English version is derived from the x264 x265 Ultimate Tutorial by iAvoe/iiAvoe

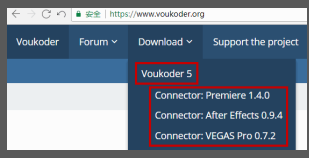
LigH	.hevc GCC10 [single .exe 8-10-12bit] w/ x86 w/ libx265.dll
Rigaya	.hevc GCC 9.3 [8-10-12bit] w/ x86
Patman	.hevc GCC 11+MSVC1925 [8-10-12bit]
ShortKatz	arm64~64e with x86 ? [?] macOS compiling needed
DJATOM-aMod	Intel, AMD zen1~2 [10bit], zen3 [10-12bit] GCC 10.2.1+GCC10.3
MeteorRain-yuuki	lsmash.mkv/mp4 或.hevc [lavf isn't as reliable as pipe acc. rumor] GCC 9.3+ICC 1900+MSVC 1916 [8][10][12bit]+[8-10-12bit]

ffmpeg all OS compatible. backup link: ottverse.com/ffmpeg-builds

mpv player a small sized opensource video player with no color issues afaik

x265GuiEx (Rigaya) 日本語, compiles by auto-setup, link for tutorial

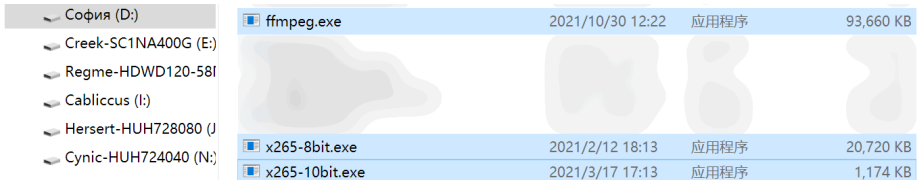
Voukoder; V-Connector free Premiere/Vegas/AE/Davinci Studio export plugin with ffmpeg's internal encoders, and good encoding presets to choose



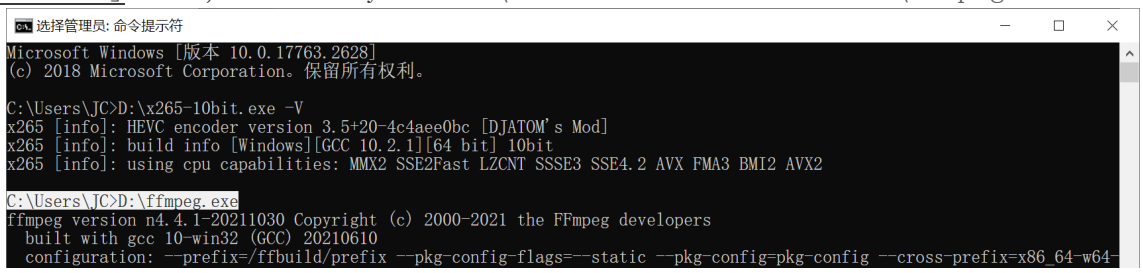
ffprobe metadata & media format reader in CLI from the same origin as ffmpeg (within the ffmpeg download zip file), see tutorial page (with webpage translate)

x265.exe command line for new users

[Download ffmpeg, ffprobe/MediaInfo & x265 to a memorable path] Here they are under D:\



[Open CMD/PowerShell or Linux/MacOS Bash/Terminal, input path\to\ffmpeg, ffprobe, x265, then press enter] i.e., here they are D:\x265-10bit.exe -V and D:\ffmpeg.exe



[Check ffmpeg build ver.] C:\folder\ffmpeg.exe; [x265 build ver.] C:\folder\x265.exe -V

[Auto-filling] Write PATH/filename partially, and hit [Tab]

Get source video metadata w/ ffprobe: `ffprobe.exe -i ".\video.mp4" -select_streams v:0 -v error -hide_banner -show_streams -show_frames -read_intervals "%+#1" -show_entries frame=top_field_first:stream=codec_long_name,width,coded_width,height,coded_height,pix_fmt,color_range,field_order,r_frame_rate,avg_frame_rate,nb_frames -of ini`

```
[frames.frame.0]
top_field_first=0          Check when source video is interlaced

[streams.stream.0]
codec_long_name=H.264      Source codec
width=1920
height=1080
coded_width=1920           if != width:  horizontal rect. pixel
coded_height=1088          if != height: vertical rect. pixel
pix_fmt=yuv420p            Colorspace
color_range=tv             Range (pc=full=0~255, tv-limited=16~235)
field_order=progressive    Field (progressive/interlaced/unknown)
r_frame_rate=24000/1001
avg_frame_rate=24000/1001 if != r_frame_rate: variable frame rate
nb_frames=20238            Total frame count
```

Variable framerate: Used on mobile devices to save battery, causing compatibility issues. Add ffmpeg option `-vsync cfr` to convert to cfr

Rectangular pixel: old & unsupported lossy compression. Swap src video if possible

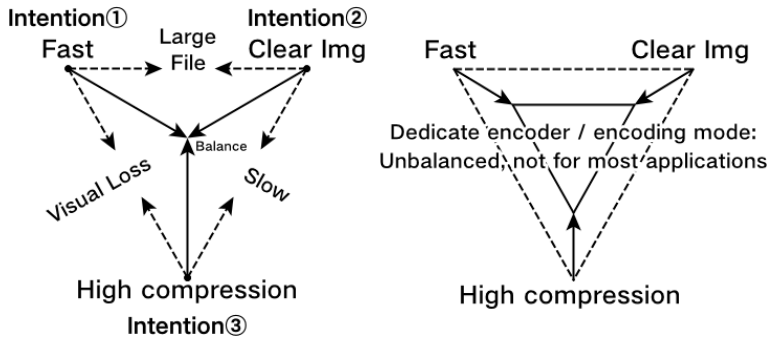
Encoding duration: number of frames÷encoding speed (fps)=required time(second)

ffmpeg-pipe-x265 example: `D:\ffmpeg.exe -i F:\video.mov -an -pix_fmt yuv420p10 -f yuv4mpegpipe -strict unofficial - | D:\x265-10bit.exe --preset slow --me umh --subme 5 --merange 48 --weightb --aq-mode 4 --bframes 5 --ref 3 --hash 2 --allow-non-conformance --qg-size 16 --rd 3 --limit-modes --limit-refs 1 --rskip 1 --splitrd-skip --no-sao --tskip --colorprim bt2020 --colormatrix bt2020nc --transfer smpte2084 --y4m - --output F:\done.hevc 2>D:\Desktop\ffmpeg_or_x265_error_logs.txt`

Get the correct -pix_fmt value: Get source video metadata with MediaInfo by dragging the file onto its program window (first-time use may require selecting [View]-[Tree]), find [Colorspace], [Color Sampling] & [Bit Depth]. (see ffprobe's method above). Usually they are [YUV], [4:2:0] & [8bit], which corresponds to yuv420p from the list below, x265 has a smaller set of supported formats than ffmpeg, they are: `yuv420p`, `yuv422p`, `yuv444p`, `yuv420p10le`, `yuv420p12le`, `yuv422p10le`, `yuv422p12le`, `yuv444p10le`, `yuv444p12le`, `yuv444p10le`, `yuv444p12le`, `gray`, `gray10le`, `gray12le`, `nv12`, `nv16`

Select bit depth for x264/5: One single x265.exe contain 8-10-12bit (Check with x265.exe -V) are set with option -D, such as -D 10 to encode in 10bit; or the downloaded zip contains separate x265-8bit.exe, x265-10bit.exe, simply call the corresponding executable

Triangle rule of encoding: The methodical way to develop encoding strategy & hardware choice. A dedicated solution delivers an unbalanced encoding result with heavy compromise, a general purposed solution in contrast provides a balanced solution that works for most applications. Faster hardware fits with general purposed, slower often fits dedicated solution



ffmpeg, VS, avs2yuv pipe

```
ffmpeg -i video_in.mp4 -an -f yuv4mpegpipe -strict unofficial - | x265 --y4m - --output

ffmpeg -i video_in.mp4 -an -f rawvideo - | x265.exe --input-res <WxH> --fps <int/flo/frac> - --output
```

-format, -an bypass audio, -strict unofficial lift std. restrictions, --y4m stands for "YUV for MPEG", both "-" passes stream through the Unix pipe

```
VSpipe.exe        [script].vpy --y4m - | x265.exe - --y4m --output

VSpipe/avs2yuv    [script].vpy - | x265.exe --input-res [WxH] --fps [] - --output

avs2yuv.exe       [script].avs -raw - | x265.exe --input-res [WxH] --fps [] - --output
```

ffmpeg built-in scaling: –sws_flags bicubic bitexact gauss neighbor bicublin lanczos spline +full_chroma_int +full_chroma_inp +accurate_rnd

Example: –sws_flags bitexact+full_chroma_int+full_chroma_inp+accurate_rnd)

ffmpeg multiplex all tracks (container format depends on output extension)

- `ffmpeg.exe -i ".\v_in.hevc" -an -c:v copy -i ".\audio_in.aac" -c:a copy -i ".\subtitle_in.srt" -c:s copy "mux_out.mkv"`
- `ffmpeg.exe -i ".\v_in.hevc" -an -c:v copy -i ".\audio1.aac" -c:a copy -i ".\aud2.aac" -c:a copy -i ".\sub1.ass" -c:s copy -i ".\sub2.ass" -c:s copy "mux_out.mkv"`

Subtitle support of different container formats: Wikipedia - Subtitle formats support

QAAC audio encoding tutorial or Github (use webpage translation)

ffmpeg replace audio track, itoffset±seconds to align:

- `ffmpeg.exe -i ".\mux_in.mov" -i ".\new_audio.aac" -c:v copy -map 0:v:0 -map 1:a:0 -c:a copy -itsoffset 0 ".\new_mux_out.mov"`

ffmpeg: small thread_queue_size warning:

- `-thread_queue_size<(avg src bitrate kbps+1000)/usable CPU core count>`

Batch: resume CMD prompt on finish: `cmd /k` **+ show windows build version:** `cmd -k`

x265 HDR settings:

HDR Tags --master-display <manually tagging for instruct video players or decoders to correctly play HDR sources
DCI-P3: G(13250,34500)B(7500,3000)R(34000,16000)WP(15635,16450)L(maxCLL×10000,1)
bt709: G(15000,30000)B(7500,3000)R(32000,16500)WP(15635,16450)L(maxCLL×10000,1)
bt2020: G(8500,39850)B(6550,2300)R(35400,14600)WP(15635,16450)L(maxCLL×10000,1)

- Check HDR source's metadata for color space，then copy the corresponding settings above as param value
- max for L has no standards，which means every video could be different, check your source stream

DCI-P3: G(x0.265, y0.690), B(x0.150, y0.060), R(x0.680, y0.320), WP(x0.3127, y0.329)
bt709: G(x0.30, y0.60), B(x0.150, y0.060), R(x0.640, y0.330), WP(x0.3127,y0.329)
bt2020: G(x0.170, y0.797), B(x0.131, y0.046), R(x0.708, y0.292), WP(x0.3127,y0.329)>
--max-cll <maxCLL,maxFALL>max, average pel intensity. Skip if MediaInfo doesn't get those values out

Color Primaries --colormatrix <as src, e.g.: gbr bt709 fcc bt470bg smpte170m YCgCo bt2020nc bt2020c smpte2084 ictcp>
--transfer <as source, e.g.: gbr bt709 fcc bt470bg smpte170m YCgCo bt2020nc bt2020c smpte2084 ictcp>

Dolby vision: DV-MEL (BL+RPU) & DV-FEL (BL+EL+RPU), x265 support 3 profiles of DV-MEL

Profile	Codec	BL:EL resolution	x265 supported	Gamma	Space
4	10bit hevc	1:1/4		SDR	YCbCr
5		BL only (DV-MEL)	✓		ICtCp
7		4K=1:1/4; 1920x1080=1:1		UHD BluRay	YCbCr
8.1		BL only (DV-MEL)	✓	HDR10	
8.2			✓	SDR	
8.4				HLG	
9	8bit avc	BL only (DV-MEL)		SDR	YCbCr

--dolby-vision-profile<select 5/8.1 (HDR10)/8.2>8.1 needs --master-display & --hdr10-opt

--dolby-vision-rpu<path>specify path to input RPU binary (.bin)

Note: Encoding speed reference content is temporarily removed due to change in settings

Gen-Purpose·Simple·Low-quality

no more configurable options for simplicity, only a few fps slower than top

splt-trans --preset slow

me-mc --me umh --subme 5 --merange 48 --weightb

adpt quant --aq-mode 4

rate control --bframes 5 --ref 3

io --hash 2 --allow-non-conformance

tgt. depth -D 8/10/12 (default 8bit or lowest built in x265.exe, same or convert to lower depth only w/ -

multi node -dither)

others --pools ,,,, (e.g.: "-,+"states a 2-node computer & use node 2, don't use >1 node per encode)

crop: --display-window < integer "←, ↑ ,→, ↓ " pixels >, ⩾22 core cpu opt.: --pme,

interlaced: --field, pixel depth reduction quality+: --dither, begin; ending frame: --seek; --

colorspace frames, crf/abr resist noise factor: --rc-grain

α——(ffmpeg pipe) x265 CLI parameters

- ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide_banner -i ".\导入.mp4" -an -f yuv4mpegpipe -strict unofficial -pix_fmt ◯ - | x265.exe --preset slow --me umh --subme 5 --merange 48 --weightb --aq-mode 4 --bframes 5 --ref 3 --hash 2 --allow-non-conformance --y4m - --output ".\v_out.hevc"

β——libx265 CLI, copy audio & multiplex to MP4

- ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide_banner -i ".\v_in.mp4" -c:v libx265 -pix_fmt ◯ -x265-params "preset=slow:me=umh:subme=5:merange=48:weightb=1:bframes=5:ref=3:hash=2:allow-

non-conformance=1" -fps_mode passthrough -c:a copy ".\v_out.mp4"

γ——Libkvazaar CLI (in dev, crf mode missing)

- ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide_banner -i ".\v_in.mp4" -c:v libkvazaar -pix_fmt

-kvazaar-params "limit-tu=1:tr-depth-intra=2:pu-depth-intra=4:pu-depth-inter=3:smp=1:amp=1:bipred=1:me=tz:subme=4:merange=48:me-early-termination=off:max-merge=2:ref=3:open-gop=0:period=360:gop=16:transform-skip=1:qp=16:fast-residual-cost=1:early-skip=1:max-merge=5:rd=3:mv-rdo=1:rdoq-skip=1:intra-rdo-et=1:sao=edge:hash=checksum" -fps_mode passthrough -c:a copy ".\v_out.mp4"

Standard.

Lots of custom options for optimizations

splt-trans --tu-intra-depth 3 --tu-inter-depth 3 --limit-tu 1 --rdpenalty 1 --rect

me-mc --me umh --subme <24fps=3, 48fps=4, 60fps=5, 100fps=6> --merange <1920:1080=48,

ref-rateol 2560:1440=52, 3840:2160=56> --weightb

--ref 3 --max-merge <2fast, 3, 4slow> --early-skip --no-open-gop --min-keyint 5 --

intra coding keyint <9×fps> --fades --bframes 8 --b-adapt 2 --radl 3 <sharp source: --pbratio 1.2>

quantization <fast: --fast-intra / mid: leave blank / slow: --b-intra / slower: --constrained-intra >

rdoq --crf <18~20 HQ 19 ~22 HD> --crqpoffs -3 --cbqpoffs -1

adapt quant --rdoq-level <1fast，2slow>

md decision <anime source: --hevc-aq, remove aq-mode> --aq-mode 4 --aq-strength <flat=0.8, edgy=1>

--rd 3 --limit-modes --limit-refs 1 --rskip <3fast, 2mid, 1slow> --rc-lookahead <3×fps,

rdo greater than bframes> --tskip-fast --rect <veryslow: --amp>

--psy-rd <film=1.6， anime=0.6, +0.6 if ctu=64, -0.6 if ctu=16> --splitrd-skip <EXP: --qp-

deblock-sao adaptation-range 3>

io --limit-sao --sao-non-deblock --deblock 0:-1

tgt. depth --hash 2 --allow-non-conformance <NAS streaming: --idr-recovery-sei>

multi node -D 8/10/12 (default 8bit or lowest built in x265.exe, same or convert to lower depth only w/ --dither)

others --pools ,,,, (e.g.: "-,+"states a 2-node computer & use node 2, don't use >1 node per encode)

crop: --display-window < integer "←, ↑ ,→, ↓ " pixels >, ⩾22 core cpu opt.: --pme,

interlaced: --field, pixel depth reduction quality+: --dither, begin; ending frame: --seek; --

colorspace frames, crf/abr resist noise factor: --rc-grain

α——(ffmpeg pipe) x265 CLI parameters

- ffmpeg.exe −loglevel 16 −hwaccel auto −y −hide_banner −i ".\v_in.mp4" −an −f yuv4mpegpipe −strict unofficial −pix_fmt ◯ − | x265.exe −−ctu ◯ −−min−cu−size 16 −−tu−intra−depth 3 −−tu−inter−depth 3 −−limit−tu 1 −−rdpenalty 1 −−me umh −−subme ◯ −−merange ◯ −−weightb −−ref 3 −−max−merge ◯ −−early−skip −−no−open−gop −−min−keyint 5 −−fades −−bframes 8 −−b−adapt 2 −−radl 3 −−pbratio 1.2 −−fast−intra −−b−intra −−constrained−intra −−crf ◯ −−crqpoffs −3 −−cbqpoffs −1 −−rdoq−level ◯ −−aq−mode 4 −−aq−strength ◯ −−rd 3 −−limit−modes −−limit−refs 1 −−rskip ◯ −−rc−lookahead ◯ −−tskip−fast −−rect −−amp −−psy−rd ◯ −−splitrd−skip −−qp−adaptation−range 4 −−limit−sao −−sao−non−deblock −−deblock 0:−1 −−hash 2 −−allow−non−conformance −−y4m − −−output ".\v_out.hevc"

β——libx265 CLI, copy audio & multiplex to MP4

- ffmpeg.exe −loglevel 16 −hwaccel auto −y −hide_banner −i ".\v_in.mp4" −c:v libx265 −pix_fmt ◯ −x265−params "ctu=◯:min−cu−size=16:tu−intra−depth=3:tu−inter−depth=3:limit−tu=1:rdpenalty=1:me=umh:subme=◯:merange=◯:weightb=1:ref=3:max−merge=◯:early−skip=1:open−gop=0:min−keyint=5:fades=1:bframes=8:b−adapt=2:radl=3:pbratio=1.2:fast−intra=1:b−intra=1:constrained−intra=1:crf=◯:crqpoffs=−3:cbqpoffs=−1:rdoq−level=◯:aq−mode=4:aq−strength=◯:rd=3:limit−modes=1:limit−refs=1:rskip=◯:rc−lookahead=◯:tskip−fast=1:rect=1:amp=1:psy−rd=◯:splitrd−skip=1:qp−adaptation−range=4:limit−sao=1:sao−non−deblock=1:deblock=0,−1:hash=2:allow−non−conformance=1" −fps_mode passthrough −c:a copy ".\v_out.mp4"

High Compression·Film·HQ Source

splt-trans	--ctu 64 --tu-intra-depth 4 --tu-inter-depth 4 --limit-tu 1
me-mc	--me star --subme <24fps=3, 48fps=4, 60fps=5, 100fps=6> --merange 56 --weightb
ref-rateol	--ref 3 --max-merge 5 --no-open-gop --min-keyint 3 --keyint <9×fps> --fades --bframes 8 --b-adapt 2 --radl 3 --analyze-src-pics
intra coding	--constrained-intra --b-intra
quantization	--crf 21.8 --crqpoffs -3 --ipratio 1.2 --pbratio 1.5
rdoq	--rdoq-level 2
adapt.quant	--aq-mode 4 --aq-strength <clean source=0.8, film=1> --qg-size 8
md decision	--rd 5 --limit-refs 0 --rskip 0 --rc-lookahead <1.8×fps, greater than bframes> --rect --amp
rdo	--psy-rd <film=1.6, animation=0.6, +0.6 if ctu=64, -0.6 if ctu=16> <EXP: --qp-adaptation-range 3>
deblock	--deblock 0:0
sao	--limit-sao --sao-non-deblock --selective-sao 3
io	--hash 2 --allow-non-conformance --nr-inter 8 <NAS streaming: --idr-recovery-sei>
tgt. depth	-D 8/10/12 (default 8bit or lowest built in x265.exe, same or convert to lower depth only w/ --dither)
multi node	--pools ,,,, (e.g.: "-,+"states a 2-node computer & use node 2, don't use >1 node per encode)
others	crop: --display-window < integer "←, ↑ ,→, ↓ " pixels >, ≥22 core cpu opt.: --pme, interlaced: --field, pixel depth reduction quality+: --dither, begin; ending frame: --seek; --frames, crf/abr resist noise factor: --rc-grain
color space	ffmpeg -pix_fmt yuv420p / yuv422p / yuv444p / yuv420p10 / yuv422p10 / yuv444p10…

α——(ffmpeg pipe) x265 CLI parameters

- ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide_banner -i ".\v_in.mp4" -an -f yuv4mpegpipe -strict unofficial -pix_fmt ◯ - | x265.exe --ctu 64 --tu-intra-depth 4 --tu-inter-depth 4 --limit-tu 1 --me star --subme ◯ --merange ◯ --weightb --ref 3 --max-merge 5 --no-open-gop --min-keyint 3 --keyint ◯ --fades --bframes 8 --b-adapt 2 --radl 3 --analyze-src-pics --constrained-intra --b-intra --crf 21.8 --crqpoffs -3 --ipratio 1.2 --pbratio 1.5 --rdoq-level 2 --aq-mode 4 --aq-strength ◯ --qg-size 8 --rd 5 --limit-refs 0 --rskip 0 --rc-lookahead ◯ --rect --amp --psy-rd ◯ --qp-adaptation-range 3 --deblock 0:-1 --limit-sao --sao-non-deblock --selective-sao 3 --hash 2 --allow-non-conformance --y4m - --output ".\v_out.hevc"

β——libx265 CLI, copy audio & multiplex to MP4

- ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide_banner -i ".\v_in.mp4" -c:v libx265 -pix_fmt ◯ -x265-params "ctu=64:tu-intra-depth=4:tu-inter-depth=4:limit-tu=1:me=star:subme= ◯ :merange= ◯ :weightb=1:ref=3:max-merge=5:open-gop=0:min-keyint=3:keyint= ◯ :fades=1:bframes=8:b-adapt=2:radl=3:analyze-src-pics=1:constrained-intra=1:b-intra=1:crf=21.8:crqpoffs=-3:ipratio=1.2:pbratio=1.5:rdoq-level=2:aq-mode=4:aq-strength= ◯ :qg-size=8:rd=5:limit-refs=0:rskip=0:rc-lookahead= ◯ :rect=1:amp=1:psy-rd= ◯ :qp-adaptation-range=3:deblock=0,-1:limit-sao=1:sao-non-deblock=1:selective-sao=3:hash=2:allow-non-conformance=1" -fps_mode passthrough -c:a copy ".\v_out.mp4"

Stock Footage·Render & Reuse

block/unit spitting——ctu 32

motion est.&cmp ——me star ——subme <24fps=3, 48fps=4, 60fps=5, 100fps=6> ——merange <1920:1080=48, 2560:1440=52, 3840:2160=56> ——analyze—src—pics

intraframe search ——max—merge 5 ——early—skip ——b—intra

rate control ——no—open—gop ——min—keyint 1 ——keyint <7×fps>——ref 3 ——fades ——bframes 7 ——b—adapt 2

quantization ——crf 17 ——crqpoffs —3 ——cbqpoffs —2

mode decision ——rd 3 ——limit—modes ——limit—refs 1 ——rskip 1 ——rc—lookahead <4×fps, , greater than bframes>

R-D optimization ——splitrd—skip

deblock ——deblock —1:—1

input output ——hash 2 ——allow—non—conformance

tuning ——tune grain

tgt pixel bit depth —D 8/10/12

others crop: ——display—window < integer "←, ↑ ,→, ↓ " pixels >, ⩾22 core cpu opt.: ——pme, interlaced: ——field, pixel depth reduction quality+: ——dither, begin; ending frame: ——seek; ——frames, crf/abr resist noise factor: ——rc—grain, multi—node: ——pools ,,,,

color space ffmpeg —pix_fmt yuv420p / yuv422p / yuv444p / yuv420p10 / yuv422p10 / yuv444p10…

α——(ffmpeg pipe) x265 CLI parameters

- ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide_banner -i ".\v_in.mp4" -an -f yuv4mpegpipe -strict unofficial -pix_fmt ◯ - | x265.exe --ctu 32 --me star --subme ◯ --merange ◯ --analyze-src-pics --max-merge 5 --early-skip --b-intra --no-open-gop --min-keyint 1 --keyint ◯ --ref 3 --fades --bframes 7 --b-adapt 2 --crf 17 --crqpoffs -3 --cbqpoffs -2 --rd 3 --limit-modes --limit-refs 1 --rskip 1 --rc-lookahead ◯ --splitrd-skip --deblock -1:-1 --hash 2 --allow-non-conformance --tune grain --y4m - --output ".\v_out.hevc"

β——libx265 CLI, copy audio & multiplex to MP4

- ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide_banner -i ".\v_in.mp4" -c:v libx265 -pix_fmt ◯ -x265-params "ctu=32:me=star:subme=◯:merange=◯:analyze-src-pics=1:max-merge=5:early-skip=1:open-gop=0:min-keyint=1:keyint=◯:ref=3:fades=1:bframes=7:b-adapt=2:radl=3:constrained-intra=1:b-intra=1:crf=17:crqpoffs =-3:cbqpoffs=-2:rd=3:limit-modes=1:limit-refs=1:rskip=1:rc-lookahead=◯:splitrd-skip=1:deblock=-1,-1:hash=2:allow-non-conformance=1:tune=grain" -fps_mode passthrough -c:a copy ".\v_out.mp4"

Anime·High Compression·Subtitle Groups

splt-trans --tu-intra-depth 4 --tu-inter-depth 4 --max-tu-size 16

me-mc --me umh --subme <24fps=3, 48fps=4, 60fps=5, 100fps=6> --merange <1920:1080=48, 2560:1440=52, 3840:2160=56> --weightb --max-merge 5 --early-skip

ref-rateol --ref 3 --no-open-gop --min-keyint 5 --keyint <12×fps> --fades --bframes 16 --b-adapt 2 --radl 3 --bframe-bias 20

intra coding --constrained-intra --b-intra

quantization --crf 22 --crqpoffs -4 --cbqpoffs -2 --ipratio 1.6 --pbratio 1.3 --cu-lossless --tskip

rdoq --psy-rdoq 2.3 --rdoq-level 2

aq --hevc-aq --aq-strength 0.9 --qg-size 8

md --rd 3 --limit-modes --limit-refs 1 --rskip 1 --rc-lookahead <2.5 × fps, greater than bframes> -

rdo -rect --amp

deblock -sao --psy-rd 1.5 --splitrd-skip --rdpenalty 2 <EXP: --qp-adaptation-range 4>

io --deblock 0:-1 --limit-sao --sao-non-deblock

tgt. depth --hash 2 --allow-non-conformance --single-sei <NAS streaming: --idr-recovery-sei>

multi nodes -D 8/10/12 (default 8bit or lowest built in x265.exe, same or convert to lower depth only w/ --dither)

others --pools ,,,, (e.g.: "-,+"states a 2-node computer & use node 2, don't use >1 node per encode)

crop: --display-window < integer "←, ↑ ,→, ↓ " pixels >, ⩾22 core cpu opt.: --pme, interlaced: --field, pixel depth reduction quality+: --dither, begin; ending frame: --seek; --frames, crf/abr

color space resist noise factor: --rc-grain

α——(ffmpeg pipe) x265 CLI parameters

- ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide_banner -i ".\v_in.mp4" -an -f yuv4mpegpipe -strict unofficial -pix_fmt ◯ - | x265.exe --tu-intra-depth 4 --tu-inter-depth 4 --max-tu-size 16 --me umh --subme ◯ --merange ◯ --weightb --max-merge 5 --early-skip --ref 3 --no-open-gop --min-keyint 5 --keyint ◯ --fades --bframes 16 --b-adapt 2 --radl 3 --bframe-bias 20 --constrained-intra --b-intra --crf 22 --crqpoffs -4 --cbqpoffs -2 --ipratio 1.6 --pbratio 1.3 --cu-lossless --tskip --psy-rdoq 2.3 --rdoq-level 2 --hevc-aq --aq-strength 0.9 --qg-size 8 --rd 3 --limit-modes --limit-refs 1 --rskip 1 --rc-lookahead ◯ --rect --amp --psy-rd 1.5 --splitrd-skip --rdpenalty 2 --qp-adaptation-range 4 --deblock -1:0 --limit-sao --sao-non-deblock --hash 2 --allow-non-conformance --y4m - --output ".\v_out.hevc"

β——libx265 CLI, copy audio & multiplex to MP4

- ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide_banner -i ".\v_in.mp4" -c:v libx265 -pix_fmt ◯ -x265-params "tu-intra-depth=4:tu-inter-depth=4:max-tu-size=16:me=umh:subme=◯:merange=◯:weightb=1:max-merge=5:early-skip=1:ref=3:open-gop=0:min-keyint=5:keyint=◯:fades=1:bframes=16:b-adapt=2:radl=3:bframe-bias=20:constrained-intra=1:b-intra=1:crf=22:crqpoffs=-4:cbqpoffs=-2:ipratio=1.6:pbratio=1.3:cu-lossless=1:tskip=1:psy-rdoq=2.3:rdoq-level=2:hevc-aq=1:aq-strength=0.9:qg-size=8:rd=3:limit-modes=1:limit-refs=1:rskip=1:rc-lookahead=◯:rect=1:amp=1:psy-rd=1.5:splitrd-skip=1:rdpenalty=2:qp-adaptation-range=4:deblock=-1,0:limit-sao=1:sao-non-deblock=1:hash=2:allow-non-conformance=1" -fps_mode passthrough -c:a copy ".\v_out.mp4"

Anime·ripper's cold war·HEDT+HQ Src Only

Paused dark flat scenes must look AS-IS, results less & slower compression than sub grps

splt-trans --tu-intra-depth 4 --tu-inter-depth 4 --max-tu-size 4 --limit-tu 1 --rect --amp

me-mc --me star --subme <24fps=3, 48fps=4, 60fps=5, 100fps=6> --merange <1920:1080=52, 2560:1440=56, 3840:2160=64> --analyze-src-pics --weightb --max-merge 5

ref-rateol --ref 3 --no-open-gop --min-keyint 1 --keyint <12×fps> --fades --bframes 16 --b-adapt 2 --radl 2

intra coding --b-intra

quantization --crf 17.1 --crqpoffs -5 --cbqpoffs -2 --ipratio 1.67 --pbratio 1.33 --cu-lossless

rdoq --psy-rdoq 2.5 --rdoq-level 2

aq <Normal: --hevc-aq --aq-strength 1.4; Jpsdr mod: --aq-auto 10 --aq-bias-strength 1.3 --aq-strength-edge 1.4 --aq-bias-strength 1.1> --qg-size 8

md --rd 5 --limit-refs 0 --rskip 2 --rskip-edge-threshold 3 --rc-lookahead <2.5 × fps, greater than bframes> --no-cutree

rdo --psy-rd 1.5 --rdpenalty 2 <EXP: --qp-adaptation-range 5>

deblock --deblock -2:-2

sao --limit-sao --sao-non-deblock --selective-sao 1

io

α——(ffmpeg pipe) std. x265 CLI parameters

- ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide_banner -i ".\v_in.mp4" -an -f yuv4mpegpipe -strict unofficial -pix_fmt ◯ - | x265.exe --tu-intra-depth 4 --tu-inter-depth 4 --max-tu-size 4 --

limit-tu 1 --rect --amp --me star --subme ◯ --merange ◯ --analyze-src-pics --weightb --max-merge 5 --ref 3 --no-open-gop --min-keyint 1 --keyint ◯ --fades --bframes 16 --b-adapt 2 --radl 2 --b-intra --crf 17.1 --crqpoffs -5 --cbqpoffs -2 --ipratio 1.67 --pbratio 1.33 --cu-lossless --psy-rdoq 2.5 --rdoq-level 2 --hevc-aq --aq-strength 1.4 --qg-size 8 --rd 5 --limit-refs 0 --rskip 2 --rskip-edge-threshold 3 --rc-lookahead ◯--no-cutree --psy-rd 1.5 --rdpenalty 2 --qp-adaptation-range 5 --deblock -2:-2 --limit-sao --sao-non-deblock --selective-sao 1 --hash 2 --allow-non-conformance --y4m - --output ".\v_out.hevc"

β——(ffmpeg pipe) jpsdr mod x265 CLI parameters

- ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide_banner -i ".\v_in.mp4" -an -f yuv4mpegpipe -strict unofficial -pix_fmt ◯ - | x265.exe --tu-intra-depth 4 --tu-inter-depth 4 --max-tu-size 4 --limit-tu 1 --rect --amp --me star --subme ◯ --merange ◯ --analyze-src-pics --weightb --max-merge 5 --ref 3 --no-open-gop --min-keyint 1 --keyint ◯ --fades --bframes 16 --b-adapt 2 --radl 2 --b-intra --crf 17.1 --crqpoffs -5 --cbqpoffs -2 --ipratio 1.67 --pbratio 1.33 --cu-lossless --psy-rdoq 2.5 --rdoq-level 2 --aq-auto 10 --aq-bias-strength 1.3 --aq-strength-edge 1.4 --aq-bias-strength 1.1 --qg-size 8 --rd 5 --limit-refs 0 --rskip 2 --rskip-edge-threshold 3 --rc-lookahead ◯--no-cutree --psy-rd 1.5 --rdpenalty 2 --qp-adaptation-range 5 --deblock -2:-2 --limit-sao --sao-non-deblock --selective-sao 1 --hash 2 --allow-non-conformance -fps_mode passthrough -c:a copy ".\v_out.mp4"

γ——Standard libx265 CLI, copy audio & multiplex to MP4

- ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide_banner -i ".\v_in.mp4" -c:v libx265 -pix_fmt ◯ -x265-params "tu-intra-depth=4:tu-inter-depth=4:max-tu-size=4:limit-

tu=1:rect=1:amp=1:me=star:subme=◯:merange=64:analyze-src-pics=1:weightb=1:max-merge=5:mcstf=1:ref=3:open-gop=0:min-keyint=1:keyint=◯:fades=1:bframes=16:b-adapt=2:radl=2:b-intra=1:crf=17.1:crqpoffs=-5:cbqpoffs=-2:ipratio=1.6:pbratio=1.33:cu-lossless=1:psy-rdoq=2.5:rdoq-level=2:hevc-aq=1:aq-strength=1.4:qg-size=8:rd=5:limit-refs=0:rskip=2:rskip-edge-threshold=3:rc-lookahead=◯:cutree=0:psy-rd=1.5:rdpenalty=2:qp-adaptation-range=5:deblock=-2:-2:limit-sao=1:sao-non-deblock=1:selective-sao=1:hash=2:allow-non-conformance=1" -fps_mode passthrough -c:a copy ".\v_out.mp4"