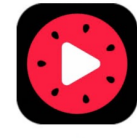


JVET-AH0178

Non-EE2: High Accuracy Sample Based Bi-Directional Optical Flow

Mehdi Salehifar, Yuwen He, Kai Zhang, Li Zhang
Bytedance Inc.



Introduction

- In JVET-AD0195, the high-precision equations to derive the BDOF MV refinement parameters was proposed and adopted into ECM-9.0:

$$\sum Gx.Gx * vx + \sum Gx.Gy * vy = \sum dI . Gx. \rightarrow s1 * vx + s2 * vy = s3$$

$$\sum Gx.Gy * vx + \sum Gy.Gy * vy = \sum dI . Gy \rightarrow s2 * vx + s5 * vy = s6$$

- In JVET-AE0065, iterative BDOF for multi-pass DMVR was proposed and adopted into ECM-10.0, based on:
 - *Iteratively applying BDOF DMVR*
 - *Adaptive BDOF subblock size, depending on PU size*
- In JVET-AG0067 improvements for DMVR were proposed and adopted into ECM-12.0, based on
 - *Using mean removed equations to derive BDOF DMVR parameters*
 - *Adding 16x16 BDOF DMVR layer*

Proposed Method

- In this contribution, high accuracy BDOF sample is proposed:
- BDOF sample formula is updated to high accuracy formula:
 - $(\sum Gx.Gx+R1) * vx + \sum Gx.Gy * vy = \sum dI . Gx - dM . \sum Gx$
 - $\sum Gx.Gy * vx + (\sum Gy.Gy+R1) * vy = \sum dI . Gy - dM . \sum Gy$
- This is the same formula used for BDOF DMVR in ECM-12.0

Simulation Results

- Simulation results compared with ECM-12.0

	Random Access Main 10						
	Over ECM-12.0						
	Y	U	V	EncT	DecT	EncVmPeak	DecVmPeak
Class A1	-0.09%	-0.14%	-0.20%	100.9%	101.4%	100.2%	99.8%
Class A2	-0.12%	-0.13%	-0.19%	101.6%	101.9%	99.9%	99.9%
Class B	-0.10%	-0.02%	-0.02%	101.4%	100.9%	100.0%	99.7%
Class C	-0.12%	-0.09%	-0.01%	101.9%	101.0%	100.5%	100.0%
Class E							
Overall	-0.11%	-0.09%	-0.09%	101.5%	101.2%	100.1%	99.9%
Class D	-0.18%	-0.20%	-0.07%	101.9%	100.6%	100.0%	100.0%
Class F	-0.01%	-0.03%	-0.12%	101.9%	102.3%	99.9%	100.0%

Conclusions

- High accuracy formula for BDOF sample is proposed.
- It has -0.11% gain for RA configuration, with 101.5%/ 101.2% complexity on top of the ECM-12.0.
- It is recommended to study the proposed method in the next round of EE2.