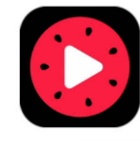


JVET-N0271

CE3-1.5: CCLM DERIVED WITH FOUR NEIGHBOURING SAMPLES

Meng Wang, Kai Zhang, Li Zhang, Hongbin Liu, Jizheng Xu,
Shiqi Wang (Bytedance)

Jurun Li, Shanshe Wang, Wen Gao (Peking University)



Proposed method

- For non-trivial cases (neighbouring samples are more than 2), Four positions are chosen:
 - $S[W'/4, -1], S[3W'/4, -1], S[-1, H'/4], S[-1, 3H'/4]$ when LM mode is applied and both above and left neighbouring samples are available;
 - $S[W'/8, -1], S[3W'/8, -1], S[5W'/8, -1], S[7W'/8, -1]$ when LM-A mode is applied or only the above neighbouring samples are available;
 - $S[-1, H'/8], S[-1, 3H'/8], S[-1, 5H'/8], S[-1, 7H'/8]$ when LM-L mode is applied or only the left neighbouring samples are available;
- The four neighbouring luma samples at the selected positions are down-sampled and compared four times to find two smaller values: x_A^0 and x_A^1 , and two larger values: x_B^0 and x_B^1
- x_A, x_B, y_A and y_B are derived as:
 - $x_A = (x_A^0 + x_A^1 + 1) \gg 1; x_B = (x_B^0 + x_B^1 + 1) \gg 1; y_A = (y_A^0 + y_A^1 + 1) \gg 1; y_B = (y_B^0 + y_B^1 + 1) \gg 1.$

$$\alpha = \frac{y_B - y_A}{x_B - x_A}$$

$$\beta = y_A - \alpha x_A$$

Complexity comparison for CCLM

For a 32x32 chroma block

	Luma sample down-sampling	Comparison between luma samples
VTM-4.0	64	128
Proposed	4	4
Proposed/VTM-4.0	6%	3%

Simulations results on VTM-4.0

■

	AI					RA				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class A1	-0.17%	-0.16%	-0.46%	96%	100%	-0.16%	-0.06%	-0.40%	100%	99%
Class A2	-0.03%	-0.04%	-0.08%	100%	101%	-0.04%	0.08%	-0.06%	100%	98%
Class B	-0.02%	-0.59%	-0.70%	99%	100%	0.00%	-0.82%	-1.13%	99%	99%
Class C	-0.02%	-0.47%	-0.33%	100%	101%	-0.03%	-0.32%	-0.59%	101%	101%
Class E	-0.02%	-0.01%	-0.15%	101%	100%					
Overall	-0.05%	-0.30%	-0.38%	99%	100%	-0.05%	-0.36%	-0.63%	100%	100%
Class D	-0.01%	-0.21%	-0.34%	99%	97%	-0.02%	-0.18%	-0.32%	99%	98%
Class F	0.01%	-0.04%	-0.21%	100%	103%	0.00%	-0.09%	-0.21%	100%	104%

Conclusion

- Because the proposed method can significantly reduce the number of down-sampling and comparison on neighbouring luma samples to derive the CCLM parameters while improving the coding performance slightly, it is recommended to adopt CE3-1.5 into VVC.