



MEDIATEK

JVET-K0232

CE2.2.1.3: Long deblocking filters

Authors: Chia-Ming Tsai, Chih-Wei Hsu, Yu-Wen Huang, Shaw-Min Lei

Presenter: Ching-Yeh Chen

Overall Summary

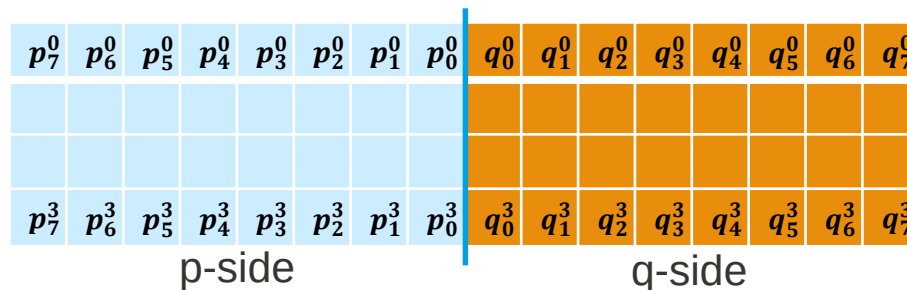
- Proposed long deblocking filter to improve visual quality when large CUs are coded
 - The filtering decisions for weak and strong filters are the same as HEVC
 - Add three long strong filters for handling blocky artifact of large CUs
 - A bugfix of applying deblocking filter at maximum TB boundaries
- Experimental results
 - Minor changes in BD-rate and encoding time, and 4% and 1% decoding time increases in VTM-1.0 and BMS-1.0, respectively
 - Blocky artifacts are effectively reduced by the proposed long strong filtering.

Long Strong Filtering Decision

- Apply long strong filtering, if all the following conditions are true
 - The slice type is inter slice.
 - The sizes of both coding blocks are larger than or equal to 8
 - HEVC strong filtering conditions are met.
 - The criteria of inter-side and intra-side differences are met.
 - All the above conditions are also met at any one of adjacent block edges.
- Otherwise (i.e. any one of above conditions is false)
 - Follow HEVC strong/weak filtering decision

Inter-Side Difference & Intra-Side Difference

- Inter-side difference
 - $InterSideDiff_i = |(p_0^i + p_1^i) - (q_0^i + q_1^i)|$, where $i = 0$ and 3
 - Should be larger than $inter_side_diff_th$, which depends on QP
- Intra-side difference
 - $IntraSideDiff_i = \sum_{s=4}^7 (|p_s^i - p_3^i| + |q_s^i - q_3^i|)$, where $i = 0$ and 3
 - Should be smaller than $\beta/2$



Long Strong Filter Set Selection

- When the long strong filtering is used, one filter among R8W7-ultra, R8W7-strong, and R4W4-strong will be selected based on CU size for each side.
 - If the sizes of both coding blocks ≥ 32 ,
 - If there is at least one of adjacent block edges which meet the same constraint, then R8W7-ultra filtering is selected
 - Otherwise, apply R8W7-strong filtering
 - Otherwise
 - For each side,
 - If “ $32 > len \geq 16$ ”, apply R8W7-strong filtering
 - Otherwise, apply R4W4-strong filtering

Example of Subjective Comparison

- The 3rd decoded picture of FoodMarket4, RA, QP=37



BMS-1.0

BMS-1.0 + TB deblocking fix + long strong Filtering

Simulation Results

	All Intra Main10									
	Over VTM-1.0					Over BMS-1.0				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class A1	0.00%	0.00%	0.00%	100%	104%	0.00%	0.00%	0.00%	100%	101%
Class A2	0.00%	0.00%	0.00%	101%	104%	0.00%	0.00%	0.00%	100%	101%
Class B	0.00%	0.00%	0.00%	100%	104%	0.00%	0.00%	0.00%	100%	101%
Class C	0.00%	0.00%	0.00%	100%	105%	0.00%	0.00%	0.00%	100%	102%
Class E	0.00%	0.00%	0.00%	100%	104%	0.00%	0.00%	0.00%	100%	101%
Overall	0.00%	0.00%	0.00%	100%	104%	0.00%	0.00%	0.00%	100%	101%
Class D	0.00%	0.00%	0.00%	100%	103%	0.00%	0.00%	0.00%	100%	103%

	Random Access Main 10									
	Over VTM-1.0					Over BMS-1.0				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class A1	-0.13%	-0.04%	-0.05%	99%	103%	-0.06%	-0.10%	0.03%	100%	99%
Class A2	-0.01%	-0.01%	0.01%	99%	104%	0.01%	0.01%	0.02%	100%	101%
Class B	0.01%	0.00%	0.02%	100%	102%	-0.01%	-0.01%	-0.03%	100%	101%
Class C	0.00%	-0.02%	-0.04%	100%	104%	0.02%	-0.05%	-0.05%	100%	101%
Overall	-0.02%	-0.02%	-0.01%	100%	103%	-0.01%	-0.04%	-0.01%	100%	101%
Class D	0.00%	0.00%	0.02%	101%	104%	0.01%	-0.01%	-0.04%	101%	102%

	Low delay B Main10									
	Over VTM-1.0					Over BMS-1.0				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class B	-0.01%	0.08%	0.15%	100%	104%	-0.02%	-0.23%	0.02%	101%	102%
Class C	0.00%	0.09%	0.09%	100%	103%	-0.03%	0.18%	0.15%	101%	101%
Class E	0.04%	-0.01%	-0.17%	100%	102%	-0.14%	-0.60%	-0.09%	100%	101%
Overall	0.01%	0.06%	0.05%	100%	103%	-0.05%	-0.19%	0.04%	101%	101%
Class D	-0.03%	-0.25%	0.03%	100%	104%	-0.01%	0.11%	-0.14%	101%	101%

Conclusions

- Proposed to add long strong filtering to deblocking filtering
 - The filtering decisions for weak and strong filters are the same as HEVC
 - Add three long strong filters for handling blocky artifact of large CUs
 - A bugfix of applying deblocking filter at maximum TB boundaries is included, which is also proposed in JVET-K0237.
- Minor changes in BD-rate and encoding time, and slightly increase decoding time
- Blocky artifacts are effectively reduced by the proposed long strong filtering.



everyday genius