | | |

# References

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# Patent rights declaration(s)

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