

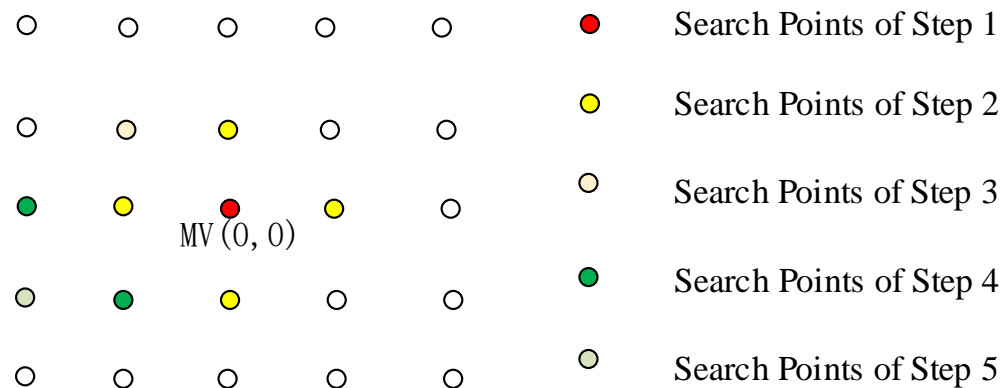
JVET-N0163

Simplified refinement process for DMVR

Fangdong Chen and Li Wang

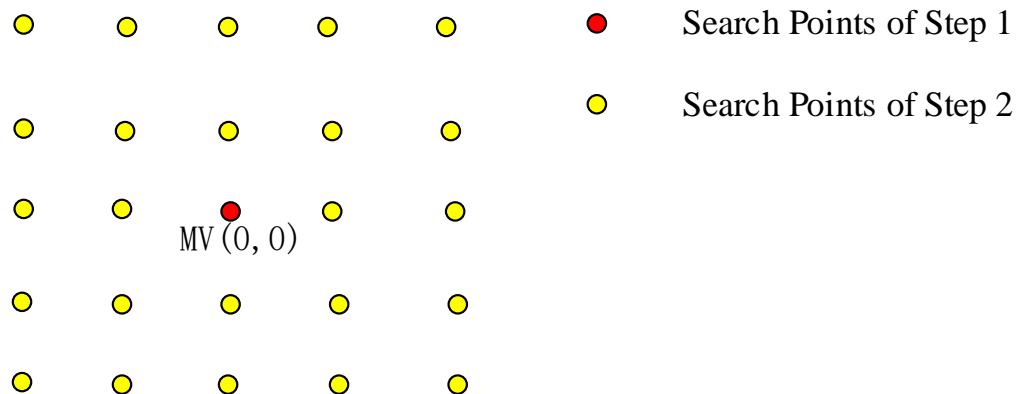
Hikvision

- The searching method for DMVR in VTM 4.0
 - Step 1: Get the cost for original MV (Early termination based on the cost)
 - Step 2: Get the cost for neighboring 4 points
 - Step 3: Get the cost for neighboring 1 points based on previous costs
 - Base on cost of 6 points of Step 1-3, obtain a new center point
 - Step 4: Get the cost for neighboring 4 points (skip the same points in step 1-3)
 - Step 5: Get the cost for neighboring 1 points based on previous costs
 - Obtain the best refined MV with the minimum cost

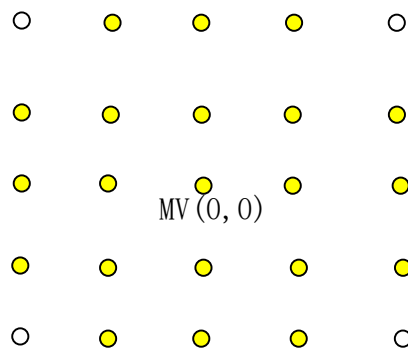


Introduction

- The searching method for DMVR in VTM 4.1 candidate (Ticket #214)
 - Step 1: Get the cost for original MV (Early termination based on the cost)
 - Step 2: Get and compare the cost for 25 points (skip the original MV cost calculation **but comparison is still conducted**)

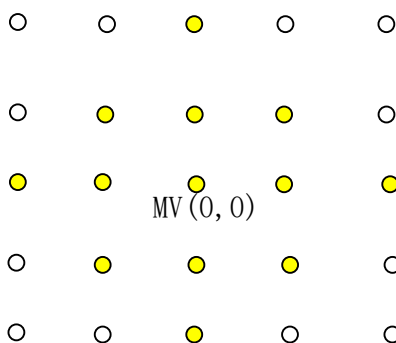


- Propose to conduct only one stage calculation to get all the cost:
 - Remove the unnecessary comparison in Ticket #214 (software cleanup)
 - Early termination is the same as Ticket #214
 - Variable is just the number of SAD calculation
- Method 1: get cost for all the 25 points at one stage (test for the cleanup)
- Method 2: get cost for 21 points at one stage
- Method 3: get cost for 13 points at one stage
- Method 4: get cost for 9 points at one stage



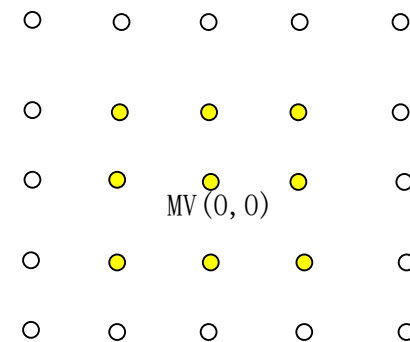
● Search Points

21 points



● Search Points

13 points



● Search Points

9 points

Experimental Results

■ Results of test A (Ticket #214)

	Random access Main10				
	Over VTM-4.0				
	Y	U	V	EncT	DecT
Class A1	-0.07%	-0.03%	-0.09%	100%	102%
Class A2	-0.08%	-0.05%	-0.09%	100%	100%
Class B	-0.02%	-0.07%	-0.06%	100%	101%
Class C	0.00%	0.00%	-0.06%	100%	103%
Class E					
Overall	-0.04%	-0.04%	-0.07%	100%	102%
Class D	-0.02%	-0.05%	-0.08%	100%	107%
Class F	-0.05%	-0.06%	-0.04%	100%	102%

■ Results of test B (Method 1-25 points with cleanup)

	Random access Main10				
	Over VTM-4.0				
	Y	U	V	EncT	DecT
Class A1	-0.07%	-0.03%	-0.09%	99%	100%
Class A2	-0.08%	-0.05%	-0.09%	100%	99%
Class B	-0.02%	-0.07%	-0.06%	100%	101%
Class C	0.00%	0.00%	-0.06%	100%	101%
Class E					
Overall	-0.04%	-0.04%	-0.07%	100%	101%
Class D	-0.02%	-0.05%	-0.08%	100%	103%
Class F	-0.05%	-0.06%	-0.04%	100%	102%

Thank DJI for the cross-checking!

Experimental Results

■ Results of test C (Method 2-21 points)

	Random access Main10				
	Over VTM-4.0				
	Y	U	V	EncT	DecT
Class A1	-0.07%	-0.04%	-0.02%	99%	100%
Class A2	-0.07%	-0.05%	-0.04%	100%	99%
Class B	-0.04%	-0.06%	-0.04%	100%	101%
Class C	-0.01%	-0.01%	-0.01%	100%	101%
Class E					
Overall	-0.04%	-0.04%	-0.03%	100%	101%
Class D	0.00%	-0.11%	-0.13%	100%	103%
Class F	-0.04%	-0.05%	-0.04%	100%	102%

■ Results of test D (Method 3-13 points)

	Random access Main10				
	Over VTM-4.0				
	Y	U	V	EncT	DecT
Class A1	0.05%	0.11%	0.13%	100%	100%
Class A2	0.08%	0.15%	0.15%	100%	98%
Class B	0.02%	0.03%	0.04%	100%	101%
Class C	0.06%	0.07%	0.07%	101%	103%
Class E					
Overall	0.05%	0.08%	0.09%	100%	101%
Class D	0.04%	-0.05%	0.04%	101%	105%
Class F	0.01%	0.03%	0.05%	101%	103%

Experimental Results

■ Results of test E (Method 4-9 points)

	Random access Main10				
	Over VTM-4.0				
	Y	U	V	EncT	DecT
Class A1	0.17%	0.25%	0.29%	100%	101%
Class A2	0.31%	0.45%	0.43%	100%	99%
Class B	0.14%	0.21%	0.18%	101%	101%
Class C	0.15%	0.23%	0.20%	101%	102%
Class E					
Overall	0.18%	0.27%	0.26%	101%	101%
Class D	0.19%	0.20%	0.15%	101%	104%
Class F	0.10%	0.15%	0.11%	101%	102%

Experimental Results

■ Summary

Search Method	Coding gains on VTM 4.0 (Y-BD rate)
Ticket #214	-0.04%
Method 1 (25 points with cleanup)	-0.04%
Method 2 (21 points)	-0.04%
Method 3 (13 points)	0.05%
Method 4 (9 points)	0.18%

Conclusion

- Propose to modify the searching process for DMVR
 - Method 1: get cost for all the 25 points (0.04% gains)
 - Method 2: get cost for 21 points (0.04% gains)
 - Method 3: get cost for 13 points (0.05% loss)
 - Method 4: get cost for 9 points (0.18% loss)
- Based on the above results, it is suggested to adopt Method 2/3 into the VTM.

Thank you !

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