JCTVC-R0075
Non-SCCE3: Encoder modification of palette mode for escape pixels

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Escape value signaling in the current palette mode

- The encoder will not use an escape color index when the palette size is less than 31.

- The last index for the escape color is always kept.

- There is space for encoder improvement
  - Change a few pixels which are quantized to some specific major colors to the escape pixels

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Our solution

- The amount of pixels which are quantized to a specific major color is less than or equal to two in a palette CU,
  - Remove the specific major color
  - Refine the major color table
  - Convert the pixels with the specific major color into escape pixels

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An example of the 8X8 palette CU

- Major color table modification
  - If the amount of major color index number one and two are both less than two, remove the two major colors from the major color table.
  - Use the escape pixel to represent the two samples.

Major color index number	Total amount
0	62
1	1
2	1
3(escape)	0

Major color index number	Total amount
0	62
1(escape)	2

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Test condition

- Under CTC JCTVC-Q1015
- Experimental results are combined with JCTVC-R0051

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Results of AI, Lossy

	All Intra (Full Frame)			All Intra (2CTU)		
	G/Y	B/U	R/V	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	-1.2%	-1.1%	-1.2%	-1.4%	-1.3%	-1.3%
RGB, text & graphics with motion,720p	-0.4%	-0.3%	-0.3%	-0.6%	-0.3%	-0.4%
RGB, mixed content, 1440p	-0.6%	-0.4%	-0.4%	-0.7%	-0.6%	-0.5%
RGB, mixed content, 1080p	-0.7%	-0.6%	-0.6%	-0.8%	-0.8%	-0.8%
RGB, Animation, 720p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
RGB, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
YUV, text & graphics with motion, 1080p	-1.1%	-1.2%	-1.2%	-1.4%	-1.4%	-1.5%
YUV, text & graphics with motion,720p	-0.1%	-0.3%	-0.5%	-0.5%	-0.5%	-0.9%
YUV, mixed content, 1440p	-0.3%	-0.5%	-0.7%	-0.4%	-0.6%	-0.7%
YUV, mixed content, 1080p	-0.5%	-1.2%	-1.1%	-0.6%	-1.0%	-1.1%
YUV, Animation, 720p	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%
YUV, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Enc Time[%]	101%			101%		
Dec Time[%]	100%			100%		

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Conclusion

- A simple scheme to determine whether to use the escape color index or not on the encoder side.

- To be combined with the adaptive escape scheme, there is a 1.4% gain.

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Recommendations

- Recommend to further study the encoder issue combined with adaptive escape scheme

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Acknowledgement

- Thanks Canon for cross check

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Thank You

Appendix

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Results of RA, Lossy

	Random Access (Full Frame)			Random Access (2CTU)		
	G/Y	B/U	R/V	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	-0.5%	-0.5%	-0.6%	-0.6%	-0.6%	-0.7%
RGB, text & graphics with motion,720p	0.0%	0.1%	0.0%	-0.2%	0.1%	0.1%
RGB, mixed content, 1440p	-0.3%	-0.1%	-0.2%	-0.4%	-0.3%	-0.2%
RGB, mixed content, 1080p	-0.4%	-0.2%	-0.3%	-0.1%	-0.2%	-0.3%
RGB, Animation, 720p	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%
RGB, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
YUV, text & graphics with motion, 1080p	-0.4%	-0.6%	-0.5%	-0.5%	-0.5%	-0.6%
YUV, text & graphics with motion,720p	0.1%	0.1%	-0.1%	-0.2%	0.0%	-0.3%
YUV, mixed content, 1440p	-0.2%	-0.2%	-0.7%	-0.2%	-0.4%	-0.5%
YUV, mixed content, 1080p	-0.1%	-0.5%	-0.7%	-0.1%	-0.2%	-0.4%
YUV, Animation, 720p	0.1%	0.0%	0.0%	0.1%	0.2%	0.0%
YUV, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Enc Time[%]	100%			100%		
Dec Time[%]	100%			100%		

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Results of LB, Lossy

	Low delay B (Full Frame)			Low delay B (2CTU)		
	G/Y	B/U	R/V	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	-0.7%	-0.7%	-0.7%	-0.7%	-0.7%	-0.8%
RGB, text & graphics with motion,720p	-0.2%	-0.2%	-0.2%	-0.1%	0.0%	0.1%
RGB, mixed content, 1440p	-0.6%	-0.2%	-0.2%	-0.3%	0.0%	0.0%
RGB, mixed content, 1080p	-0.4%	-0.4%	-0.6%	-0.1%	-0.3%	0.1%
RGB, Animation, 720p	-0.1%	-0.1%	-0.1%	0.0%	0.0%	0.0%
RGB, camera captured, 1080p	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%
YUV, text & graphics with motion, 1080p	-0.3%	-0.6%	-0.5%	-0.4%	-0.5%	-0.6%
YUV, text & graphics with motion,720p	0.1%	0.2%	-0.4%	0.1%	0.0%	-0.1%
YUV, mixed content, 1440p	-0.2%	-0.4%	-0.5%	0.0%	0.0%	-0.4%
YUV, mixed content, 1080p	-0.3%	-1.4%	-0.5%	-0.1%	-1.1%	-0.6%
YUV, Animation, 720p	0.0%	0.1%	0.0%	-0.1%	-0.1%	0.0%
YUV, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Enc Time[%]	100%			100%		
Dec Time[%]	101%			100%		

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