

Affine motion mode in intra coding

Siqi Cao, Haiyang Han, Jun Wang, Fan Liang,
Yuanfang Yu, Yang Liu

Jan. 2019

Outline

- Introduction
- Algorithm Description
- Results
- Conclusion

Introduction

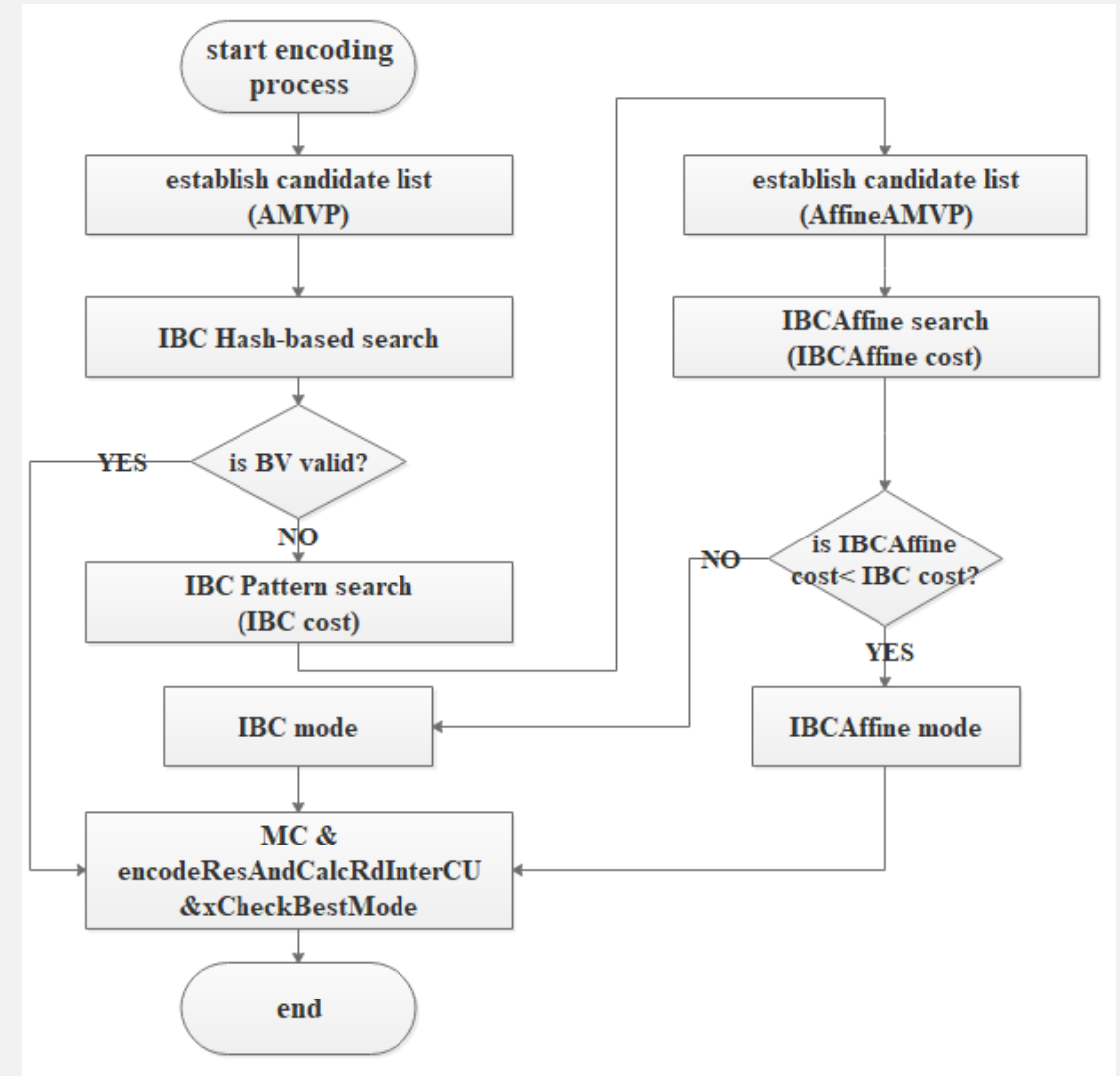
- IBC mode was implemented on VTM-3.0 to achieve efficient screen content coding
- Video sequences containing non-translational intra motion still require efficient compression:
 - Map sequences, there can be rotated repeated text
 - Blocks on the same object boundary also contain rotated repeated patterns
- CPR Affine mode is therefore implemented as OPPO's CfP response

Algorithm Description

- CPR Affine flag is signaled at block level (on/off)
 - Block size: 16x16
- If a CPR Affine block is coded in non-merge mode
 - Similar to IBC non-merge mode in VTM-3.0 (BVDAffine is coded in the same way as MVDAffine)
 - Similar IBC non-merge mode MVP candidates approach (Affine AMVP)
- Only local search is used
 - Similar to Inter affine mode
 - The reference frame is the current frame
 - 4 parameters (two control points)
- Luma-Chroma separate split tree (DualTree)
 - Only Luma is considered
- Decoder side
 - Shares the same syntax with the affine motion inter prediction

Algorithm Description

- Affine AMVP
 - neighboring blocks is coded as CPR affine mode (IBC affine mode)
 - spatial domain candidates



Result when IBC is turned on

		All Intra Main10															
		QPI	Reference						Over VTM-3.0						BD-rate (piecewise cubic)		
			kbps	Y psnr	U psnr	V psnr	Enc T [s]	Enc T [h]	kbps	Y psnr	U psnr	V psnr	Enc T [s]	Enc T [h]	Y	U	V
ClassF	ArenaOfValor	22	91672.86	44.22	45.27	45.90	404863.66	112.46	91667.87	44.22	45.27	45.90	624592.38	173.50	0.0%	0.0%	0.0%
		27	53262.51	40.70	42.46	42.86	291180.80	80.88	53258.59	40.70	42.46	42.86	444744.64	123.54			
		32	30430.23	37.45	40.29	40.51	307011.40	85.28	30434.66	37.45	40.29	40.51	325742.71	90.48			
		37	17267.72	34.38	38.58	38.68	178323.81	49.53	17265.03	34.38	38.58	38.68	189053.06	52.51			
	BasketballDrillText	22	19010.84	42.52	43.99	44.74	71071.49	19.74	19007.35	42.52	43.99	44.74	206366.59	57.32	0.0%	0.0%	0.0%
		27	10694.58	39.08	41.22	41.76	57443.68	15.96	10694.17	39.08	41.22	41.76	138706.26	38.53			
		32	6117.80	36.01	39.18	39.60	40735.44	11.32	6116.03	36.01	39.17	39.60	96945.36	26.93			
		37	3604.65	33.15	37.63	37.84	24445.46	6.79	3604.07	33.15	37.63	37.84	55691.58	15.47			
	SlideEditing	22	20102.27	47.01	45.32	45.86	57530.23	15.98	20062.33	47.01	45.32	45.87	178120.27	49.48	-0.2%	-0.1%	-0.2%
		27	14907.28	42.59	41.28	42.30	53052.49	14.74	14880.53	42.59	41.28	42.30	146337.43	40.65			
		32	11524.47	38.09	39.25	40.50	57590.03	16.00	11499.94	38.09	39.25	40.50	138096.11	38.36			
		37	8663.06	33.22	38.33	39.56	43750.72	12.15	8640.48	33.21	38.33	39.56	126188.54	35.05			
	SlideShow	22	4225.05	51.29	54.29	55.30	61055.52	16.96	4225.49	51.30	54.30	55.29	96017.21	26.67	-0.1%	0.0%	0.2%
		27	2804.29	47.62	51.03	52.22	31489.52	8.75	2801.29	47.61	51.03	52.19	74523.24	20.70			
		32	1888.46	43.96	48.62	50.23	26228.14	7.29	1885.72	43.96	48.59	50.21	74505.49	20.70			
		37	1247.88	40.16	46.74	48.62	21244.70	5.90	1244.15	40.14	46.77	48.64	58665.86	16.30			
Class F															-0.1%	-0.1%	-0.1%
All															-0.1%	-0.1%	0.0%
Time geomean								18.93						40.24			
Time ratio														213%			
Time sum (hours)								479.73						826.19	0.7222		

Anchor:
VTM-3.0 with IBC on

CPR affine mode ratio:
3%

Conclusion

- Experimental results show the proposed method can improve the compression efficiency on screen content materials
- CPR Affine Merge mode and 6 parameter (3 control points) need further investigation
- Suggest to include new standard test sequence to test the compression efficiency of the CPR Affine mode