

JVET-O0400

CE7-related: Context-coded bin restriction

**Jungah Choi, Sunmi Yoo, Jin Heo, Jangwon Choi,
Jaehyun Lim, Seung Hwan Kim**

LG Electronics Inc.

Summary

- Proposal
 - To further restrict the total number of context-coded bins
 - We use the intra sub-partitions (ISP) mode as well as number of coefficients in the TU
- Simulation results (Based on VTM-5.0)
 - AI, low QP

	Performance			Max - Bin2Bit Ratio	TRF of Max - Bin2Bit Ratio	Avg TRF - Bin2Bit Ratio	Avg - Bin2Bit Ratio	EncT	DecT
	Y	U	V	Diff	Diff	Diff	Diff		
Proposed Method on top of VTM5.0	0.03%	0.05%	0.06%	-0.58%	-0.85%	-0.79%	-0.55%	102%	114%
CE7-1.1	0.06%	-0.06%	-0.04%	-1.67%	-1.23%	-1.00%	-1.52%	100%	96%
Proposed Method on top of ce7-1.1	0.08%	-0.02%	0%	-2.08%	-1.84%	-1.57%	-1.92%	100%	98%

- AI, CTC

	Performance			Max - Bin2Bit Ratio	TRF of Max - Bin2Bit Ratio	Avg TRF - Bin2Bit Ratio	Avg - Bin2Bit Ratio	EncT	DecT
	Y	U	V	Diff	Diff	Diff	Diff		
Proposed Method on top of VTM5.0	0.04%	0.03%	0.05%	-0.41%	-0.94%	-0.91%	-0.37%	102%	120%
CE7-1.1	-0.01%	-0.06%	-0.03%	2.99%	4.95%	5.01%	2.86%	100%	97%
Proposed Method on top of ce7-1.1	0.01%	0.01%	0.02%	2.73%	4.58%	4.53%	2.65%	100%	100%

Proposed method

- Current limit for context-coded bins is too large for the ISP mode
 - As the distance from reference pixels gets shorter, the amount of residual signals in TUs with ISP mode becomes much smaller than other TUs
 - Try to find the appropriate transition point between context coding and bypass coding

CE7-1.1	$\text{remRegBins} = \text{tbwidth} * \text{tbheight} * 1.75$
Proposed	$\text{remRegBins} = \text{tbwidth} * \text{tbheight} * (\text{isISP? } 1 : 1.75)$

Test Results (Low QP)

- on top of CG-level constraint of VTM5.0

	All Intra Main10																
	Over VTM-5.0			Max - Bin2Bit Ratio			TRF of Max - Bin2Bit Ratio			Avg TRF - Bin2Bit Ratio			Avg - Bin2Bit Ratio				
	Y	U	V	Ref	Test	Diff (%)	Ref	Test	Diff (%)	Ref	Test	Diff (%)	Ref	Test	Diff (%)	EncT	DecT
Class A1	0.04%	0.04%	0.08%	0.99	0.99	-0.28%	1.33	1.33	-0.58%	1.33	1.32	-0.58%	1.00	0.99	-0.32%	102%	102%
Class A2	0.02%	0.02%	0.02%	0.85	0.85	-0.27%	1.11	1.11	-0.27%	1.11	1.11	-0.28%	0.86	0.86	-0.25%	102%	100%
Class B	0.01%	0.02%	0.02%	0.88	0.88	-0.31%	1.09	1.09	-0.47%	1.12	1.11	-0.34%	0.90	0.89	-0.26%	102%	102%
Class C	0.02%	0.08%	0.08%	0.81	0.80	-1.12%	0.97	0.96	-1.65%	0.99	0.97	-1.73%	0.82	0.81	-1.20%	102%	103%
Class E	0.05%	0.13%	0.10%	0.96	0.95	-0.98%	1.23	1.21	-1.41%	1.23	1.22	-1.10%	0.95	0.95	-0.76%	103%	99%
Overall	0.03%	0.05%	0.06%	0.89	0.89	-0.58%	1.13	1.13	-0.85%	1.14	1.14	-0.79%	0.90	0.89	-0.55%	102%	101%
Class D	0.02%	0.03%	0.03%	0.78	0.77	-1.10%	0.91	0.89	-1.54%	0.92	0.91	-1.57%	0.78	0.78	-1.12%	100%	104%
Class F	0.05%	0.03%	0.07%	0.92	0.91	-0.82%	1.08	1.07	-1.41%	1.05	1.04	-1.72%	0.91	0.90	-0.88%	105%	101%

- on top of TU-level constraint of CE7-1.1

	All Intra Main10																
	Over VTM-5.0			Max - Bin2Bit Ratio			TRF of Max - Bin2Bit Ratio			Avg TRF - Bin2Bit Ratio			Avg - Bin2Bit Ratio				
	Y	U	V	Ref	Test	Diff (%)	Ref	Test	Diff (%)	Ref	Test	Diff (%)	Ref	Test	Diff (%)	EncT	DecT
Class A1	0.02%	-0.10%	-0.07%	0.99	0.98	-1.79%	1.33	1.31	-1.63%	1.33	1.31	-1.39%	1.00	0.98	-1.54%	100%	99%
Class A2	0.08%	0.01%	0.02%	0.85	0.83	-3.00%	1.11	1.08	-2.68%	1.11	1.08	-2.62%	0.86	0.83	-3.00%	100%	97%
Class B	0.07%	-0.09%	-0.07%	0.88	0.87	-0.83%	1.09	1.09	-0.15%	1.12	1.12	0.18%	0.90	0.89	-0.70%	100%	98%
Class C	0.16%	0.07%	0.09%	0.81	0.76	-6.06%	0.97	0.90	-7.20%	0.99	0.92	-6.85%	0.82	0.77	-5.84%	99%	97%
Class E	0.06%	0.06%	0.05%	0.96	0.96	0.19%	1.23	1.24	0.79%	1.23	1.25	1.19%	0.95	0.96	0.47%	100%	99%
Overall	0.08%	-0.02%	0.00%	0.89	0.87	-2.08%	1.13	1.11	-1.84%	1.14	1.13	-1.57%	0.90	0.88	-1.92%	100%	98%
Class D	0.14%	0.05%	0.07%	0.78	0.74	-5.46%	0.91	0.85	-6.61%	0.92	0.87	-5.72%	0.78	0.75	-4.82%	100%	96%
Class F	0.15%	0.12%	0.09%	0.92	0.90	-1.60%	1.08	1.04	-3.62%	1.05	0.99	-5.87%	0.91	0.88	-3.13%	100%	98%

Test Results (CTC)

- on top of CG-level constraint of VTM5.0

	All Intra Main10																
	Over VTM-5.0			Max - Bin2Bit Ratio			TRF of Max - Bin2Bit Ratio			Avg TRF - Bin2Bit Ratio			Avg - Bin2Bit Ratio				
				Ref	Test	Diff (%)	Ref	Test	Diff (%)	Ref	Test	Diff (%)	Ref	Test	Diff (%)	EncT	DecT
Class A1	0.02%	0.01%	0.05%	1.13	1.13	-0.03%	1.56	1.56	-0.03%	1.56	1.55	-0.26%	1.14	1.14	-0.08%	103%	102%
Class A2	0.02%	0.02%	0.00%	1.12	1.12	-0.19%	1.57	1.56	-0.58%	1.57	1.57	-0.35%	1.12	1.12	-0.12%	102%	101%
Class B	0.04%	-0.03%	0.11%	1.09	1.08	-0.35%	1.51	1.50	-0.70%	1.51	1.50	-0.85%	1.10	1.10	-0.34%	102%	102%
Class C	0.06%	0.15%	0.03%	1.04	1.04	-0.82%	1.48	1.45	-1.99%	1.49	1.46	-1.79%	1.06	1.05	-0.81%	102%	103%
Class E	0.05%	0.02%	0.02%	1.07	1.07	-0.67%	1.41	1.39	-1.57%	1.40	1.38	-1.14%	1.07	1.06	-0.44%	101%	103%
Overall	0.04%	0.03%	0.05%	1.09	1.08	-0.41%	1.50	1.49	-0.94%	1.51	1.49	-0.91%	1.10	1.09	-0.37%	102%	102%
Class D	0.05%	0.32%	0.10%	1.03	1.02	-0.84%	1.47	1.44	-1.60%	1.48	1.45	-2.15%	1.03	1.02	-1.00%	101%	104%
Class F	0.01%	0.06%	-0.02%	1.12	1.12	0.02%	1.47	1.44	-1.74%	1.47	1.45	-1.54%	1.14	1.14	-0.33%	104%	101%

- on top of TU-level constraint of CE7-1.1

	All Intra Main10																
	Over VTM-5.0			Max - Bin2Bit Ratio			TRF of Max - Bin2Bit Ratio			Avg TRF - Bin2Bit Ratio			Avg - Bin2Bit Ratio				
				Ref	Test	Diff (%)	Ref	Test	Diff (%)	Ref	Test	Diff (%)	Ref	Test	Diff (%)		
Class A1	0.04%	0.14%	0.02%	1.13	1.17	3.05%	1.56	1.64	5.19%	1.56	1.63	4.90%	1.14	1.18	2.93%	101%	101%
Class A2	0.02%	-0.04%	-0.05%	1.12	1.15	2.93%	1.57	1.65	5.02%	1.57	1.65	4.99%	1.12	1.16	2.83%	101%	101%
Class B	-0.01%	-0.06%	-0.04%	1.09	1.13	3.95%	1.51	1.60	5.77%	1.51	1.60	5.79%	1.10	1.14	3.53%	100%	102%
Class C	0.01%	-0.01%	0.08%	1.04	1.05	0.58%	1.48	1.49	1.00%	1.49	1.51	1.40%	1.06	1.06	0.79%	100%	103%
Class E	0.00%	0.06%	0.10%	1.07	1.11	3.19%	1.41	1.50	6.69%	1.40	1.49	6.20%	1.07	1.10	3.37%	100%	103%
Overall	0.01%	0.01%	0.02%	1.09	1.12	2.73%	1.50	1.57	4.58%	1.51	1.57	4.53%	1.10	1.13	2.65%	100%	102%
Class D	0.03%	0.15%	0.07%	1.03	1.03	0.20%	1.47	1.49	1.34%	1.48	1.49	0.39%	1.03	1.04	0.21%	100%	104%
Class F	0.02%	0.10%	-0.12%	1.12	1.14	0.99%	1.47	1.48	1.07%	1.47	1.49	0.92%	1.14	1.15	0.55%	100%	102%

Thank you