|  |  |
| --- | --- |
| **Joint Collaborative Team on Video Coding (JCT-VC)**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  18th Meeting: Sapporo, JP, 30 June – 9 July 2014 | Document: JCTVC-R0172 |

|  |  |  |  |
| --- | --- | --- | --- |
| *Title:* | **SCCE3: crosscheck report of SCCE3 test A.7 encoder-improved palette generation** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Proposal | | |
| *Author(s) or Contact(s):* | Yuwen He, Yan Ye 9710 Scranton Rd, #250 San Diego, CA 92121, USA | Tel: Email: | +1-858-210-4819/-4803 [yuwen.he@interdigital.com](mailto:yuwen.he@interdigital.com) [yan.ye@interdigital.com](mailto:yan.ye@interdigital.com) |
| *Source:* | InterDigital Communications, Inc. | | |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Abstract

This documents reports the crosscheck results for SCCE3 test A.7 on encoder-improved palette generation (JCTVC-R0064). The source code provided by the proponents was verified to be consistent with the description in JCTVC-Q1123. The rate-distortion performance was evaluated for SCCE3 test conditions JCTVC-Q1123 and matches the one provided in JCTVC-R0064.

# Introduction

JCTVC-R0048 [2] describes a technique where an improved palette table generation method is used to derive the palette table for palette mode coding. The main steps are the use of histogram of the pixel values in a CU to derive the palette, use of rate-distortion checking to prune the palette (decide whether pixels should be coded as escape pixel or as index), use of centroids in deriving the final palette. More details of this technique can be found in JCTVC-R0064.

# Simulation results

The performance of the SCCE3 test A.7 is evaluated according to SCCE3 test conditions [1] and is summarized below. The detailed results can be found in the attached excel datasheets.

Table 1. Average BD rate reduction for lossless coding compared with SCCE3 full frame IntraBC anchors

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **All Intra** | | | |
|  | Bit-rate saving (Total) | Bit-rate saving (Average) | Bit-rate saving (Min) | Bit-rate saving (Max) |
|  |
| RGB, text & graphics with motion, 1080p | 0.2% | 0.1% | -0.6% | 0.8% |
| RGB, text & graphics with motion,720p | -0.1% | -0.2% | -0.6% | 0.3% |
| RGB, mixed content, 1440p | 0.1% | 0.1% | 0.0% | 0.2% |
| RGB, mixed content, 1080p | 0.1% | 0.1% | 0.1% | 0.1% |
| RGB, Animation, 720p | 0.0% | 0.0% | 0.0% | 0.0% |
| RGB, camera captured, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, text & graphics with motion, 1080p | -0.2% | -0.2% | -1.0% | 0.4% |
| YUV, text & graphics with motion,720p | -0.3% | -0.3% | -0.7% | 0.1% |
| YUV, mixed content, 1440p | 0.1% | 0.1% | 0.0% | 0.2% |
| YUV, mixed content, 1080p | 0.1% | 0.1% | 0.1% | 0.1% |
| YUV, Animation, 720p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, camera captured, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| Enc Time[%] | 94% | | | |
| Dec Time[%] | 94% | | | |
|  |  |  |  |  |
|  | **Random Access** | | | |
|  | Bit-rate saving (Total) | Bit-rate saving (Average) | Bit-rate saving (Min) | Bit-rate saving (Max) |
|  |
| RGB, text & graphics with motion, 1080p | 0.6% | 0.0% | -0.9% | 0.7% |
| RGB, text & graphics with motion,720p | 0.0% | -0.1% | -0.3% | 0.0% |
| RGB, mixed content, 1440p | 0.0% | 0.0% | 0.0% | 0.0% |
| RGB, mixed content, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| RGB, Animation, 720p | 0.0% | 0.0% | 0.0% | 0.0% |
| RGB, camera captured, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, text & graphics with motion, 1080p | 0.2% | -0.3% | -1.1% | 0.3% |
| YUV, text & graphics with motion,720p | 0.0% | -0.2% | -0.5% | 0.0% |
| YUV, mixed content, 1440p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, mixed content, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, Animation, 720p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, camera captured, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| Enc Time[%] | 89% | | | |
| Dec Time[%] | 91% | | | |
|  |  |  |  |  |
|  |  |  |  |  |
|  | **Low Delay B** | | | |
|  | Bit-rate saving (Total) | Bit-rate saving (Average) | Bit-rate saving (Min) | Bit-rate saving (Max) |
|  |
| RGB, text & graphics with motion, 1080p | 0.6% | -0.1% | -0.9% | 0.7% |
| RGB, text & graphics with motion,720p | 0.0% | -0.1% | -0.3% | 0.0% |
| RGB, mixed content, 1440p | 0.0% | 0.0% | 0.0% | 0.0% |
| RGB, mixed content, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| RGB, Animation, 720p | 0.0% | 0.0% | 0.0% | 0.0% |
| RGB, camera captured, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, text & graphics with motion, 1080p | 0.2% | -0.3% | -1.1% | 0.3% |
| YUV, text & graphics with motion,720p | 0.0% | -0.2% | -0.5% | 0.0% |
| YUV, mixed content, 1440p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, mixed content, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, Animation, 720p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, camera captured, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| Enc Time[%] | 88% | | | |
| Dec Time[%] | 89% | | | |

Table 2. Average BD rate reduction for lossy coding compared with SCCE3 full frame IntraBC anchors

|  |  |  |  |
| --- | --- | --- | --- |
|  | **All Intra** | | |
|  | G/Y | B/U | R/V |
| RGB, text & graphics with motion, 1080p | -2.4% | -2.2% | -2.2% |
| RGB, text & graphics with motion,720p | -1.6% | -1.2% | -1.3% |
| RGB, mixed content, 1440p | -1.3% | -1.0% | -1.1% |
| RGB, mixed content, 1080p | -1.3% | -1.2% | -1.3% |
| RGB, Animation, 720p | 0.0% | -0.1% | -0.1% |
| RGB, camera captured, 1080p | 0.0% | 0.0% | 0.0% |
| YUV, text & graphics with motion, 1080p | -2.4% | -3.2% | -3.0% |
| YUV, text & graphics with motion,720p | -0.8% | -1.8% | -2.3% |
| YUV, mixed content, 1440p | -0.9% | -2.1% | -2.3% |
| YUV, mixed content, 1080p | -1.1% | -2.4% | -2.8% |
| YUV, Animation, 720p | 0.0% | -0.2% | -0.3% |
| YUV, camera captured, 1080p | 0.0% | 0.0% | 0.0% |
| Enc Time[%] | 98% | | |
| Dec Time[%] | 96% | | |
|  |  |  |  |
|  | **Random Access** | | |
|  | G/Y | B/U | R/V |
| RGB, text & graphics with motion, 1080p | -1.2% | -1.2% | -1.2% |
| RGB, text & graphics with motion,720p | -1.4% | -1.0% | -1.2% |
| RGB, mixed content, 1440p | -0.9% | -0.5% | -0.6% |
| RGB, mixed content, 1080p | -0.7% | -0.5% | -0.7% |
| RGB, Animation, 720p | 0.0% | -0.1% | 0.0% |
| RGB, camera captured, 1080p | 0.1% | 0.1% | 0.1% |
| YUV, text & graphics with motion, 1080p | -1.1% | -2.0% | -1.8% |
| YUV, text & graphics with motion,720p | -0.7% | -1.5% | -2.3% |
| YUV, mixed content, 1440p | -0.4% | -1.4% | -1.9% |
| YUV, mixed content, 1080p | -0.6% | -1.5% | -1.9% |
| YUV, Animation, 720p | 0.2% | -0.1% | -0.2% |
| YUV, camera captured, 1080p | 0.1% | 0.2% | 0.3% |
| Enc Time[%] | 93% | | |
| Dec Time[%] | 97% | | |
|  |  |  |  |
|  | **Low delay B** | | |
|  | G/Y | B/U | R/V |
| RGB, text & graphics with motion, 1080p | -1.2% | -1.3% | -1.2% |
| RGB, text & graphics with motion,720p | -1.2% | -0.9% | -1.1% |
| RGB, mixed content, 1440p | -1.0% | -0.6% | -0.7% |
| RGB, mixed content, 1080p | -0.6% | -0.2% | -0.5% |
| RGB, Animation, 720p | -0.1% | -0.2% | -0.1% |
| RGB, camera captured, 1080p | 0.1% | 0.1% | 0.1% |
| YUV, text & graphics with motion, 1080p | -0.9% | -1.7% | -1.6% |
| YUV, text & graphics with motion,720p | -0.3% | -0.9% | -1.6% |
| YUV, mixed content, 1440p | -0.5% | -1.3% | -2.4% |
| YUV, mixed content, 1080p | -0.5% | -2.0% | -1.5% |
| YUV, Animation, 720p | 0.0% | 0.0% | -0.1% |
| YUV, camera captured, 1080p | 0.1% | 0.1% | 0.2% |
| Enc Time[%] | 93% | | |
| Dec Time[%] | 94% | | |

# References

1. Y.-W. Huang, P. Onno, R. Joshi, R. Cohen, X. Xiu, Z. Ma, “HEVC Screen Content Core Experiment 3 (SCCE3): Palette mode”, JCTVC-Q1123, Apr. 2014.

1. [W. Pu](mailto:wpu@qti.qualcomm.com), [V. Seregin](mailto:vseregin@qti.qualcomm.com), R. Joshi, M. Karczewicz, J. Sole, “SCCE3: Test A.7 – Encoder-Improved Palette Generation”, JCTVC-R0064, Jul. 2014.