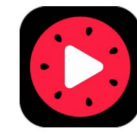


JVET-AE0131

Non-EE2: Variance based Classification for In-loop Filtering

Wenbin Yin, Kai Zhang, Li Zhang,
Bytedance Inc.



Summary

■ Motivation

- Variance Could Reflect the Difference Between Rich Texture and Smooth Contents
- Efficient Classification Can Improve the Reconstruction Quality of In-Loop Filters

■ Proposed Solution

- Variance based Classification for ALF
- Variance based Classification for BF

Classification of Loop Filters in ECM-9.0

■ Classification in ALF

- 3 Switchable Classifiers
- Band-based, Texture-based and Residual-based Classifier

■ Classification in BF

- TU is Filtering Unit
- Filtering Strength Only Related to QP, Size and Prediction Mode of One TU

Proposed Methods

■ Classification in ALF

- Keep 3 Switchable Classifiers Unchanged
- Further Classify Each Unit into 2 Levels based on Variance and Boundary Position Jointly
- Combine the Variance Level with the Existing Classifiers to Output Final Classification Results

■ Classification in BF

- Keep the Existing Classification Unchanged
- Classify Each TU into 5 Levels based on Variance
- Select the Best Filtering Strength based on Variance Level

Simulation Results

- Anchor is ECM-9.0
- Table Shows the Performance of the Proposed Method

	AI					RA					LB				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class-A1	*0.02%	-0.05%	-0.05%	100.2%	100.4%	*0.01%	-0.21%	0.14%	100.1%	99.4%					
Class-A2	-0.01%	-0.01%	0.01%	99.7%	100.1%	*-0.06%	-0.09%	-0.09%	100.2%	100.3%					
Class-B	0.00%	-0.04%	0.03%	99.1%	100.2%	-0.02%	-0.05%	0.15%	100.3%	99.6%					
Class-C	-0.04%	-0.01%	0.06%	100.9%	99.6%	-0.11%	-0.18%	0.05%	99.6%	100.0%	-0.15%	-0.31%	-0.40%	99.7%	100.0%
Class-E	-0.05%	0.02%	0.09%	100.3%	100.7%						0.03%	-1.04%	0.78%	100.5%	100.0%
Overall	*-0.02%	-0.02%	0.03%	100.0%	100.1%	*-0.04%	-0.12%	0.07%	100.0%	99.8%					
Class-D	-0.02%	-0.07%	0.13%	99.2%	100.0%	-0.09%	-0.23%	0.15%	99.9%	100.3%	-0.19%	0.56%	-0.21%	100.7%	100.9%
Class-F	-0.02%	-0.02%	0.07%	99.7%	102.1%	-0.09%	-0.01%	-0.15%	101.0%	100.9%					

Conclusion

- A Variance based Classification for In-loop Filtering is Proposed
- 2 Aspects are Included:
 - Variance based Classification for ALF
 - Variance based Classification for BF
- Promising Coding Gain Can be Achieved with Limited Coding Time Increase
- Recommended to Include into Next Round of EE2
- Thanks Ericsson for Cross-Checking

Thanks!