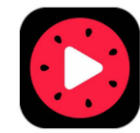
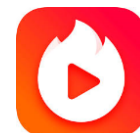


JVET-AD0361

Update on optimized VVC encoder implementation BVC for live-streaming

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Summary

- An optimized VVC encoder, namely BVC encoder
 - Developed by Bytedance
 - Support majority of the coding tools introduced in VVC main profile
 - Support scene change detection, rate control, and pre-processing
- Performance with 16 threads compared to x265(v3.5)
 - 54.27% BD rate gain with 10.86% enc-time increase
- Performance with 16 threads compared to HM-17.0

Cfg.	BD rate relative to HM				Speedup vs. HM
	Y (%)	U (%)	V (%)	YUV (%)	
RA	-5.14	-24.37	-25.16	-9.47	928x
LDB	-0.91	-14.20	-13.98	-3.62	513x

BVC encoder

■ Supported features

- Self-developed framework for better support of parallel encoding
 - Task level
 - Picture level
 - Tile level
 - CTU row level (Wavefront)
- A variety of fast encoding algorithms for each enabled coding tool at each preset
- Optimized SIMD implementation
- Pre-analysis features, such as video type detection (camera or SCC), adaptive GOP size determination, motion complexity analysis, and scene cut detection
- Pre-processing for noise detection and reduction

BVC encoder

- Supported features (continued)
 - Multiple coding and rate control modes, including CQP, CRF, CBR and ABR
 - Predefined quality/speed presets

Simulation results

- Use x265 and HM-17.0 as anchors
- Threads#: 16
- RA/LDB configuration and internal bit-depth is set to 8

Compared to x265					
Class	Y (%)	U (%)	V (%)	YUV (%)	Speed up
A1	-56.22	-63.85	-68.27	-58.84	0.80
A2	-59.38	-65.92	-62.24	-60.26	0.71
B	-51.25	-62.58	-63.83	-53.78	0.86
C	-46.14	-53.88	-56.74	-48.08	1.41
AVG	-52.51	-61.18	-62.51	-54.57	0.90

Compared to HM-17.0 LDB					
Class	Y (%)	U (%)	V (%)	YUV (%)	Speed up
B	-0.30	-10.75	-11.73	-2.24	684
C	2.38	-3.49	-3.53	1.29	344
E	-6.31	-34.22	-31.68	-12.45	677
AVG	-0.91	-14.20	-13.98	-3.62	513

Compared to HM-17.0 RA					
Class	Y (%)	U (%)	V (%)	YUV (%)	Speed up
A1	-12.63	-26.18	-30.29	-16.63	1098
A2	-10.15	-22.74	-17.33	-12.71	915
B	-4.18	-26.44	-30.38	-9.19	1028
C	3.02	-21.64	-20.65	-2.01	757
AVG	-5.14	-24.37	-25.16	-9.47	928
A1+A2+B AVG	-8.11	-25.36	-26.79	-12.18	1011

Thank you!