

JVET-Q0493

Non-CE2: Palette encoder improvements for lossless coding

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Introduction

- In current VVC palette encoder
 - The palette table are determined by RD decision
 - K means clustering
 - Each pixel is assigned to a palette table element of minimum sum of absolute distance (SAD) if the SAD is smaller than a pre-defined error
 - If the minimum SAD of a pixel to the palette table is larger than pre-defined error, the pixel is added in the palette table as a new entry
 - The palette distortion is scaled down to 8 bit scale

The Proposed Methods

- Firstly, it is proposed to use correct precision of distortion based on input bit-depth during the derivation of the palette for lossless coding
- Secondly, it is proposed to remove the unnecessary calculation of distortion during palette coding RD decision on lossless

Anchor: PLT On

Test: PLT On + Encoder improvements

Dual Tree On

	All Intra Main			Random Access Main			Low delay B Main		
	compression ratio		Bit-rate saving	compression ratio		Bit-rate saving	compression ratio		Bit-rate saving
	VTM7	test		VTM7	test		VTM7	test	
TGM 1080p	20.1	21.3	-6.13%	42.5	44.6	-3.35%	62.1	64.7	-2.69%
TGM 720p	11.0	12.1	-7.19%	13.9	15.3	-4.28%	25.2	26.5	-2.14%
Animation	5.8	6.9	-7.66%	1.7	2.0	-6.27%	1.6	2.0	-7.14%
Mixed content	7.2	7.3	-1.89%	6.2	6.2	-0.29%	6.9	6.9	-0.18%
Camera-Captured content	1.9	1.9	0.00%	0.3	0.3	0.00%	0.3	0.3	0.00%
Overall	10.5	11.2	-5.12%	15.6	16.6	-3.14%	23.5	24.5	-2.58%
Enc Time[%]	100%			97%			101%		
Dec Time[%]	93%			97%			93%		

Dual Tree Off

	All Intra Main			Random Access Main			Low delay B Main		
	compression ratio		Bit-rate saving	compression ratio		Bit-rate saving	compression ratio		Bit-rate saving
	VTM7	test		VTM7	test		VTM7	test	
TGM 1080p	26.8	27.4	-2.46%	54.1	55.0	-1.39%	75.9	76.9	-1.11%
TGM 720p	13.4	13.5	-2.30%	16.7	16.8	-0.80%	27.5	27.7	-0.84%
Animation	6.0	7.1	-7.35%	1.7	2.0	-6.24%	1.6	2.0	-7.13%
Mixed content	7.9	8.0	-0.66%	6.3	6.3	-0.12%	7.0	7.0	-0.07%
Camera-Captured content	1.8	1.8	0.00%	0.3	0.3	0.00%	0.3	0.3	0.00%
Overall	12.9	7.1	-2.69%	19.2	19.5	-1.74%	27.5	27.9	-1.84%
Enc Time[%]	100%			103%			99%		
Dec Time[%]	94%			101%			95%		

Anchor: PLT(EG3) On + Encoder improvements

Test: PLT(EG5) On + Encoder improvements

Dual Tree Off

	All Intra Main			Random Access Main			Low delay B Main		
	compression ratio		Bit-rate saving	compression ratio		Bit-rate saving	compression ratio		Bit-rate saving
	VTM7	test		VTM7	test		VTM7	test	
TGM 1080p	27.4	28.2	-2.73%	55.0	56.1	-1.80%	76.9	78.2	-1.61%
TGM 720p	13.5	13.6	-0.87%	16.8	16.9	-0.34%	27.7	27.7	-0.29%
Animation	7.1	7.2	-0.54%	2.0	2.0	-0.52%	2.0	2.0	-0.48%
Mixed content	8.0	8.0	-0.70%	6.3	6.3	-0.11%	7.0	7.0	-0.06%
Camera-Captured content	1.8	1.8	0.00%	0.3	0.3	0.00%	0.3	0.3	0.00%
Overall	13.3	13.5	-1.13%	19.5	19.8	-0.65%	27.9	28.2	-0.58%
Enc Time[%]	99%			96%			99%		
Dec Time[%]	102%			95%			97%		

Dual Tree On

	All Intra Main			Random Access Main			Low delay B Main		
	compression ratio		Bit-rate saving	compression ratio		Bit-rate saving	compression ratio		Bit-rate saving
	VTM7	test		VTM7	test		VTM7	test	
TGM 1080p	21.3	21.8	-2.07%	44.6	45.2	-1.48%	64.7	65.5	-1.40%
TGM 720p	12.1	12.1	-0.59%	15.3	15.3	-0.26%	26.5	26.5	-0.22%
Animation	6.9	7.0	-0.47%	2.0	2.0	-0.51%	2.0	2.0	-0.48%
Mixed content	7.3	7.4	-1.06%	6.2	6.3	-0.18%	6.9	6.9	-0.11%
Camera-Captured content	1.9	1.9	-0.04%	0.3	0.3	0.00%	0.3	0.3	0.00%
Overall	11.2	11.4	-0.96%	16.6	16.7	-0.56%	24.5	24.7	-0.52%
Enc Time[%]	97%			101%			102%		
Dec Time[%]	98%			97%			103%		

Summary

- The proposed method report improvement compared to anchor
- It is recommended to consider adoption the proposed method
- Thanks Alibaba for cross-checking (Q0587)

Thank you