

JCTVC-D099

CE1: Report of implicit direct vector derivation

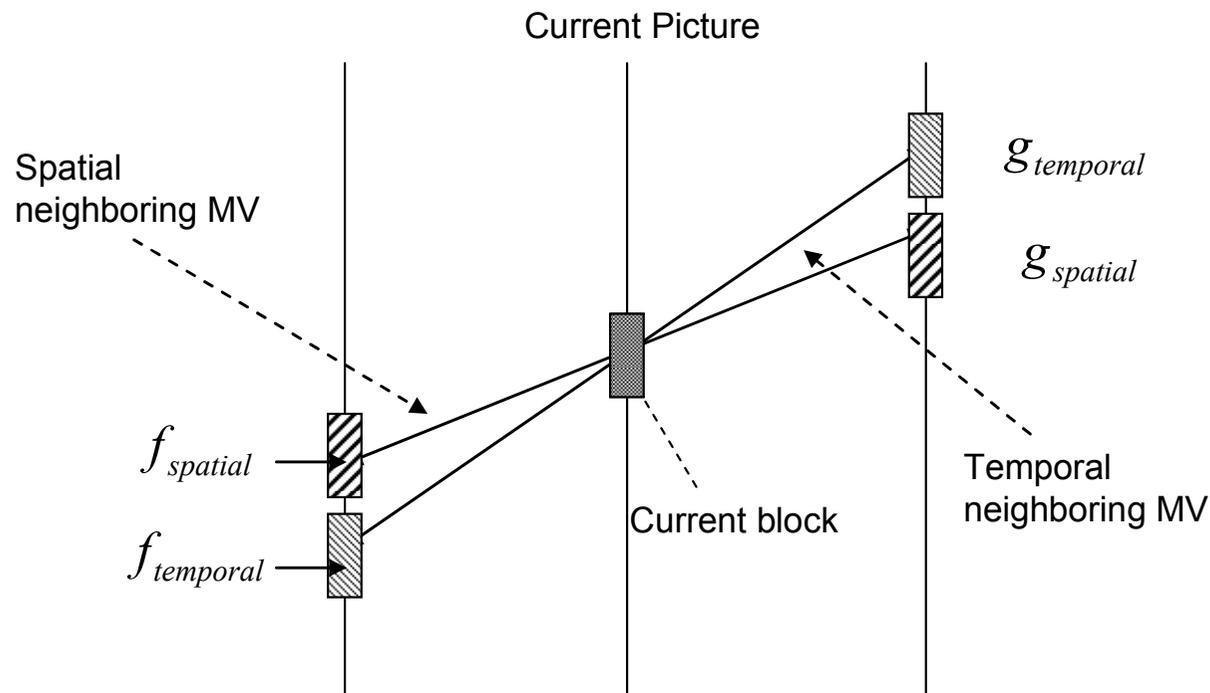
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Summary

- ***Implicit Direct Vector Derivation (IDVD) technique (C124) evaluated as a part of CE1(C501)***
 - Adaptive skip/direct MV derivation without any side information, by relying on decoder-side assistance
 - 0.5% average gain, 1.3% at maximum for RA
 - Performance loss in LD
 - Cross-verified by D168

IDVD overview

- Adaptive direct MV derivation from spatial and temporal candidates
 - Without sending any signaling bit by employing very simple SAD competition at both encoder and decoder
 - Used also as B-Skip MV



Test Condition

- Software: TMuC v0.9
 - Replaced AMVP based skip/direct to IDVD based ones
- Anchor: C500
 - Random Access & Low-Delay cases for both HE and LC conditions
- Encoding/decoding time measurement
 - Linux 64bit
 - Time command of Linux platform
 - Measured with output of YUV files

HE-RA: R-D performance

	BD-rate[%]		
	Y	U	V
Average Class A	-0.9	-0.6	-0.4
Average Class B	-0.4	-0.2	-0.3
Average Class C	-0.3	0.1	0.0
Average Class D	-0.6	-0.4	-0.1
Average All	-0.5	-0.2	-0.1

LC-RA: R-D performance

	BD-rate[%]		
	Y	U	V
Average Class A	-0.8	-0.7	-0.6
Average Class B	-0.4	-0.6	-0.7
Average Class C	0.2	0.4	0.3
Average Class D	0.3	0.2	0.6
Average All	-0.1	-0.1	-0.1

HE-LD: R-D performance

	BD-rate[%]		
	Y	U	V
Average Class B	0.6	0.5	-0.4
Average Class C	0.7	0.8	0.8
Average Class D	0.5	-0.1	0.2
Average Class E	0.1	-3.8	-4.3
Average All	0.5	-0.4	-0.7

LC-LD: R-D performance

	BD-rate[%]		
	Y	U	V
Average Class B	0.7	0.0	-0.3
Average Class C	1.0	0.5	0.6
Average Class D	1.0	-0.1	0.0
Average Class E	-0.8	-0.8	-0.3
Average All	0.6	-0.1	0.0

Encoding/Decoding time for RA condition

	Encoding time [%]		Decoding time [%]	
	HE	LC	HE	LC
Average Class A	103.22	103.27	116.11	128.33
Average Class B	104.80	103.65	126.06	135.67
Average Class C	102.74	102.77	122.15	124.59
Average Class D	103.49	103.90	133.49	128.79
Average all	103.69	103.43	125.79	129.90

Encoding/Decoding time for LD condition

	Encoding time [%]		Decoding time [%]	
	HE	LC	HE	LC
Average Class B	102.74	100.99	107.62	118.86
Average Class C	100.98	100.91	104.99	112.87
Average Class D	104.14	100.99	109.63	116.07
Average Class E	101.92	101.29	104.02	117.81
Average all	101.39	100.72	108.02	118.01

RA Decoding time w/ and w/o YUV outputs

	w/ YUV output[%]		w/o YUV output [%]	
	HE	LC	HE	LC
Average all (class A/B/C/D)	125	129	120	126

Discussions

- Compression Performance
 - Gain can still be observed even with adaptive MV coding technique such as AMVP/Merge
 - Interaction with MV coding techniques needs to be checked
 - Especially for high-resolution sequences having stable background or uniform global motion
 - Performance loss in LD needs further investigation
 - may suggest that replacement of all skip/direct modes to IDVD would not be a right choice
- Encoding / Decoding time
 - No impact to encoding time
 - Decoding time increase comes from SAD competition with MC interpolation filter
 - More significant for lower bitrate condition where skip/direct happens more frequently

Conclusion

- Performance of IDVD has been verified in the CE1 framework
 - Gain in RA condition even with adaptive MV coding tools of HM-1
- Recommendations
 - Continue further study on impact of IDVD especially in terms of interaction with HM-2 MV coding tools