

REDEFINING MOBILITY



JCT3V-D0183: CE6.h related: Simplified DC predictor for depth intra modes

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Introduction

- Partition-based depth coding methods
 - DMM1/2/3/4, SDC_DMM1, Chain coding
 - Two partitions, each partition is represented by a single value

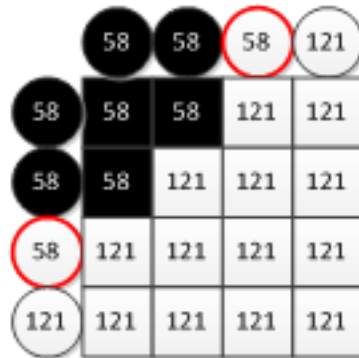
P_0	P_0	P_0	P_0
P_0	P_0	P_0	P_1
P_0	P_0	P_1	P_1
P_0	P_1	P_1	P_1

P_0	P_0	P_1	P_1
P_0	P_0	P_1	P_1
P_1	P_1	P_1	P_1
P_1	P_1	P_1	P_1

- The representative values (i.e., DC) are predicted by reference samples
 - Reference samples are partitioned according to the given partition pattern
 - For each partition, the average of reference samples belonging to this partition is derived as the predicted DC value

Problem statement

- Increased computational complexity
 - A number of addition operations are needed for large block sizes
 - Division operation is needed for both encoder and decoder
- Inaccurate DC predictors
 - The reference samples may be partitioned inaccurately



58	58	89	89
58	89	89	89
89	89	89	89
89	89	89	89

Proposal

- Select only one or two reference samples to derive predicted DC
 - Selection of reference samples depends on the TL, TR and BL values of the given partition pattern

	p _{0,-1}	p _{1,-1}	p _{2,-1}	p _{3,-1}	p _{4,-1}	p _{5,-1}	p _{6,-1}	p _{7,-1}
p _{-1,0}	c _{0,0}	c _{1,0}	c _{2,0}	c _{3,0}	c _{4,0}	c _{5,0}	c _{6,0}	c _{7,0}
p _{-1,1}	c _{0,1}	c _{1,1}	c _{2,1}	c _{3,1}	c _{4,1}	c _{5,1}	c _{6,1}	c _{7,1}
p _{-1,2}	c _{0,2}	c _{1,2}	c _{2,2}	c _{3,2}	c _{4,2}	c _{5,2}	c _{6,2}	c _{7,2}
p _{-1,3}	c _{0,3}	c _{1,3}	c _{2,3}	c _{3,3}	c _{4,3}	c _{5,3}	c _{6,3}	c _{7,3}
p _{-1,4}	c _{0,4}	c _{1,4}	c _{2,4}	c _{3,4}	c _{4,4}	c _{5,4}	c _{6,4}	c _{7,4}
p _{-1,5}	c _{0,5}	c _{1,5}	c _{2,5}	c _{3,5}	c _{4,5}	c _{5,5}	c _{6,5}	c _{7,5}
p _{-1,6}	c _{0,6}	c _{1,6}	c _{2,6}	c _{3,6}	c _{4,6}	c _{5,6}	c _{6,6}	c _{7,6}
p _{-1,7}	c _{0,7}	c _{1,7}	c _{2,7}	c _{3,7}	c _{4,7}	c _{5,7}	c _{6,7}	c _{7,7}

TL == TR
TL == BL

	p _{0,-1}	p _{1,-1}	p _{2,-1}	p _{3,-1}	p _{4,-1}	p _{5,-1}	p _{6,-1}	p _{7,-1}
p _{-1,0}	c _{0,0}	c _{1,0}	c _{2,0}	c _{3,0}	c _{4,0}	c _{5,0}	c _{6,0}	c _{7,0}
p _{-1,1}	c _{0,1}	c _{1,1}	c _{2,1}	c _{3,1}	c _{4,1}	c _{5,1}	c _{6,1}	c _{7,1}
p _{-1,2}	c _{0,2}	c _{1,2}	c _{2,2}	c _{3,2}	c _{4,2}	c _{5,2}	c _{6,2}	c _{7,2}
p _{-1,3}	c _{0,3}	c _{1,3}	c _{2,3}	c _{3,3}	c _{4,3}	c _{5,3}	c _{6,3}	c _{7,3}
p _{-1,4}	c _{0,4}	c _{1,4}	c _{2,4}	c _{3,4}	c _{4,4}	c _{5,4}	c _{6,4}	c _{7,4}
p _{-1,5}	c _{0,5}	c _{1,5}	c _{2,5}	c _{3,5}	c _{4,5}	c _{5,5}	c _{6,5}	c _{7,5}
p _{-1,6}	c _{0,6}	c _{1,6}	c _{2,6}	c _{3,6}	c _{4,6}	c _{5,6}	c _{6,6}	c _{7,6}
p _{-1,7}	c _{0,7}	c _{1,7}	c _{2,7}	c _{3,7}	c _{4,7}	c _{5,7}	c _{6,7}	c _{7,7}

TL ≠ TR
TL ≠ BL

	p _{0,-1}	p _{1,-1}	p _{2,-1}	p _{3,-1}	p _{4,-1}	p _{5,-1}	p _{6,-1}	p _{7,-1}
p _{-1,0}	c _{0,0}	c _{1,0}	c _{2,0}	c _{3,0}	c _{4,0}	c _{5,0}	c _{6,0}	c _{7,0}
p _{-1,1}	c _{0,1}	c _{1,1}	c _{2,1}	c _{3,1}	c _{4,1}	c _{5,1}	c _{6,1}	c _{7,1}
p _{-1,2}	c _{0,2}	c _{1,2}	c _{2,2}	c _{3,2}	c _{4,2}	c _{5,2}	c _{6,2}	c _{7,2}
p _{-1,3}	c _{0,3}	c _{1,3}	c _{2,3}	c _{3,3}	c _{4,3}	c _{5,3}	c _{6,3}	c _{7,3}
p _{-1,4}	c _{0,4}	c _{1,4}	c _{2,4}	c _{3,4}	c _{4,4}	c _{5,4}	c _{6,4}	c _{7,4}
p _{-1,5}	c _{0,5}	c _{1,5}	c _{2,5}	c _{3,5}	c _{4,5}	c _{5,5}	c _{6,5}	c _{7,5}
p _{-1,6}	c _{0,6}	c _{1,6}	c _{2,6}	c _{3,6}	c _{4,6}	c _{5,6}	c _{6,6}	c _{7,6}
p _{-1,7}	c _{0,7}	c _{1,7}	c _{2,7}	c _{3,7}	c _{4,7}	c _{5,7}	c _{6,7}	c _{7,7}

TL == TR
TL ≠ BL

	p _{0,-1}	p _{1,-1}	p _{2,-1}	p _{3,-1}	p _{4,-1}	p _{5,-1}	p _{6,-1}	p _{7,-1}
p _{-1,0}	c _{0,0}	c _{1,0}	c _{2,0}	c _{3,0}	c _{4,0}	c _{5,0}	c _{6,0}	c _{7,0}
p _{-1,1}	c _{0,1}	c _{1,1}	c _{2,1}	c _{3,1}	c _{4,1}	c _{5,1}	c _{6,1}	c _{7,1}
p _{-1,2}	c _{0,2}	c _{1,2}	c _{2,2}	c _{3,2}	c _{4,2}	c _{5,2}	c _{6,2}	c _{7,2}
p _{-1,3}	c _{0,3}	c _{1,3}	c _{2,3}	c _{3,3}	c _{4,3}	c _{5,3}	c _{6,3}	c _{7,3}
p _{-1,4}	c _{0,4}	c _{1,4}	c _{2,4}	c _{3,4}	c _{4,4}	c _{5,4}	c _{6,4}	c _{7,4}
p _{-1,5}	c _{0,5}	c _{1,5}	c _{2,5}	c _{3,5}	c _{4,5}	c _{5,5}	c _{6,5}	c _{7,5}
p _{-1,6}	c _{0,6}	c _{1,6}	c _{2,6}	c _{3,6}	c _{4,6}	c _{5,6}	c _{6,6}	c _{7,6}
p _{-1,7}	c _{0,7}	c _{1,7}	c _{2,7}	c _{3,7}	c _{4,7}	c _{5,7}	c _{6,7}	c _{7,7}

TL ≠ TR
TL == BL

Results

■ HTM-6.0, Common test condition

	video 0	video 1	video 2	video PSNR / video bitrate	video PSNR / total bitrate	synth PSNR / total bitrate
Balloons	0.0%	0.0%	0.0%	0.0%	0.0%	-0.15%
Kendo	0.0%	0.0%	0.0%	0.0%	0.0%	-0.02%
Newspapercc	0.0%	-0.2%	0.1%	0.0%	-0.1%	-0.24%
GhostTownFly	0.0%	0.0%	0.1%	0.0%	0.0%	-0.40%
PoznanHall2	0.0%	-0.2%	-0.4%	-0.1%	-0.2%	-0.21%
PoznanStreet	0.0%	0.3%	0.0%	0.0%	0.0%	-0.03%
UndoDancer	0.0%	-0.2%	-0.2%	-0.1%	-0.1%	-0.65%
1024x768	0.0%	-0.1%	0.0%	0.0%	0.0%	-0.13%
1920x1088	0.0%	0.0%	-0.1%	0.0%	-0.1%	-0.32%
average	0.0%	0.0%	-0.1%	0.0%	-0.1%	-0.24%

Results

- HTM-6.0, All intra test condition

	video 0	video 1	video 2	video PSNR / video bitrate	video PSNR / total bitrate	synth PSNR / total bitrate
Balloons	0.0%	0.0%	0.0%	0.0%	0.0%	-0.09%
Kendo	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.11%
Newspapercc	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.20%
GhostTownFly	0.0%	0.0%	0.0%	0.0%	-0.2%	-0.40%
PoznanHall2	0.0%	0.0%	0.0%	0.0%	0.0%	-0.09%
PoznanStreet	0.0%	0.0%	0.0%	0.0%	0.0%	-0.05%
UndoDancer	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.04%
1024x768	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.13%
1920x1088	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.14%
average	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.14%

- Thank HHI for cross-check (JCT3V-D0270)!

Conclusion

- Significant complexity reduction of predicted DC derivation
 - At most two additions are needed
 - Division is removed completely
- More efficient DC prediction
 - CTC: average -0.24% gain for synthesized
 - All-intra: average -0.14% gain for synthesized

Thanks!