

Non-SCCE3: Modified Escaped pixel mode in palette based coding[JCTVC-R0080]

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■ Palette base coding tools in SCCE3.

- A pre-defined parameter, `max_palette_size`, is used.
- If the number of distinct pixel values in a CU is less than or equal to `max_palette_size`, all distinct pixel values will be included in palette.

| | | | | | | | |
|----|----|----|----|----|----|----|----|
| C8 | C0 | C1 | C2 | C2 | C1 | C0 | C3 |
| C0 | C0 | C1 | C2 | C2 | C1 | C0 | C0 |
| C0 | C0 | C1 | C2 | C2 | C1 | C0 | C0 |
| C0 | C0 | C1 | C2 | C2 | C1 | C0 | C0 |
| C0 | C0 | C1 | C2 | C2 | C1 | C0 | C0 |
| C6 | C6 | C0 | C0 | C1 | C1 | C7 | C7 |
| C6 | C6 | C6 | C0 | C0 | C0 | C7 | C7 |
| C4 | C4 | C4 | C4 | C4 | C0 | C0 | C5 |

`max_palette_size=32`

`Palette={C0,C1,C2,C3,C4,C5,C6,C7,C8}`

- If palette size is less than max_palette_size,
 - scan CU to get {index,run} pairs. If all of the following conditions are true, the corresponding palette_entry is removed from palette, i.e. it becomes escaped pixel.
 - The {index,run} pair occurs only once in whole CU.
 - The palette_entry corresponding above {index,run} pair can not be predicted.
 - {escaped pixel value,run} is coded for escaped pixels.
 - predictor of palette is generated using two parts. One part is palette, the other is reconstructed pixel values in “escape_mode”.

| | | | | | | | |
|----|----|----|----|----|----|----|----|
| C8 | C0 | C1 | C2 | C2 | C1 | C0 | C3 |
| C0 | C0 | C1 | C2 | C2 | C1 | C0 | C0 |
| C0 | C0 | C1 | C2 | C2 | C1 | C0 | C0 |
| C0 | C0 | C1 | C2 | C2 | C1 | C0 | C0 |
| C0 | C0 | C1 | C2 | C2 | C1 | C0 | C0 |
| C6 | C6 | C0 | C0 | C1 | C1 | C7 | C7 |
| C6 | C6 | C6 | C0 | C0 | C0 | C7 | C7 |
| C4 | C4 | C4 | C4 | C4 | C0 | C0 | C5 |

max_palette_size=32

Palette={C0,C1,C2, C6,C7}

Coded escaped pixels: {C8,1}, {C3,1},{C4,5},{C5,1}

Predictor for next CU:{C0,C1,C2,C6,C7, C8,C3,C4,C5}

Simulation results(AI-lossless)

■ Anchor: SCCE3 (2CTU IBC) anchor

| | All Intra | | | |
|-----------------------------------------|----------------------------|------------------------------|--------------------------|--------------------------|
| | Bit-rate saving (Total) | Bit-rate saving (Average) | Bit-rate saving (Min) | Bit-rate saving (Max) |
| RGB, text & graphics with motion, 1080p | 1.7% | 1.7% | 1.0% | 2.2% |
| RGB, text & graphics with motion,720p | 0.7% | 0.5% | 0.0% | 0.9% |
| RGB, mixed content, 1440p | 0.3% | 0.4% | 0.1% | 0.7% |
| RGB, mixed content, 1080p | 0.4% | 0.4% | 0.4% | 0.4% |
| 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 | 1.6% | 1.8% | 0.9% | 3.2% |
| YUV, text & graphics with motion,720p | 0.4% | 0.4% | 0.0% | 0.7% |
| YUV, mixed content, 1440p | 0.3% | 0.4% | 0.1% | 0.6% |
| YUV, mixed content, 1080p | 0.4% | 0.4% | 0.4% | 0.4% |
| 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[%] | 100% | | | |
| Dec Time[%] | 112% | | | |

Simulation results(RA-lossless)

■ Anchor: SCCE3 (2CTU IBC) anchor

| | Random Access | | | |
|-----------------------------------------|----------------------------|------------------------------|--------------------------|--------------------------|
| | Bit-rate saving (Total) | Bit-rate saving (Average) | Bit-rate saving (Min) | Bit-rate saving (Max) |
| RGB, text & graphics with motion, 1080p | 1.1% | 1.0% | 0.9% | 1.1% |
| RGB, text & graphics with motion, 720p | 0.1% | 0.2% | 0.0% | 0.3% |
| RGB, mixed content, 1440p | 0.0% | 0.0% | 0.0% | 0.1% |
| 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 | 0.8% | 1.0% | 0.7% | 1.5% |
| YUV, text & graphics with motion, 720p | 0.1% | 0.1% | 0.0% | 0.3% |
| YUV, mixed content, 1440p | 0.0% | 0.0% | 0.0% | 0.1% |
| 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[%] | 97% | | | |
| Dec Time[%] | 113% | | | |

Simulation results(LB-lossless)

■ Anchor: SCCE3 (2CTU IBC) anchor

| | 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 | 1.0% | 0.8% | 0.6% | 1.0% |
| RGB, text & graphics with motion,720p | 0.1% | 0.1% | 0.0% | 0.3% |
| 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 | 0.6% | 0.8% | 0.6% | 1.2% |
| YUV, text & graphics with motion,720p | 0.0% | 0.1% | 0.0% | 0.3% |
| 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[%] | 93% | | | |
| Dec Time[%] | 109% | | | |

Simulation results(AI-lossy)

■ Anchor: SCCE3 (2CTU IBC) anchor

| | All Intra | | |
|-----------------------------------------|-----------|-------|-------|
| | G/Y | B/U | R/V |
| RGB, text & graphics with motion, 1080p | -1.0% | -1.1% | -1.0% |
| RGB, text & graphics with motion,720p | -0.4% | -0.4% | -0.4% |
| RGB, mixed content, 1440p | -0.3% | -0.2% | -0.2% |
| RGB, mixed content, 1080p | -0.3% | -0.4% | -0.4% |
| RGB, Animation, 720p | 0.0% | 0.0% | 0.0% |
| RGB, camera captured, 1080p | 0.0% | 0.0% | 0.0% |
| YUV, text & graphics with motion, 1080p | -0.9% | -0.8% | -0.9% |
| YUV, text & graphics with motion,720p | -0.4% | -0.4% | -0.4% |
| YUV, mixed content, 1440p | -0.2% | -0.3% | -0.2% |
| YUV, mixed content, 1080p | -0.3% | -0.5% | -0.5% |
| YUV, Animation, 720p | 0.0% | 0.0% | 0.0% |
| YUV, camera captured, 1080p | 0.0% | 0.0% | 0.0% |
| Enc Time[%] | 102% | | |
| Dec Time[%] | 102% | | |

Simulation results(RA-lossy)

■ Anchor: SCCE3 (2CTU IBC) anchor

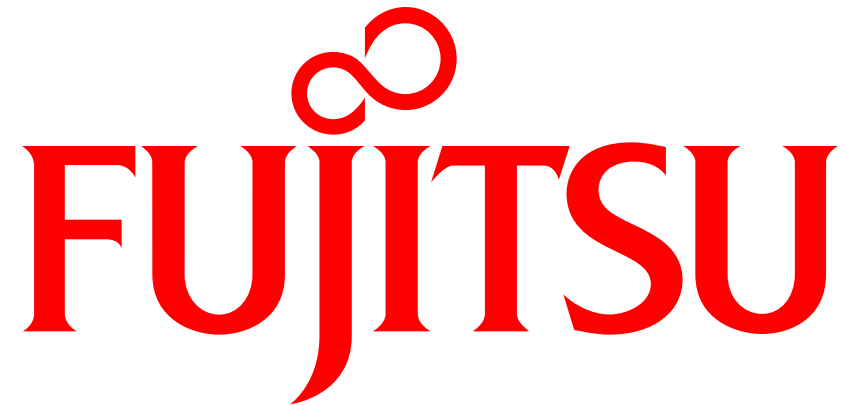
| | Random Access | | |
|-----------------------------------------|---------------|-------|-------|
| | G/Y | B/U | R/V |
| RGB, text & graphics with motion, 1080p | -0.4% | -0.5% | -0.5% |
| RGB, text & graphics with motion,720p | -0.2% | -0.3% | -0.2% |
| RGB, mixed content, 1440p | -0.1% | -0.1% | -0.1% |
| RGB, mixed content, 1080p | -0.2% | -0.2% | -0.3% |
| RGB, Animation, 720p | 0.0% | -0.1% | 0.0% |
| RGB, camera captured, 1080p | 0.0% | 0.1% | 0.0% |
| YUV, text & graphics with motion, 1080p | -0.3% | -0.3% | -0.4% |
| YUV, text & graphics with motion,720p | -0.3% | -0.2% | -0.2% |
| YUV, mixed content, 1440p | -0.1% | -0.2% | -0.2% |
| YUV, mixed content, 1080p | -0.2% | -0.2% | -0.3% |
| YUV, Animation, 720p | 0.0% | 0.0% | -0.2% |
| YUV, camera captured, 1080p | 0.0% | 0.0% | 0.0% |
| Enc Time[%] | 101% | | |
| Dec Time[%] | 104% | | |

Simulation results(LB-lossy)

■ Anchor: SCCE3 (2CTU IBC) anchor

| | Low delay B | | |
|-----------------------------------------|-------------|-------|-------|
| | G/Y | B/U | R/V |
| RGB, text & graphics with motion, 1080p | -0.5% | -0.5% | -0.5% |
| RGB, text & graphics with motion,720p | -0.4% | -0.2% | -0.2% |
| RGB, mixed content, 1440p | -0.2% | -0.1% | 0.0% |
| RGB, mixed content, 1080p | -0.1% | -0.3% | 0.0% |
| RGB, Animation, 720p | 0.0% | 0.1% | 0.0% |
| RGB, camera captured, 1080p | 0.0% | 0.0% | 0.0% |
| YUV, text & graphics with motion, 1080p | -0.2% | -0.2% | -0.2% |
| YUV, text & graphics with motion,720p | 0.0% | 0.2% | 0.1% |
| YUV, mixed content, 1440p | 0.0% | 0.0% | -0.3% |
| YUV, mixed content, 1080p | -0.2% | -0.6% | -0.7% |
| YUV, Animation, 720p | 0.0% | 0.0% | -0.1% |
| YUV, camera captured, 1080p | 0.0% | 0.0% | 0.0% |
| Enc Time[%] | 101% | | |
| Dec Time[%] | 102% | | |

- Gain is showed for the modified escaped pixel mode.
- Suggest to list this proposal to future CE.



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