

Modifications to HE transform coefficient coding for transform skip mode

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Qualcomm

Transform Skip Mode

- Transform skip mode was proposed in the last meeting
 - 2-D, only horizontal, only vertical, no transform
- Changes to HE transform coefficient coding
 - Fixed length coding in bypass mode for last position coding
 - Different contexts for significance flag coding

Last Position Coding

- Last position coding in the direction transform is applied
 - Same as HM4.0
- Last position coding in the direction transform is skipped
 - Fixed number of bits coded in bypass mode
 - Dependent on size of the block in that direction
 - Bypass mode is more desirable

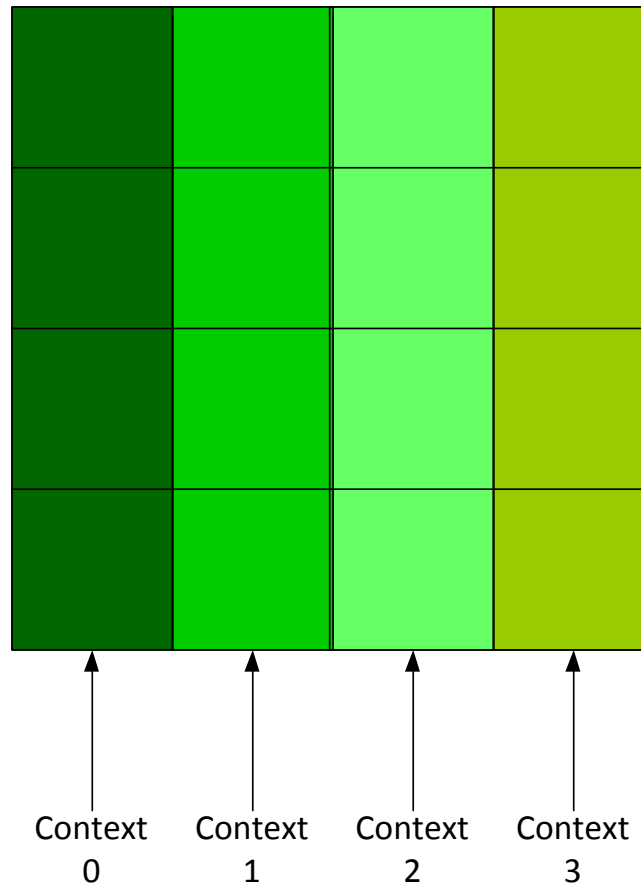
Significance Flag Coding

- Contexts for 16x16 and 32x32 blocks are unchanged
 - Uses spatial neighborhood
 - Effective for transform skip mode
- No transform case
 - 1 context for entire 4x4 block
 - 1 context for entire 8x8 block

Significance Flag Coding

- Transform only in horizontal direction
 - One context for each column (4+8)
- Transform only in vertical direction
 - One context for each row
 - Same contexts (from horizontal transform only case) reused

Significance Flag Coding



Results

	Random Access HE			Low delay B HE			Low delay P HE		
	Y	U	V	Y	U	V	Y	U	V
Class A	0.05%	-0.34%	-0.26%						
Class B	-0.33%	-0.05%	0.27%	-0.34%	1.10%	1.34%	-0.51%	0.65%	1.34%
Class C	-0.50%	-0.33%	0.05%	-0.81%	0.11%	0.63%	-1.00%	0.13%	0.63%
Class D	-0.81%	-0.25%	-0.21%	-1.21%	1.22%	0.87%	-1.51%	0.71%	0.50%
Class E				-0.34%	2.63%	1.74%	-0.39%	2.99%	1.57%
Class F	-2.21%	-1.36%	-1.38%	-5.09%	-3.72%	-3.49%	-5.49%	-3.83%	-3.74%
Overall	-0.74%	-0.45%	-0.28%	-1.56%	0.19%	0.20%	-1.79%	0.01%	0.05%
	-0.74%	-0.47%	-0.30%	-1.56%	0.06%	0.10%	-1.79%	-0.05%	-0.05%
Enc Time[%]		138%			131%			144%	
Dec Time[%]		103%			104%			101%	
Overall No F	-0.39%	-0.23%	-0.02%	-0.68%	1.17%	1.12%	-0.86%	0.98%	1.00%

Comparison with HM 4.0

JCT-VC, Daegu, January 2011

Results

	Random Access HE			Low delay B HE			Low delay P HE		
	Y	U	V	Y	U	V	Y	U	V
Class A	-0.03%	-0.11%	0.02%						
Class B	-0.08%	-0.12%	0.00%	-0.06%	0.23%	0.08%	-0.12%	-0.03%	0.23%
Class C	-0.13%	-0.16%	-0.12%	-0.19%	-0.12%	-0.03%	-0.21%	-0.03%	0.11%
Class D	-0.11%	-0.15%	-0.19%	-0.07%	0.23%	-0.08%	-0.11%	0.16%	0.19%
Class E				-0.14%	1.01%	-0.65%	-0.06%	0.60%	-0.40%
Class F	-0.31%	-0.32%	-0.28%	-0.47%	-0.69%	-0.65%	-0.55%	-0.59%	-0.35%
Overall	-0.13%	-0.17%	-0.11%	-0.18%	0.09%	-0.23%	-0.21%	-0.01%	-0.01%
	-0.13%	-0.17%	-0.11%	-0.18%	0.03%	-0.31%	-0.21%	-0.03%	-0.03%
Enc Time[%]		100%			100%			100%	
Dec Time[%]		100%			100%			98%	

Overall No F	-0.09%	-0.14%	-0.07%	-0.11%	0.29%	-0.13%	-0.13%	0.13%	0.07%
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Comparison with BBC transform-skip-mode anchor

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Conclusion

- Changes proposed to HE transform coefficient coding for transform skip mode
 - Fixed length coding in bypass mode for last position coding
 - Different contexts for significance flag coding
 - Good gains for class F