



CREATING THE LIVING NETWORK™

JVET-J0045

On latency reduction for template-based inter prediction

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Problem statement

- The motion-compensated prediction (MCP) in HEVC
 - The MCP only uses the samples from reference pictures
 - No dependency between the MCPs of neighboring blocks
 - ***The decoding of multiple CUs can be done in parallel***
- Template-based inter prediction modes in JEM
 - FRUC template-matching and LIC
 - Several template-based coding methods are also used in the CfP responses: residual sign prediction, MV difference sign derivation, motion candidate reorder and transform syntax reorder and so forth
 - ***The decoding of one CU cannot start until all its neighboring samples are fully reconstructed***

Low latency template-based inter prediction

- The main modules of the existing template-based inter prediction methods remain the same
- The derivation of template samples is modified:
 - a) **Use the prediction samples** as the template samples
 - When OBMC is applied, the prediction samples are generated before the OBMC
 - b) **Add the reconstructed DC** to form the template samples
 - The DC is available after parsing without need to do inverse quantization and inverse transform
- **Adaptive template size** for FRUC template-matching
 - Depending on CU size, either 4 or 2 rows/columns of neighboring samples are used as the top and left template samples

Simulation results

- Implemented on top of the CfP response software from InterDigital and Dolby (JVET-J0015)
- Based on the RA configuration and follows the CfP testing conditions
- The results of JVET-J0015 are used as anchor
- Two tested cases
 - Disable FRUC template-matching and/or LIC
 - Enable FRUC template-matching and/or LIC + the proposed template sample derivation

Simulation results

- The proposed method keeps majority of the coding gain of these two template-based inter coding modes

Test cases		Average		
		Y	U	V
FRUC template-matching only	Disable	2.55%	2.17%	2.36%
	Proposed	0.30%	0.20%	0.19%
LIC only	Disable	0.91%	0.39%	0.49%
	Proposed	0.17%	-0.06%	-0.15%
FRUC template-matching and LIC	Disable	3.27%	2.44%	2.64%
	Proposed	0.46%	0.23%	0.16%

Simulation results

- Anchor: disabling FRUC template-matching and/or LIC
- Test: enabling FRUC template-matching and/or LIC + the proposed template sample derivation

Test cases	Average		
	Y	U	V
FRUC template only	-2.19%	-1.92%	-2.11%
LIC only	-0.73%	-0.45%	-0.64%
FRUC template + LIC	-2.71%	-2.14%	-2.41%

Conclusion

- Existing template based methods achieve good coding efficiency but have significant decoder architecture issues
- The proposed method alleviate the architecture problem and keep majority of the gain
- Should be included in the Test Model