

JVET-M0328

Simplified Triangle Prediction Unit Mode

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Abstract

- Remove redundancies for triangle prediction
 - Remove redundant pruning and candidates of candidate list
 - Remove redundant weighting group
 - Remove redundant flag signaling

Introduction

■ Merge list derivation for triangle prediction

- Step 1 : Collect motions from 5 spatial neighboring blocks and 2 temporal co-located blocks
 - Spatial neighboring blocks require $1+2+3+4=10$ times of pruning
 - proposed to remove it
- Step 2 : Construct the uni-prediction candidate list according in the order:
 - Uni-prediction MV, L0 MV, L1 MV, and **average of L0 and L1**
 - Pruning is also conducted during the construction

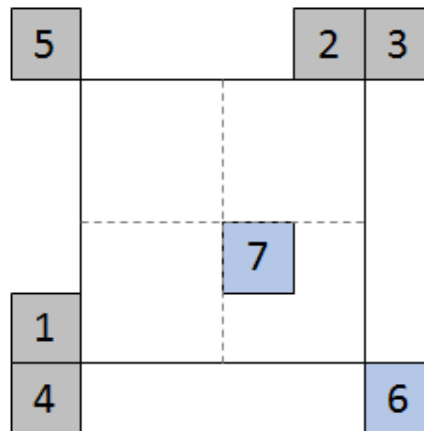


Fig.1 Neighboring blocks

Introduction

- Motion compensation for triangle prediction
 - Two weighting factor groups
 - 1st weighting factor group: $\{7/8, 6/8, 4/8, 2/8, 1/8\}$ and $\{7/8, 4/8, 1/8\}$ are used for the luminance and the chrominance samples, respectively;
 - 2nd weighting factor group: $\{7/8, 6/8, 5/8, 4/8, 3/8, 2/8, 1/8\}$ and $\{6/8, 4/8, 2/8\}$ are used for the luminance and the chrominance samples, respectively.
 - Propose to remove one of them

Introduction

- Triangle prediction flag signaling
 - When MMVD or MHItra(CIIP) mode is enabled, the triangular prediction unit mode must be disabled.
 - However, its flag is still signaled in this case.

Remove redundancies for triangle prediction

■ Six tests:

- Test A: Remove the pruning process when collecting the five spatial candidates
- Test B: Remove the averaged MV of the L0 and L1 MVs of bi-prediction MVs
- Combination of Test A and Test B
- Test C: Only keep the 1st weighting factor group
- Test D: Only keep the 2nd weighting factor group
- Test E: The triangular prediction unit flag is not signaled when MMVD or MHIIntra mode is enabled

Experimental Results

■ Results of test A (Remove redundant pruning)

	Random access Main10				
	Over VTM-3.0				DecT
	Y	U	V	EncT	
Class A1	0.01%	0.03%	0.00%	100%	101%
Class A2	-0.01%	0.00%	0.03%	100%	99%
Class B	0.00%	-0.02%	-0.04%	100%	101%
Class C	0.00%	0.01%	0.00%	100%	100%
Class E					
Overall	0.00%	0.00%	-0.01%	100%	100%
Class D	0.00%	-0.04%	0.03%	100%	100%
Class F	0.00%	0.01%	0.02%	101%	102%

	Low delay B Main10				
	Over VTM-3.0				DecT
	Y	U	V	EncT	
Class A1					
Class A2					
Class B	0.04%	-0.21%	0.05%	100%	96%
Class C	0.01%	-0.01%	0.03%	101%	108%
Class E	0.00%	0.00%	0.00%	100%	106%
Overall	0.02%	-0.09%	0.03%	100%	102%
Class D	-0.01%	0.02%	-0.07%	101%	100%
Class F	-0.04%	-0.17%	-0.25%	101%	106%

■ Results of test B (Remove redundant candidates)

	Random access Main10				
	Over VTM-3.0				DecT
	Y	U	V	EncT	
Class A1	0.00%	-0.07%	0.03%	100%	102%
Class A2	-0.01%	-0.02%	0.03%	100%	103%
Class B	0.01%	0.07%	-0.03%	100%	101%
Class C	0.00%	0.05%	-0.03%	100%	100%
Class E					
Overall	0.00%	0.02%	0.00%	100%	101%
Class D	0.04%	-0.04%	-0.01%	100%	99%
Class F	-0.13%	-0.24%	-0.22%	101%	102%

	Low delay B Main10				
	Over VTM-3.0				DecT
	Y	U	V	EncT	
Class A1					
Class A2					
Class B	0.02%	-0.19%	0.07%	101%	98%
Class C	0.02%	0.15%	0.37%	101%	102%
Class E	0.07%	0.32%	-0.05%	100%	101%
Overall	0.03%	0.05%	0.14%	101%	100%
Class D	0.05%	0.32%	0.01%	100%	96%
Class F	-0.01%	-0.02%	0.36%	100%	102%

Thank Panasonic for the cross-checking

Experimental Results

■ Results of combination of Test A and Test B

	Random access Main10				
	Over VTM-3.0				
	Y	U	V	EncT	DecT
Class A1	0.01%	-0.05%	0.09%	100%	101%
Class A2	0.00%	0.03%	0.05%	100%	101%
Class B	0.00%	0.02%	-0.03%	100%	100%
Class C	0.00%	0.06%	0.07%	100%	100%
Class E					
Overall	0.00%	0.02%	0.04%	100%	100%
Class D	0.03%	-0.02%	-0.01%	100%	98%
Class F	0.00%	0.00%	-0.01%	101%	102%

	Low delay B Main10				
	Over VTM-3.0				
	Y	U	V	EncT	DecT
Class A1					
Class A2					
Class B	0.02%	-0.32%	0.03%	101%	95%
Class C	0.03%	0.28%	0.31%	101%	104%
Class E	0.06%	0.49%	0.29%	101%	99%
Overall	0.03%	0.09%	0.19%	101%	99%
Class D	0.00%	0.23%	0.03%	100%	95%
Class F	-0.03%	0.43%	-0.38%	100%	98%

Experimental Results

■ Results of test C

	Random access Main10				
	Over VTM-3.0				DecT
	Y	U	V	EncT	
Class A1	0.04%	0.12%	0.04%	100%	101%
Class A2	0.00%	0.10%	0.08%	101%	103%
Class B	0.01%	0.12%	0.06%	99%	100%
Class C	0.04%	0.01%	0.06%	99%	98%
Class E					
Overall	0.02%	0.09%	0.06%	100%	100%
Class D	0.02%	-0.10%	-0.06%	99%	99%
Class F	0.02%	0.01%	0.03%	100%	101%

	Low delay B Main10				
	Over VTM-3.0				DecT
	Y	U	V	EncT	
Class A1					
Class A2					
Class B	0.04%	-0.21%	0.09%	100%	96%
Class C	0.03%	0.26%	0.16%	101%	102%
Class E	0.03%	-0.13%	-0.51%	100%	98%
Overall	0.03%	-0.03%	-0.04%	100%	99%
Class D	-0.01%	-0.15%	0.38%	100%	92%
Class F	0.10%	0.20%	-0.22%	101%	101%

■ Results of test D (Proposed to keep the 2nd weight group)

	Random access Main10				
	Over VTM-3.0				DecT
	Y	U	V	EncT	
Class A1	-0.01%	-0.06%	-0.02%	100%	102%
Class A2	0.01%	0.00%	0.06%	100%	103%
Class B	0.00%	0.10%	0.03%	100%	100%
Class C	0.04%	-0.02%	0.10%	100%	99%
Class E					
Overall	0.01%	0.01%	0.05%	100%	101%
Class D	-0.01%	0.14%	0.01%	100%	98%
Class F	0.01%	-0.02%	0.02%	101%	101%

	Low delay B Main10				
	Over VTM-3.0				DecT
	Y	U	V	EncT	
Class A1					
Class A2					
Class B	0.02%	-0.13%	0.01%	101%	98%
Class C	0.06%	0.10%	0.23%	101%	101%
Class E	0.01%	0.06%	-0.37%	101%	100%
Overall	0.03%	-0.01%	-0.01%	101%	100%
Class D	0.11%	0.25%	0.02%	100%	96%
Class F	0.11%	-0.04%	0.38%	101%	100%

Experimental Results

■ Results of combination of Test E

	Random access Main10				
	Over VTM-3.0				
	Y	U	V	EncT	DecT
Class A1	-0.06%	-0.08%	-0.09%	100%	103%
Class A2	-0.10%	-0.09%	-0.02%	99%	97%
Class B	-0.07%	-0.02%	-0.18%	99%	95%
Class C	-0.07%	-0.06%	-0.09%	99%	95%
Class E					
Overall	-0.07%	-0.05%	-0.11%	99%	97%
Class D	-0.10%	-0.20%	-0.07%	99%	104%
Class F	-0.03%	-0.01%	-0.03%	100%	98%

	Low delay B Main10				
	Over VTM-3.0				
	Y	U	V	EncT	DecT
Class A1					
Class A2					
Class B	-0.10%	-0.32%	0.00%	100%	98%
Class C	-0.19%	0.03%	-0.14%	100%	96%
Class E	-0.13%	0.03%	-0.17%	99%	101%
Overall	-0.14%	-0.12%	-0.09%	100%	98%
Class D	-0.17%	0.13%	0.13%	99%	98%
Class F	0.00%	-0.14%	-0.54%	99%	99%

Conclusion

- We propose several simplified methods for triangle prediction unit mode.
 - Remove redundant pruning and candidates (Test A and B) 0.00% (RA) 0.03% (RA)
 - Remove redundant weighting group (Test D) 0.01% (RA) 0.03% (RA)
 - Remove redundant flag signaling (Test E) -0.07% (RA) -0.14% (RA)
 - These simplified methods bring negligible coding loss, one even provides some coding gains.

- Based on the above results, it is suggested to adopt them into the VTM.

Thank you !

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