

JVET-K0105

CE9-related: Simplification of Decoder Side Motion Vector Derivation

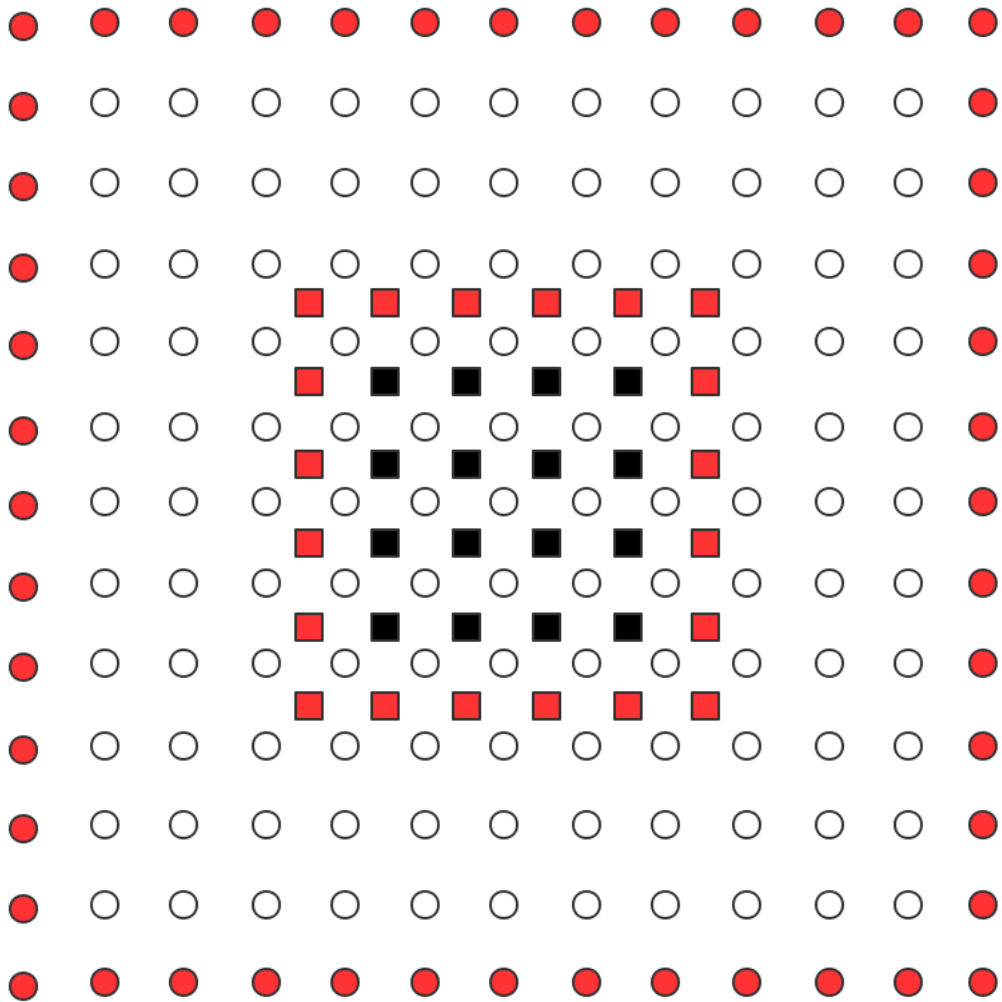
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Problems of DMVR

■ Around 40% more pixels are fetched in worst-case

	4x4 bi-predicted block	4x8/8x4 bi-predicted block
DMVR off	$2 \times (4 + 7) \times (4 + 7) / 16 = 15.125$	$2 \times (4 + 7) \times (8 + 7) / 32 = 10.3125$
DMVR on	$2 \times (4 + 9) \times (4 + 9) / 16 = 21.125$	$2 \times (4 + 9) \times (8 + 9) / 32 = 13.8125$
Ratio	140%	134%

■ Full SAD needs to be calculated for 18 candidate blocks



Proposed Solution

- ❑ Disable DMVR for 4x4 blocks

- ❑ Worst-case bandwidth is reduced by **40%**, and is same with DMVR off case.

	4x4 bi-predicted block	4x8/8x4 bi-predicted block
DMVR off	$2 \times (4 + 7) \times (4 + 7) / 16 = \mathbf{15.125}$	$2 \times (4 + 7) \times (8 + 7) / 32 = 10.3125$
DMVR on	$2 \times (4 + 7) \times (4 + 7) / 16 = \mathbf{15.125}$	$2 \times (4 + 9) \times (8 + 9) / 32 = 13.8125$

- ❑ SAD is calculated for every 2 rows

- ❑ Computational complexity of SAD cost calculation is reduced by **50%**.

Experimental Results

Test#1: SAD is calculated for every 2 rows

	Over VTM-1.0 + DMVR on					Over BMS-1.0				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class A1	0.04%	0.08%	0.08%	100%	99%	0.03%	-0.01%	0.01%	81%	100%
Class A2	0.08%	0.11%	0.10%	100%	99%	0.05%	0.02%	0.04%	83%	100%
Class B	0.06%	0.02%	0.06%	97%	99%	0.04%	-0.01%	0.03%	111%	100%
Class C	0.10%	0.03%	0.02%	105%	100%	0.08%	0.12%	0.06%	132%	99%
Class E										
Overall	0.07%	0.05%	0.06%	100%	99%	0.05%	0.03%	0.04%	103%	100%
Class D	0.09%	0.12%	0.11%	125%	100%	0.11%	0.03%	0.13%	124%	100%

Experimental Results

Test#2: Test#1 + disable DMVR for 4x4 blocks

	Over VTM-1.0 + DMVR on					Over BMS-1.0				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class A1	0.04%	0.09%	0.06%	122%	98%	0.03%	0.00%	0.00%	122%	100%
Class A2	0.12%	0.09%	0.12%	123%	98%	0.05%	0.01%	0.01%	127%	100%
Class B	0.06%	0.05%	0.10%	116%	98%	0.03%	0.00%	0.05%	159%	99%
Class C	0.08%	0.04%	0.05%	117%	99%	0.09%	0.10%	0.06%	145%	99%
Class E										
Overall	0.07%	0.06%	0.08%	119%	98%	0.05%	0.03%	0.03%	141%	99%
Class D	0.11%	0.24%	0.24%	131%	99%	0.10%	-0.04%	0.03%	133%	100%

Thanks Sharp for kindly crosschecking the results.

Summary

- ❑ Worst-case bandwidth is reduced by **40%**.
- ❑ Computational complexity of SAD cost calculation is reduced by **50%**.
- ❑ Minor impact on coding performance, **1%~2%** decoding time reduction.

Thank you!