

IMPROVEMENTS IN X265 ENCODER

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Mile High Video 2019



AGENDA

- ▶ Introduction to HEVC, x265
- ▶ x265 encoding tools
- ▶ Briefing v3.0
- ▶ Future ideas



X265: AN OPEN-SOURCE HEVC ENCODER

- ▶ Goal of video compression - streaming/downloading high-quality videos without delay
- ▶ AVC standard is the most popular and widely used

HEVC

- ▶ Adoption of 4k led to the introduction of HEVC standard
- ▶ Successor of AVC
- ▶ Compute intensive algorithms
- ▶ Achieves half bitrate of AVC for same quality

x265

- ▶ Encodes streams in HEVC standard
- ▶ Available as open-source software library/application
- ▶ Published with GNU GPL v2 license



X265 KEY ENCODING TOOLS

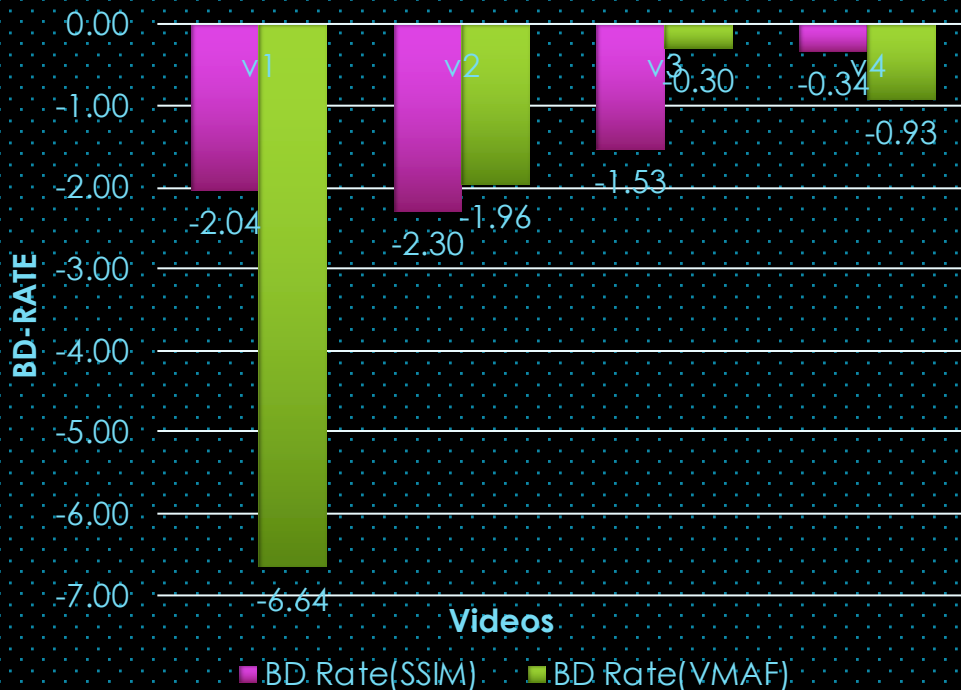
- ▶ Quality tools
 - ✓ Rate control mechanisms
 - ✓ Adaptive quantization techniques
 - ✓ Motion search methods
 - ✓ Scene detection algorithms
- ▶ Performance tools
 - ✓ Assembly level optimization
 - ✓ Fast encoding for block selection



X265 V3.0 : VERYSLOW PRESET TUNING

- ▶ Encoding tools are grouped as “presets”
 - ✓ Fast encoding tools for speed
 - ✓ High complexity tools for compression efficiency
- ▶ Presets range from ultrafast to veryslow and placebo
- ▶ VOD providers opt “veryslow” for quality
- ▶ V3.0 tuned parameters - limit-tu, limit-ref, numMergeCandidates, etc.
- ▶ Negative BD rate indicates improved compression efficiency

V3.0 vs v2.9 BD-RATE



X265 V3.0 : ZONE CONFIGURATION

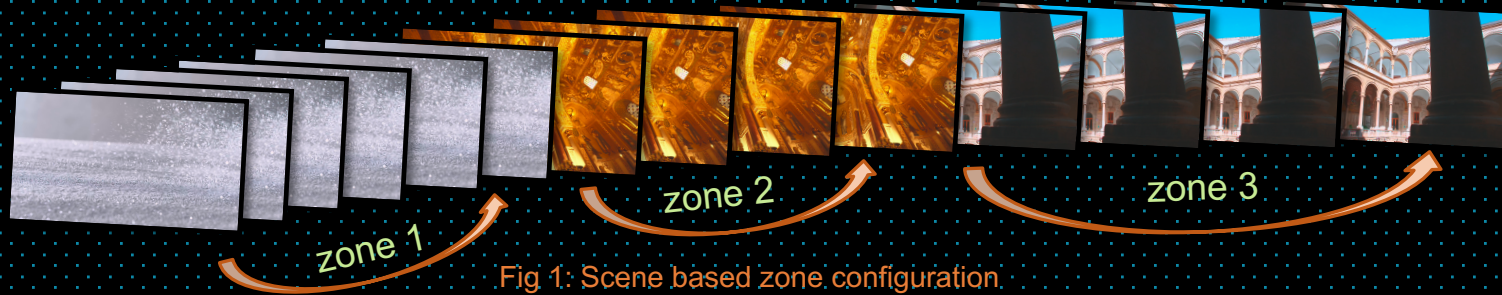


Fig 1: Scene based zone configuration

Usage: `--zone-file <FILE>`

- ▶ Zone defines region/chunk of video
- ▶ v3.0 allows configuration of encoding parameters for each zone
- ▶ Used in VOD/offline encoding
- ▶ Provides support for content adaptive encoding



X265 V3.0 : SUPPORT FOR DOLBY VISION'S HDR

- ▶ Dolby delivers HDR with peak brightness of 10,000 nits.
- ▶ Provides wide-color-gamut content using IPT color space.
- ▶ Supports upto 12 bit color depth
- ▶ Supports dynamic metadata

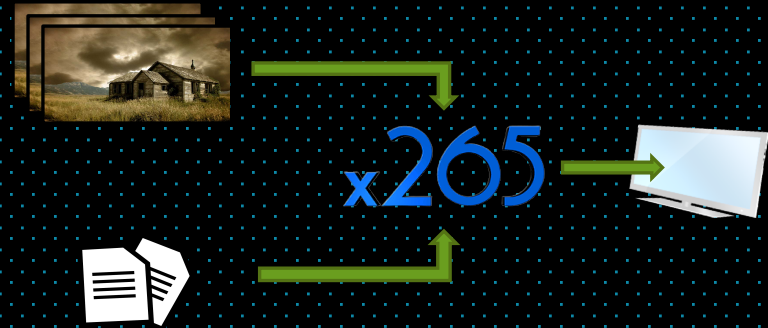


Fig. 2b: x265 muxing video stream and metadata



Fig. 2a: HDR color gamut

- ▶ Replaces muxer, parses Dolby Vision RPU (metadata) and muxes it with the elementary video stream
- ▶ Supports interface through profile id for managing HDR parameters

Usage: `--dolby-vision-profile <ID> --dolby-vision-rpu <FILE>`

X265 V3.0 : ADD ONS

Content specific quality improving features

- ▶ Adaptive quantization using new mode HEVC AQ

Usage: --hevc-aq

- ▶ Tune animation content

Usage: --tune anime

- ▶ Distortion share through multi-pass encoding

Usage: --refine-ctu-distortion



V3.1 & FUTURE IDEAS

v3.1 is out for use

- ▶ SVT-HEVC integration with x265
- ▶ Ability for encoder to generate interlaced streams from progressive input
- ▶ Fade detection algorithm
- ▶ Performance improvement for medium preset with negligible loss in quality

Plans for the next version

- ▶ Optimize encodes of HDR content
- ▶ Improvements in Adaptive Quantization
- ▶ Scene detection enhancement

Improvements in x265 Encoder
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THANK YOU