

JVET-00795

CE4-related: On the context variables and syntax elements of merge index

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Overall Summary

- Simplify the context variables and syntax elements of merge index
 - Reuse the same context variable for all merge index syntax elements
 - Bin grouping for TPM syntax elements (No BD-rate changes)

Over VTM-5.0 (%)			Y	U	V	EncT	DecT
1	Reuse the same context variable for all merge index syntax elements	RA	0.05	0.00	-0.03	99%	98%
		LB	0.05	0.25	0.06	100%	99%

Introduction

- In VTM5.0, three context variables for merge index
 - First bin of merge_idx, merge_triangle_idx0, and merge_triangle_idx1
 - First bin of mmvd_cand_flag
 - First bin of merge_subblock_idx
- Propose to reuse the context variable of merge_idx for all merge index syntax elements

Proposed Method 1

- Reuse the same context variable for all merge index syntax elements
 - Remove two context variables for mmvd_cand_flag and merge_subblock_idx

Syntax element	binIdx					
	0	1	2	3	4	>= 5
mmvd_cand_flag[][] merge_subblock_idx[][] merge_idx[][] merge_triangle_idx0[][] merge_triangle_idx1[][]	0	bypass	bypass	bypass	bypass	na

Simulation Results

- Reuse the same context variable for all merge index syntax elements

	Random access Main10				
	Over VTM-5.0				
	Y	U	V	EncT	DecT
Class A1	0.05%	-0.11%	0.14%	100%	97%
Class A2	0.06%	0.04%	0.09%	100%	98%
Class B	0.04%	0.07%	-0.04%	99%	98%
Class C	0.05%	-0.05%	-0.22%	99%	97%
Class E					
Overall	0.05%	0.00%	-0.03%	99%	98%
Class D	0.07%	0.19%	0.31%	98%	99%
Class F	0.05%	0.14%	0.07%	99%	97%

	Low delay B Main10				
	Over VTM-5.0				
	Y	U	V	EncT	DecT
Class A1					
Class A2					
Class B	0.04%	0.21%	0.17%	99%	99%
Class C	0.07%	0.18%	0.09%	100%	100%
Class E	0.04%	0.42%	-0.16%	101%	98%
Overall	0.05%	0.25%	0.06%	100%	99%
Class D	0.09%	-0.29%	-0.03%	98%	99%
Class F	0.12%	0.27%	-0.52%	97%	97%

Introduction

- In VVC Draft 5, the signalling order of TPM merge syntax is merge_triangle_split_dir, merge_triangle_idx0, and merge_triangle_idx1
 - 4 times of switching between context coded bins and bypass coded bins
- Propose to reduce the number of switching between context coded bins and bypass coded bins

Coded	Syntax elements
Bypass coded bin	merge_triangle_split_dir
Context coded bin	First bin of merge_triangle_idx0
Bypass coded bins	Remaining bins of merge_triangle_idx0
Context coded bin	First bin of merge_triangle_idx1
Bypass coded bins	Remaining bins of merge_triangle_idx1

Proposed Method 2.1

- Bin grouping for TPM syntax elements
 - Move merge_triangle_split_dir after merge_triangle_idx1
 - No BD-rate changes

if(MergeTriangleFlag[x0][y0]) {	
merge_triangle_idx0 [x0][y0]	ae(v)
merge_triangle_idx1 [x0][y0]	ae(v)
merge_triangle_split_dir [x0][y0]	ae(v)
}	

Coded bin	Syntax elements
Context coded bin	First bin of merge_triangle_idx0
Bypass coded bins	Remaining bins of merge_triangle_idx0
Context coded bin	First bin of merge_triangle_idx1
Bypass coded bins	Remaining bins of merge_triangle_idx1
Bypass coded bin	merge_triangle_split_dir

Proposed Method 2.2

- Bin grouping for TPM syntax elements
 - Group first bins of merge_triangle_idx0 and merge_triangle_idx1
 - No BD-rate changes

if(MergeTriangleFlag[x0][y0]) {	
merge_triangle_idx0_gt0[x0][y0]	ae(v)
merge_triangle_idx1_gt0[x0][y0]	ae(v)
if(merge_triangle_idx0_gt0[x0][y0]) {	
merge_triangle_idx0_minus1[x0][y0]	ae(v)
}	
if(merge_triangle_idx1_gt0[x0][y0]) {	
merge_triangle_idx1_minus1[x0][y0]	ae(v)
}	
merge_triangle_split_dir[x0][y0]	ae(v)
}	

Coded bin	Syntax elements
Context coded bin	merge_triangle_idx0_gt0
Context coded bin	merge_triangle_idx1_gt0
Bypass coded bins	merge_triangle_idx0_minus1
Bypass coded bins	merge_triangle_idx1_minus1
Bypass coded bin	merge_triangle_split_dir

Conclusions

- Reuse the same context variable for all merge index syntax elements
 - Remove two context variables
- Bin grouping for TPM syntax elements
 - Reduce the number of switching between contexts coded bins and bypass coded bins
- Thanks to Alibaba for cross-checking