

JVTVC-G955 (Non-CE6a): Joint contribution on the integration of several chroma coding tools

Canon
Intel
Mitsubishi
NHK

Technologies

- “Cross-channel Intra chroma residual prediction” (JCTVC-G173, Intel),
- “Luma-based chroma prediction - Model correction” (JCTVC-G244, Canon),
- “On additional SAO Band Offset classifications” (JCTVC-G246, Canon)
- “Improvement to chroma TU specification” (JCTVC-G442, Mitsubishi Electric and NHK)

Results

- Reference is HM4.0 without bugfix on alpha bits
- Results (YUV value based on PSNR_{AV}):

	All Intra HE					All Intra LC			
	Y	U	V	YUV		Y	U	V	YUV
Class A	-0.5%	-17.4%	-22.2%	-3.3%		-0.6%	-17.5%	-20.9%	-3.0%
Class B	-0.2%	-4.8%	-7.0%	-1.2%		-0.4%	-4.9%	-7.0%	-1.2%
Class C	-0.6%	-4.0%	-5.5%	-1.4%		-0.7%	-5.0%	-6.9%	-1.6%
Class D	-0.6%	-3.7%	-5.0%	-1.2%		-0.6%	-4.3%	-6.2%	-1.4%
Class E	-0.2%	-9.8%	-9.3%	-1.9%		-0.5%	-10.5%	-8.7%	-1.9%
Overall	-0.4%	-7.7%	-9.7%	-1.8%		-0.5%	-8.1%	-9.9%	-1.8%
	-0.4%	-7.6%	-9.6%	-1.8%		-0.5%	-8.1%	-9.7%	-1.8%
Enc Time[%]	100%					100%			
Dec Time[%]	100%					100%			

- Near additive:

	All Intra HE			All Intra LC		
	Y	U	V	Y	U	V
JCTVC-G173	-0.3%	-1.0%	-3.0%	-0.3%	-0.6%	-3.5%
JCTVC-G244	0.0%	-4.2%	-4.5%	-0.1%	-4.4%	-4.3%
JCTVC-G245	0.0%	-1.3%	-1.6%	0.0%	-0.7%	-0.9%
JCTVC-G442	-0.1%	-2.1%	-1.9%	-0.2%	-2.9%	-3.0%
Combination	-0.4%	-7.7%	-9.7%	-0.5%	-8.1%	-9.9%

- Modify the RDO formula as JCTVC-G.401

$$\min(SSE_Y + 0.65 * \omega(SSE_U + SSE_V)) * \frac{6}{(4 + 2 * 0.65)} + \lambda R$$

	All Intra HE			All Intra LC		
	Y	U	V	Y	U	V
Combination	-0.4%	-7.7%	-9.7%	-0.5%	-8.1%	-9.9%
Combination + RDO (G401)	-1.1%	-1.4%	-3.4%	-1.1%	-2.1%	-3.7%

	All Intra HE	All Intra LC
ENC Time	99%	99%
DEC Time	97%	98%

Conclusion

- Combination of the 4 proposed tools show additive gains
- BD rate gains are 0.4-0.5% for luma and around 8 to 10% for Chroma
- Modify the weight between luma and chroma :
 - **1.1%** luma gain
 - Reduction of encoder and decoder times
- Authors therefore recommend adoption of the 4 proposed tools