



Non-CE11: Modified Method for Two-Level Coding of Significance Maps

Shih-Ta Hsiang, Tzu-Der (Peter) Chuang, Shawmin Lei



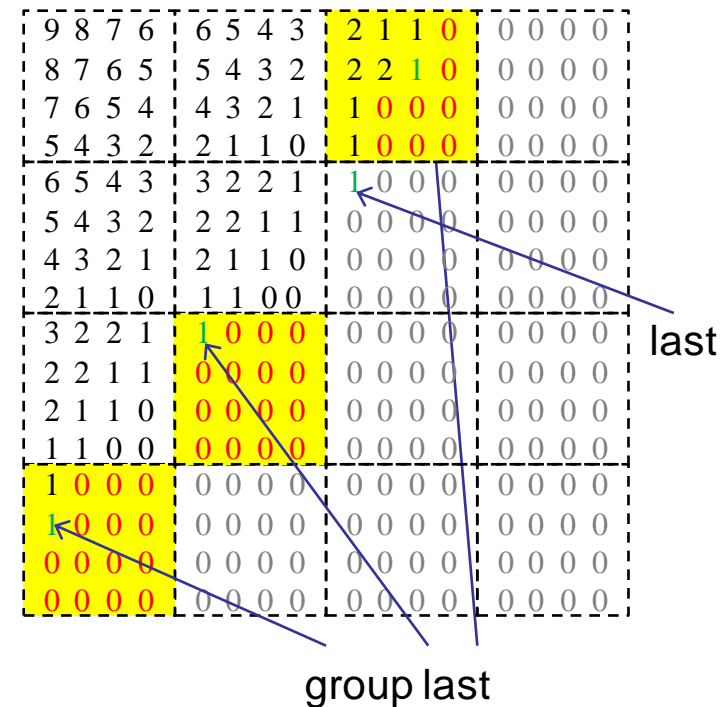
Presented by Tzu-Der (Peter) Chuang
8th JCT-VC Meeting in San José
1–10 February, 2012

Overall Summary

- Propose to code the position of the last significant coefficient within a sub-block for coding the significance maps in large transform blocks
- Benefits
 - Reduced number of coded bins
 - Improved efficiency
- No BD-rate loss for HE configurations and Y BD-rate decreases 0.0 – 0.3 % for LC configurations

Proposed Method

- Code new syntax elements **group_last_significant_coeff_x** and **group_last_significant_coeff_y** to represent the position of the last significant coefficient in scanning order within a sub-block
- New syntax elements are only coded for the sub-block with the group significance flag explicitly coded as '1'
- Coding significance flags is skipped for the coefficients after the last significant coefficient within the sub-block



CABAC

- Syntax elements **group_last_significant_coeff_x** and **group_last_significant_coeff_y** each binarized by a truncated unary code
- Each bin is assigned a single context
- Add 12 new contexts (6 for Luma, 6 for Chroma)

Results

- JCTVC-G1200 anchor
- No BD-bitrate loss for HE configurations
- Y BD-bitrate decreases 0.0 - 0.3 % for LC configurations
- Thank JVC for verification

	All Intra HE			All Intra LC		
	Y	U	V	Y	U	V
Class A (8bit)	0.0%	0.0%	0.1%	-0.1%	-0.2%	-0.2%
Class B	0.0%	0.0%	0.1%	-0.2%	-0.4%	-0.4%
Class C	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.1%
Class D	0.0%	0.1%	0.1%	-0.1%	-0.1%	-0.1%
Class E	0.1%	0.2%	0.2%	-0.1%	-0.1%	-0.2%
Overall	0.0%	0.1%	0.1%	-0.1%	-0.2%	-0.2%
	0.0%	0.1%	0.1%	-0.1%	-0.2%	-0.2%
Class F	0.0%	0.0%	0.1%	0.0%	0.0%	-0.1%
Enc Time[%]	103.3%			105.5%		
Dec Time[%]	103.5%			104.7%		

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A (8bit)	0.0%	0.0%	-0.1%	0.0%	0.0%	-0.3%
Class B	0.0%	-0.1%	0.0%	-0.1%	-0.2%	-0.3%
Class C	0.0%	-0.1%	0.1%	0.0%	-0.1%	-0.1%
Class D	0.0%	-0.2%	0.0%	0.0%	0.3%	-0.2%
Class E						
Overall	0.0%	-0.1%	0.0%	-0.1%	0.0%	-0.2%
	0.0%	-0.1%	0.0%	-0.1%	0.0%	-0.2%
Class F	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Enc Time[%]	100.9%			104.5%		
Dec Time[%]	100.6%			103.6%		

	Low Delay B HE			Low Delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	0.1%	-0.1%	0.0%	-0.3%	-0.4%	-0.1%
Class C	0.0%	-0.1%	0.1%	-0.1%	0.0%	-0.2%
Class D	0.0%	-0.4%	-0.2%	-0.1%	0.9%	0.2%
Class E	0.1%	0.3%	-0.4%	-0.2%	0.0%	-0.2%
Overall	0.0%	-0.1%	-0.1%	-0.2%	0.1%	0.0%
	0.0%	-0.1%	-0.1%	-0.2%	0.1%	0.0%
Class F	-0.1%	0.0%	-0.6%	0.0%	-0.5%	-0.3%
Enc Time[%]	101.7%			101.7%		
Dec Time[%]	101.7%			100.7%		

Coded Bin Statistics

- The coded bin counts versus the HM5.0 anchor
- Total: total number of coded bins (including bypass bins)
- Sig
 - bins for significant flags for HM-5.0
 - bins for significant flags and the sub-block last coefficient positions for the proposal

	All Intra HE		All Intra LC		All Intra HE-10	
	Total	Sig	Total	Sig	Total	Sig
Class A (8bit)	-0.19%	-1.10%	-1.07%	-3.64%		
Class B	-0.44%	-2.05%	-1.68%	-4.79%		
Class C	-0.10%	-0.76%	-0.52%	-1.78%		
Class D	-0.20%	-1.07%	-0.67%	-2.26%		
Class E	-0.44%	-2.40%	-1.31%	-5.16%		
Overall	-0.28%	-1.49%	-1.07%	-3.49%		

	Random Access HE		Random Access LC		Random Access HE-10	
	Total	Sig	Total	Sig	Total	Sig
Class A (8bit)	-0.25%	-1.47%	-0.52%	-2.56%	-0.37%	-1.53%
Class B	-0.39%	-1.98%	-0.93%	-3.76%	-0.38%	-1.95%
Class C	-0.07%	-0.56%	-0.31%	-1.45%		
Class D	-0.06%	-0.57%	-0.29%	-1.50%		
Class E						
Overall	-0.20%	-1.16%	-0.54%	-2.38%	-0.38%	-1.76%

	Low delay B HE		Low delay B LC		Low delay B HE-10	
	Total	Sig	Total	Sig	Total	Sig
Class A						
Class B	-0.24%	-1.32%	-0.89%	-3.58%		
Class C	0.00%	-0.22%	-0.38%	-1.57%		
Class D	0.02%	-0.22%	-0.29%	-1.35%		
Class E	-0.24%	-1.22%	-0.85%	-3.73%		
Overall	-0.12%	-0.75%	-0.61%	-2.55%		

Conclusion

- Proposed a modified method to further exploit the new two-level diagonal sub-block scan structure for coding significance maps
- Results show the proposal can reduce the number of coded bins while achieving similar or improved efficiency