



CREATING THE LIVING NETWORK™

JVET-L0259

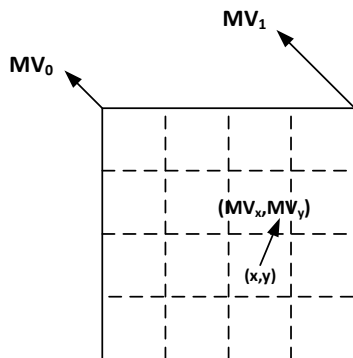
CE4-related: Adaptive precision for affine
MVD coding

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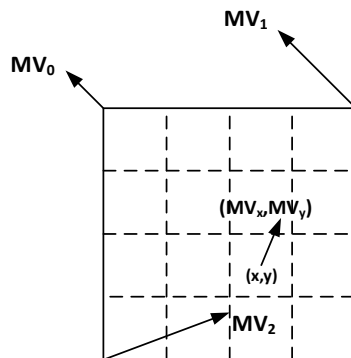


Introduction

- Current affine coding in VTM-2.0
 - Signal MVs at control points for the CU coded in affine mode
 - The MVs at control points are coded with predictive coding in 1/4-pel precision
 - Derive the MV for each 4x4 sub-block within the CU for MC



4-parameter affine



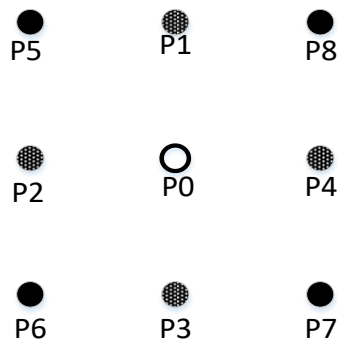
6-parameter affine

Adaptive precision for affine MVD coding

- Add two additional precision sets to get better trade-off between affine prediction and MVD signaling overhead
 - {1-pel, 1/4-pel, 1/4-pel}, {1/4-pel, 1/4-pel, 1/4-pel}, {1/8-pel, 1/8-pel, 1/8-pel}
 - Two flags are signaled: the first flag to indicate if {1-pel, 1/4-pel, 1/4-pel} is used; the second flag to indicate if {1/8-pel, 1/8-pel, 1/8-pel} is used
- Encoding
 - Encoder will check RD cost of {1/4-pel, 1/4-pel, 1/4-pel} first; only when affine mode is selected as the best mode, the other two precision sets will be checked and one precision will be selected using ME cost
 - The affine model type and reference pictures will be reused from the affine type and reference pictures determined at precision {1/4-pel, 1/4-pel, 1/4-pel}

Adaptive precision for affine MVD coding

- For the low precision set {1-pel, 1/4-pel, 1/4-pel}, additional motion refinement after the existing affine motion estimation (ME) is performed
 - Check {P1, P2, P3, P4} first; if the best MV is changed from P0, the other two nearest corner positions selected from {P5, P8, P6, P7} will be checked additionally



Simulation Results

- The anchor: VTM-2.0.1 (BMS-2.0.1 software with VTM configuration)
- Test: adaptive precision for affine MVD coding

	Random Access Main 10					Low delay B Main10				
	Over VTM-2.0.1					Over VTM-2.0.1				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class A1	-0.47%	-0.29%	-0.38%	105%	102%					
Class A2	-0.59%	-0.36%	-0.51%	107%	102%					
Class B	-0.42%	-0.28%	-0.35%	107%	99%	-0.22%	-0.01%	-0.22%	105%	99%
Class C	-0.35%	-0.21%	-0.17%	106%	99%	-0.20%	-0.11%	-0.23%	104%	99%
Class E						-0.36%	0.06%	-0.08%	109%	102%
Overall	-0.44%	-0.28%	-0.34%	106%	100%	-0.25%	-0.02%	-0.19%	106%	100%
Class D	-0.40%	-0.36%	-0.44%	107%	99%	-0.35%	-0.15%	-0.18%	104%	99%
Class F	-0.26%	-0.22%	-0.19%	105%	101%	-0.27%	0.03%	-0.35%	104%	99%

Simulation Results

- The anchor: VTM-2.0.1 (BMS-2.0.1 software with VTM configuration)
- Test: adaptive precision for affine MVD coding + encoder affine ME improvements (JVET-L0260)

	Random Access Main 10					Low delay B Main10				
	Over VTM-2.0.1					Over VTM-2.0.1				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class A1	-0.66%	-0.27%	-0.49%	108%	102%					
Class A2	-0.91%	-0.66%	-0.79%	112%	102%					
Class B	-0.63%	-0.57%	-0.61%	110%	100%	-0.30%	-0.24%	-0.21%	110%	100%
Class C	-0.54%	-0.38%	-0.27%	109%	100%	-0.29%	-0.23%	-0.17%	107%	100%
Class E						-0.42%	-0.14%	-0.45%	116%	100%
Overall	-0.67%	-0.47%	-0.53%	110%	101%	-0.33%	-0.21%	-0.26%	111%	100%
Class D	-0.59%	-0.42%	-0.32%	110%	101%	-0.53%	0.36%	-0.61%	108%	99%
Class F (optional)	-0.51%	-0.45%	-0.52%	107%	102%	-0.72%	-0.44%	-0.41%	107%	100%

Conclusions

- Adaptive precision for affine MVD coding are proposed
 - Add two additional precision sets: {1-pel, 1/4-pel, 1/4-pel}, {1/8-pel, 1/8-pel, 1/8-pel}
 - For RA, 0.44% BD gain with 106% encoding time
 - For LD, 0.25% BD gain with 106% encoding time
 - Combined with affine ME improvements
 - For RA, 0.67% BD gain with 110% encoding time
 - For LD, 0.33% BD gain with 111% encoding time
- Suggest to include it in CE
- Thank Bytedance for cross-checking (JVET-L0502)

THANK YOU!

