

MEDIATEK

JVET-L0092

CE4-related: A simplification algorithm for ATMVP

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12th JVET Meeting in Macao
3–12 Oct. 2018

Overall Summary

- Proposed method
 - Disable ATMVP when CU area is smaller than or equal to 128 or 256

		Over VTM 2.0.1				
		Y	U	V	EncT	DecT
Threshold = 128	RA	0.03%	0.03%	-0.03%	99%	100%
	LB	0.02%	-0.07%	0.01%	99%	99%
Threshold = 256	RA	0.07%	0.11%	0.01%	100%	99%
	LB	0.06%	0.11%	0.00%	99%	99%

Alternative Temporal Motion Vector Prediction (ATMVP)

- ATMVP candidate construction requires several steps:
 1. Find an initial vector according to the spatial merge candidates, up to four candidates are searched
 2. Constrain and modify the initial vector
 3. Find the corresponding block pointed by the modified initial vector
 4. Check the availability of the center motion vector (MV) of the corresponding block
 5. Find MVs of all collocated sub-CUs; if not available, use the center MV
 6. Scale collocated sub-CU MVs to reference index 0
 7. Use the center vector to prune the following temporal candidate

Problem Statement

- The clock cycle budgets are already very tight for traditional merge modes
 - Even more challenging for ATMVP
- Merge mode is getting more and more complex, and therefore simplifying ATMVP is highly suggested

Assuming Clock @ 1GHz	8K 60fps decoder	8K 120fps decoder
4x4 CU	8	4
4x8 or 8x4 CU	16	8
8x8 CU	32	16
Assuming Clock @ 500MHz	8K 60fps decoder	8K 120fps decoder
4x4 CU	4	2
4x8 or 8x4 CU	8	4
8x8 CU	16	8

Proposed Method

- Simply disables ATMVP for small CUs
- If the current CU area \leq Threshold, the ATMVP candidate is not put into the merge candidate list
 - Threshold values equal to 128 and 256 are tested

Simulation Results

		Over VTM 2.0.1				
		Y	U	V	EncT	DecT
Threshold = 128	RA	0.03%	0.03%	-0.03%	99%	100%
	LB	0.02%	-0.07%	0.01%	99%	99%
Threshold = 256	RA	0.07%	0.11%	0.01%	100%	99%
	LB	0.06%	0.11%	0.00%	99%	99%

Conclusions

- Proposed to disable ATMVP when CU area is smaller than or equal to 128 or 256
 - Makes real-time hardware design less challenging
 - Loss for threshold = 128 is smaller than 0.03%
 - Loss for threshold = 256 is smaller than 0.07%