

JVET-Q0320

AHG13: Performance of VVC field coding

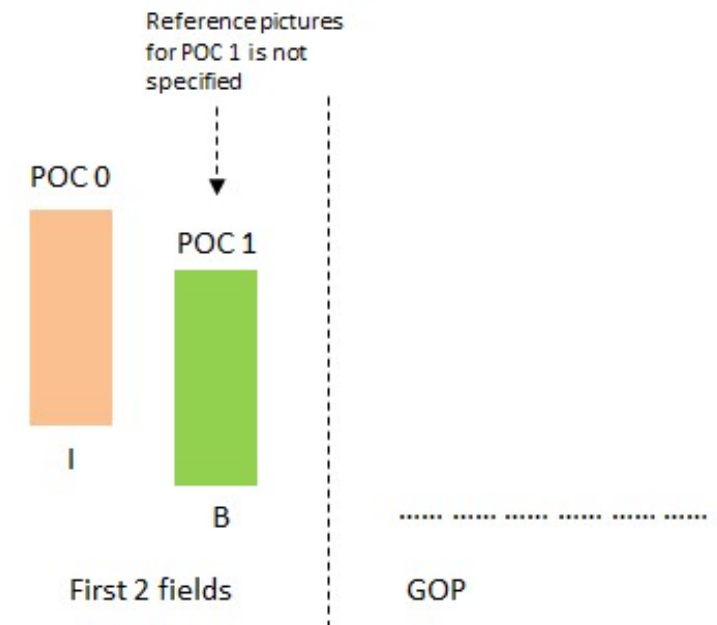
Han Boon Teo, Hai Wei Sun, Chong Soon Lim

Introduction

According to VTM ticket #503, field coding was broken since VTM6.1.

Three problems were found and fixed in VTM7.0.

- Initialization of RPL settings for the second field.
- Corrected PSNR and bitrate calculation for interlaced frames.
- Corrected FrameSkip for field coding.



Code change & field coding config files were released in merge request #1147, which has been merged into master.

Test conditions

To test the implementation, we used the following test seq from Sveriges Television AB (SVT).

Resolution	1920 x 1080i
Chroma format	YCbCr 4:2:0
Frame number	250 (or 500 fields)
Frame rate	25 (or 50i)
Bit depth	8-bit



Test conditions

Comparison 1	HM16.21 field coding		VTM7.0 field coding	
	GOP size	Intra Period	GOP size	Intra Period
RA	16 fields	32 fields	16 fields	32 fields
LDB	8 fields	-1	8 fields	-1

Comparison 2	VTM7.0 frame coding		VTM7.0 field coding	
	GOP size	Intra Period	GOP size	Intra Period
RA	16 frames	32 frames	32 fields	64 fields
LDB	8 frames	-1	16 fields	-1

Comparison 3	HM16.21 frame coding		HM16.21 field coding	
	GOP size	Intra Period	GOP size	Intra Period
RA	8 frames	16 frames	16 fields	32 fields
LDB	4 frames	-1	8 fields	-1

All tested config files are provided in contribution.

HM field vs VTM field				
Comparison 1		Y	U	V
RA	CrowdRun	-21.02%	-23.38%	-19.41%
	DucksTakeOff	-23.94%	-21.23%	-44.15%
	InToTree	-29.26%	-77.80%	-42.67%
	OldTownCross	-33.35%	-52.92%	-37.91%
	ParkJoy	-20.69%	-14.66%	-16.32%
	Overall	-25.65%	-38.00%	-32.09%
LDB	CrowdRun	-17.29%	-9.43%	-7.38%
	DucksTakeOff	-20.55%	-12.97%	-30.14%
	InToTree	-20.99%	-25.42%	-20.21%
	OldTownCross	-30.02%	-37.90%	-31.26%
	ParkJoy	-16.50%	-5.93%	-1.25%
	Overall	-21.07%	-18.33%	-18.05%

Performance

VTM frame vs VTM field				
Comparison 2		Y	U	V
RA	CrowdRun	-39.55%	-34.71%	-34.88%
	DucksTakeOff	-3.24%	43.96%	81.88%
	InToTree	-51.04%	-55.86%	-36.51%
	OldTownCross	-44.28%	-8.98%	-9.65%
	ParkJoy	-36.60%	-31.20%	-24.74%
	Overall	-34.94%	-17.36%	-4.78%
LDB	CrowdRun	-31.04%	-23.58%	-24.37%
	DucksTakeOff	0.56%	20.96%	61.67%
	InToTree	-39.38%	-18.68%	-19.25%
	OldTownCross	-32.41%	3.06%	-1.68%
	ParkJoy	-27.41%	-22.50%	-17.49%
	Overall	-25.94%	-8.15%	-0.22%

HM frame vs HM field				
Comparison 3		Y	U	V
RA	CrowdRun	-38.12%	-33.21%	-33.96%
	DucksTakeOff	-0.90%	18.83%	51.14%
	InToTree	-47.69%	-33.30%	-33.13%
	OldTownCross	-41.75%	-13.28%	-13.25%
	ParkJoy	-33.43%	-26.42%	-24.37%
	Overall	-32.38%	-17.48%	-10.71%
LDB	CrowdRun	-35.24%	-30.74%	-31.44%
	DucksTakeOff	1.00%	19.76%	49.70%
	InToTree	-39.65%	-21.53%	-18.46%
	OldTownCross	-32.29%	8.61%	9.58%
	ParkJoy	-29.66%	-25.06%	-20.92%
	Overall	-27.17%	-9.79%	-2.31%

The simulation results show that sequences with camera motion and action favours field coding.

DucksTakeOff contains no camera motion so it favours frame coding.