



CE11.1.2: Unified Method for Coding 4x4 & 8x8 Significance Maps

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



Presented by Tzu-Der (Peter) Chuang
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Overall Summary

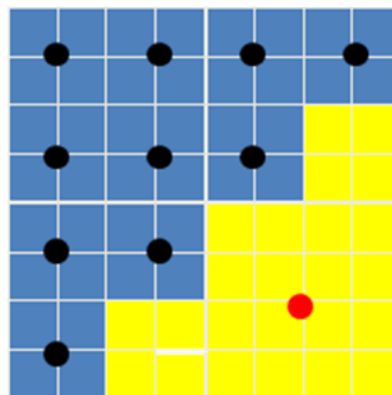
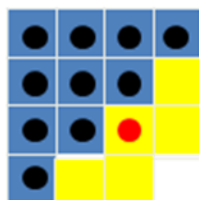
- Propose a unified context configuration map for coding significance maps in 4x4 and 8x8 transform blocks
- Context selection can be determined by simple logic without a use of look-up tables
- The same logic is shared for context selection for coding 4x4 and 8x8 transforms and Luma and Chroma components
- No coding efficiency loss under the HM common test conditions

Introduction

- A unified context configuration map was used for coding 4x4 and 8x8 transform block types and for coding Luma and Chroma components in H.264/AVC and previous WD's
- JCTVC-G1015 adopted in WD5
 - Different context configuration maps for 4x4 and 8x8 transform block types
 - Different context configuration maps for Luma and Chroma in 4x4 transform blocks
 - 3 sets of LUTs employed for context selection in HM5.0
- Context selection logic may be more important than quantity of contexts

Proposed Unified Method

- Having the coefficients from the highest frequency region shares the same context.
- Same context configuration map for 4x4 transform blocks and down-sampled 8x8 transform blocks
- Same context configuration map for Luma & Chroma



BR6

Context Assignment and Selection

- Increase 7 contexts versus WD5 (2 contexts for Luma and 5 contexts for Chroma)
 - Reduce 18 contexts versus WD4
- Context selection by simple logic without LUT's

```

if ( uiLog2BlkSize < 4)
{
    uiCtx = uiLog2BlkSize == 2? ( uiPosY << 2 ) +
uiPosX : ((uiPosY >> 1) << 2) + (uiPosX >> 1);
    uiCtx = (uiLog2BlkSize == 2? 0 : 11) + (uiCtx <
10 ? (uiCtx == 7? 10 : uiCtx) : (uiCtx == 12? 7 :
10));
}

```

0	1	2	3
4	5	6	10
8	9	10	10
7	10	10	10

Results

- JCTVC-G1200 anchor
- No coding efficient loss

	All Intra HE			All Intra LC		
	Y	U	V	Y	U	V
Class A (8bit)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class B	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class C	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%
Class D	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%
Class E	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%
Overall	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class F	0.1%	0.0%	0.0%	0.1%	0.0%	0.1%
Enc Time[%]	99.7%			100.1%		
Dec Time[%]	101.2%			101.1%		

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A (8bit)	0.0%	0.0%	-0.1%	0.0%	0.1%	-0.1%
Class B	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%
Class C	0.0%	-0.1%	0.1%	0.1%	0.0%	0.1%
Class D	0.0%	-0.2%	0.2%	0.0%	0.5%	0.1%
Class E						
Overall	0.0%	-0.1%	0.1%	0.0%	0.2%	0.0%
	0.0%	-0.1%	0.1%	0.0%	0.2%	0.0%
Class F	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%
Enc Time[%]	100.4%			100.5%		
Dec Time[%]	100.5%			121.9%		

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	0.0%	0.2%	0.3%	0.1%	-0.1%	0.5%
Class C	0.1%	-0.1%	0.2%	0.1%	0.1%	0.2%
Class D	0.1%	0.0%	0.4%	0.0%	0.6%	0.4%
Class E	0.0%	-0.3%	-0.7%	-0.1%	-1.5%	-0.1%
Overall	0.0%	0.0%	0.1%	0.0%	-0.1%	0.3%
	0.0%	0.0%	0.1%	0.0%	-0.1%	0.2%
Class F	0.0%	-0.5%	0.0%	0.3%	-1.1%	-0.3%
Enc Time[%]	101.5%			101.3%		
Dec Time[%]	101.4%			101.0%		

Results

- QP = 12, 17, 22, 27
- No more than 0.1% BD-rate increase for Luma
- Thanks to BBC, Sharp, and Samsung for cross check

	All Intra HE			All Intra LC		
	Y	U	V	Y	U	V
Class A (8bit)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class B	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class C	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Class D	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class E	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%
Overall	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class F	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%
Enc Time[%]	99.6%			96.8%		
Dec Time[%]	95.9%			97.3%		

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A (8bit)	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%
Class B	0.0%	0.0%	0.1%	0.0%	0.1%	0.2%
Class C	0.1%	0.2%	0.2%	0.1%	0.2%	0.2%
Class D	0.1%	0.1%	0.2%	0.1%	0.3%	0.3%
Class E						
Overall	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%
	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%
Class F	-0.1%	0.1%	0.0%	0.1%	0.1%	0.1%
Enc Time[%]	97.6%			97.7%		
Dec Time[%]	97.2%			96.9%		

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	0.0%	0.1%	0.1%	0.1%	0.1%	0.2%
Class C	0.1%	0.1%	0.2%	0.1%	0.3%	0.3%
Class D	0.1%	0.2%	0.3%	0.1%	0.4%	0.4%
Class E	0.1%	-0.3%	0.2%	0.0%	-0.8%	0.1%
Overall	0.1%	0.0%	0.2%	0.1%	0.1%	0.2%
	0.1%	0.0%	0.2%	0.1%	0.1%	0.2%
Class F	0.0%	-0.3%	0.0%	0.4%	0.4%	0.0%
Enc Time[%]	97.5%			99.2%		
Dec Time[%]	96.3%			96.8%		

Conclusion

- Propose a unified context configuration map for 4x4 and 8x8 transform types and Luma and Chroma components
- Can select context by simple logic without look-up tables
- Simplify the coding process with almost no efficiency loss
- Recommend for adoption into HEVC WD6