

JVET-AH0219

Non-EE2: Improvements on Inter LFNST/NSPT

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Introduction

- In ECM-12.0, LFNST/NSPT can be applied to inter-coded blocks
 - *The transform kernels for intra LFNST/NSPT are reused by inter blocks*
 - *The 1st DIMD intra prediction mode (IPM) corresponding to the highest amplitude is used to determine the LFNST/NSPT kernel set*
- It is asserted that a single IPM may not sufficiently profile a GPM-coded block
- Besides, in ECM-12.0, inter LFNST/NSPT cannot be applied to an SBT-coded block

Proposed methods

- **Aspect #1:** Multiple LFNST/NSPT kernel set for GPM mode
 - *Beside the 1st DIMD IPM, a second DIMD IPM corresponding to the 2nd highest HOG amplitude is used as an additional IPM candidate.*
 - *A CU-level flag indicating the IPM index is signaled*
- **Aspect #2:** LFNST/NSPT for SBT-coded blocks
 - *A CU-level LFNST/NSPT index is signaled for an SBT-coded block*
 - *When LFNST/NSPT is applied to an SBT-coded CU, the TU with non-zero residual will perform LFNST/NSPT, and the prediction signal within the TU region is used to derive the IPM for transform*

Simulation results

■ Experimental results (ECM12.0 as the anchor)

	Random Access Main 10						
	Over ECM-12.0						
	Y	U	V	EncT	DecT	EncVmPeak	DecVmPeak
Class A1	-0.08%	0.09%	0.04%	100.8%	99.1%	99.9%	99.9%
Class A2	-0.09%	0.08%	0.10%	101.7%	98.7%	99.9%	99.7%
Class B	-0.08%	0.20%	0.26%	102.7%	99.5%	100.5%	99.9%
Class C	-0.07%	0.07%	0.14%	102.3%	99.7%	100.3%	100.3%
Class E							
Overall	-0.08%	0.12%	0.15%	102.0%	99.3%	100.2%	100.0%
Class D	-0.10%	0.14%	0.28%	102.4%	100.4%	100.5%	100.3%
Class F	-0.03%	0.04%	0.01%	102.2%	100.3%	100.5%	100.1%
Class TGM	#VALUE!	#VALUE!	#VALUE!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Three Qp22 missing points are copied from anchor

Conclusion

- Two aspects to improve inter LFNST/NSPT are presented
- 0.08 coding gain in RA configurations with 102% encoder runtime
- Recommend to study the proposed method in EE2