SCAV: Seminar 3

FFmpeg

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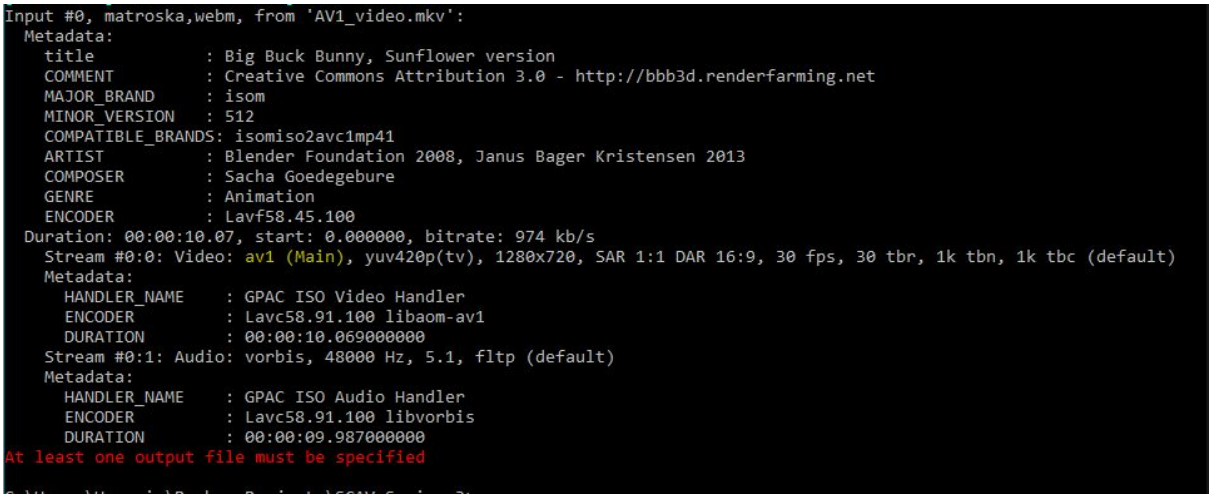
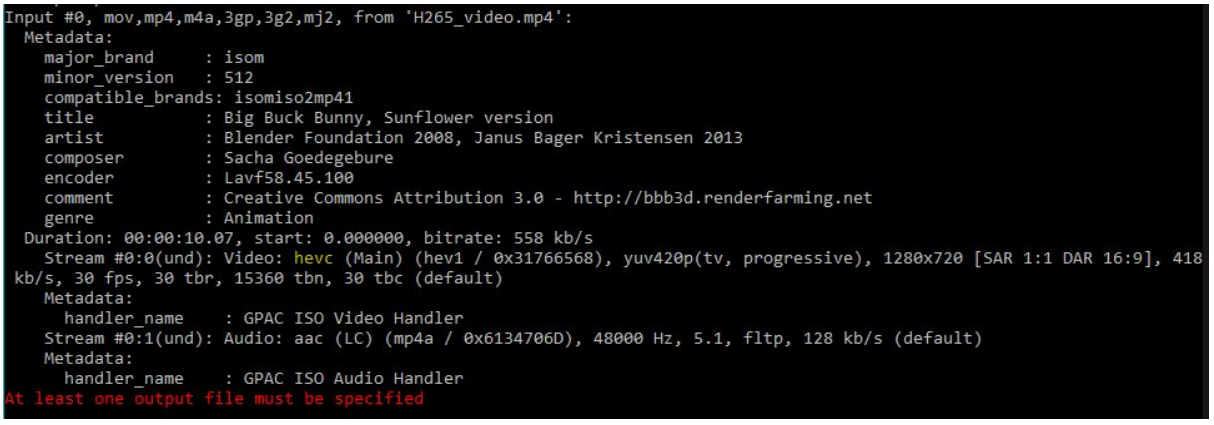
1. **Convert them into VP8, VP9, h265 & AV1.**

   To convert videos into VP8, VP9, H265 and AV1, we have done a script that used the 4 different encoding libraries, the correspondent for each codec. We have used a video in 720p and 10s to make sure that everything worked as expected. The first 30 codecs went relatively fast, while the AV1 took much more time. Originally the video was in H264, here are some captures showcasing the correct conversion.





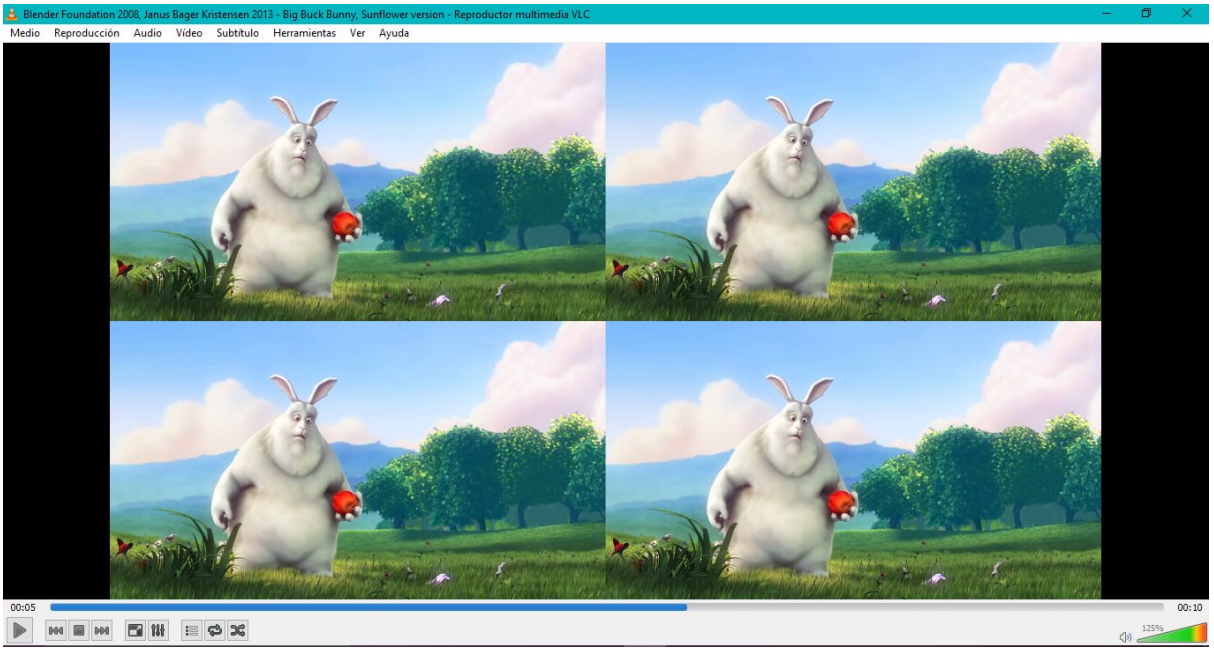
```
Input #0, matroska,webm, from 'VP8_video.webm':
  Metadata:
    title           : Big Buck Bunny, Sunflower version
    COMMENT         : Creative Commons Attribution 3.0 - http://bbb3d.renderfarming.net
    MAJOR_BRAND     : isom
    MINOR_VERSION   : 512
    COMPATIBLE_BRANDS: isomiso2avc1mp41
    ARTIST          : Blender Foundation 2008, Janus Bager Kristensen 2013
    COMPOSER        : Sacha Goedegebure
    GENRE           : Animation
    ENCODER         : Lavf58.45.100
  Duration: 00:00:10.07, start: 0.000000, bitrate: 1003 kb/s
    Stream #0:0: Video: vp8, yuv420p(progressive), 1280x720, SAR 1:1 DAR 16:9, 30 fps, 30 tbr, 1k tbn, 1k tbc (default)
    Metadata:
      HANDLER_NAME    : GPAC ISO Video Handler
      ENCODER         : Lavc58.91.100 libvpx
      DURATION        : 00:00:10.069000000
    Stream #0:1: Audio: vorbis, 48000 Hz, 5.1, fltp (default)
    Metadata:
      HANDLER_NAME    : GPAC ISO Audio Handler
      ENCODER         : Lavc58.91.100 libvorbis
      DURATION        : 00:00:09.987000000
At least one output file must be specified
```

```
Input #0, matroska,webm, from 'VP9_video.webm':
  Metadata:
    title           : Big Buck Bunny, Sunflower version
    COMMENT         : Creative Commons Attribution 3.0 - http://bbb3d.renderfarming.net
    MAJOR_BRAND     : isom
    MINOR_VERSION   : 512
    COMPATIBLE_BRANDS: isomiso2avc1mp41
    ARTIST          : Blender Foundation 2008, Janus Bager Kristensen 2013
    COMPOSER        : Sacha Goedegebure
    GENRE           : Animation
    ENCODER         : Lavf58.45.100
  Duration: 00:00:10.07, start: -0.007000, bitrate: 2706 kb/s
    Stream #0:0: Video: vp9 (Profile 0), yuv420p(tv), 1280x720, SAR 1:1 DAR 16:9, 30 fps, 30 tbr, 1k tbn, 1k tbc (defaul
t)
    Metadata:
      HANDLER_NAME    : GPAC ISO Video Handler
      ENCODER         : Lavc58.91.100 libvpx-vp9
      DURATION        : 00:00:10.073000000
    Stream #0:1: Audio: opus, 48000 Hz, 5.1, fltp (default)
    Metadata:
      HANDLER_NAME    : GPAC ISO Audio Handler
      ENCODER         : Lavc58.91.100 libopus
      DURATION        : 00:00:09.992000000
At least one output file must be specified
```

The four videos are included in the videos folder.

2. **Once you have the ‘mandanga’, try to create a new video as the one of the 4 videos at the same time.**

   To create a new video using the four last ones in a 2x2 grid we used the *vstack* and *hstack* function to stack horizontally and vertically the videos. We joined 2 and 2 together and then the 4. We also used a mp4 file containing only the audio.



So, let's compare the results a bit without looking into the real differences of the codecs, but just what we are able to see from the videos, the real user experience:

- We have VP8 in the top left, in his right side we have the VP9, down it we have H265 and then we have AV1. Right on, we can see that the quality is progressive, vp8 has the worst quality, while AV1 has the best one.
- VP8 and VP9 are quite similar, both have a bad quality compared with the other two. We see that the colors are much more saturated, and have less dynamic range. Maybe the bit depth is lower, and that's why we have this limited range of colors. Also, we can see for instance in the sky, which is an homogenous part, the apprecance of some sort of rays/transitions from one level of color to the other. Actually on both VP8 nad VP9 if we look closely, we see this distortion, that is normally related to a low resolution. We can see everything is quite squared. We must say that in VP9, this distortion is lower, but in VP8 it is much more present.

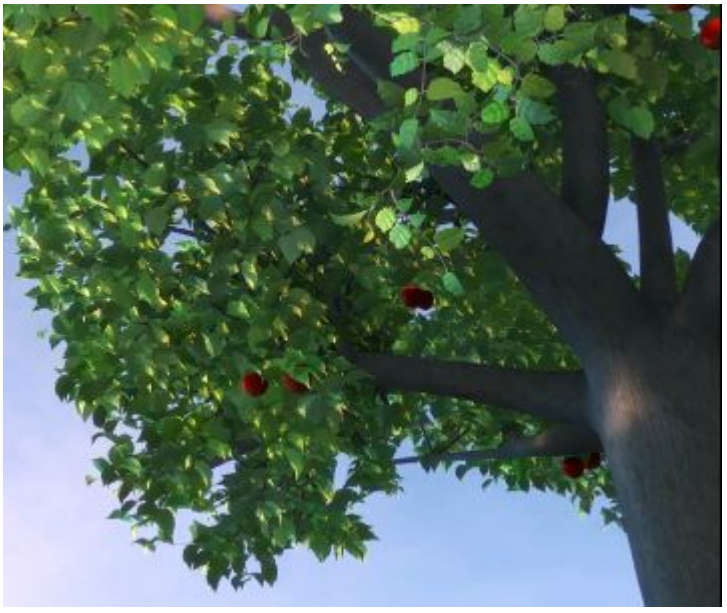

VP8 vs VP9.

- Then if we pass to the H265, we see that the colors are much better. There is less saturation, more contrast, more dynamic range. And those

artifacts are certainly reduced. We get for inace a better segregation of the hair.



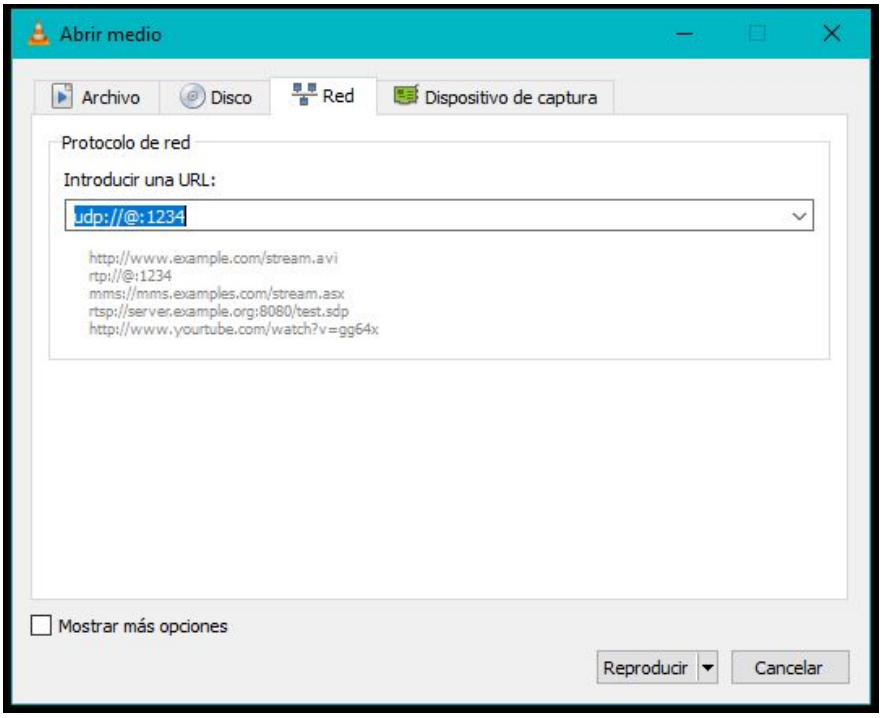
VP8 vs H265.

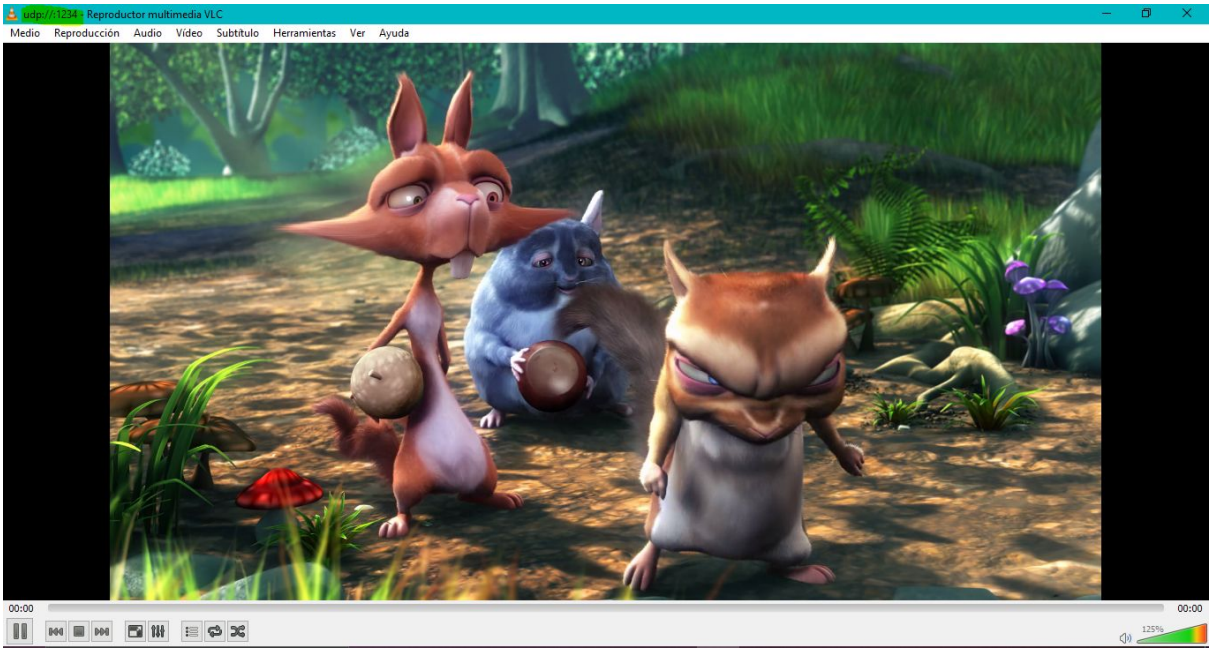

VP9 vs H265.

- Finally, we have the AV1, which improves even more the color factor, in our opinion. The range is better even if in comparison to H265 does not change as much. It is the one with better resolution also. For instance the hair has much more detail.
- Finally at a data level the same video of 10s at 720p weights **1.2MB** in VP8, **3.24MB** in VP9, **685KB** in H265 and **1.16MB** in AV1. Thus, actually the codec/format with a better tradeoff of quality vs size would be H265 (in my case, with what I was able to deduct from my computer, elsewhere this can change, and the quality from H265 to AV1 can improve much more that what I am able to see).

3. **Try to achieve with FFMpeg or FFServer to create a live streaming of the BBB Video.**

   To stream the video, we did it very fastly, we wrote a command in ffmpeg that uses the *mpgets* to stream in udp to a local network. We defined our local network and the port 1234 and streamed the full bbb file.


Abrir medio
Archivo
Disco
Red
Dispositivo de captura
Protocolo de red
Introducir una URL:
udp://@:1234
http://www.example.com/stream.avi
rtp://@:1234
mms://mms.examples.com/stream.asx
rtsp://server.example.org:8080/test.sdp
http://www.yourtube.com/watch?v=gg64x
Mostrar más opciones
Reproducir
Cancelar


udp://:1234 - Reproductor multimedia VLC
Medio
Reproducción
Audio
Vídeo
Subtítulo
Herramientas
Ver
Ayuda
00:00
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125%