Optimal Hyper-parametrization for efficient Video Compression

Video Compression Hackathon - SBI

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Problem

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- Storage and retrieval of these video files is a challenge especially given the expected tsunami of video files that are expected to be generated on extending more use-cases to our client base of over 45 crore customers.

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- These methods have been used heavily in all domains.
- I made use of the same to learn optimal parameters for a vast array of these.

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- These methods were tabulated into 4 optimal settings in `vals.txt`
- Then, these were made use of for encoding using `x265`.

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- The Encryption Algorithm used was AES.
- We also used `zlib` for further compression.

Video used

- `phase3.mp4`
- Profile : H.264
- Dimensions : 1920×1080
- FPS : 30.0
- Bit-Rate : 17036 kbps
- Size : 127.8 MB
- The file may be found here.

Decompressed Video

- `phase31.mp4`
- Profile (Main) : H.265
- Dimensions : 1920×1080
- FPS : 30.0 (as expected)
- Bit-Rate : 1381 kbps
- Size (compressed) : 9.5 MB

Hardware Details

- CPU : Intel(R) Core(TM) i5-1035G1 CPU 1.00GHz
- Memory : 8 GB
- Memory Clock : 3200 MHz
- L1 Cache : 128 kB
- L2 Cache : 2 MiB
- L3 Cache : 6 MiB

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- Different Types of applications provide scope for different types of compression shorthands.

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- Different Types of applications provide scope for different types of compression shorthands.
- Our approach enables us to learn these shorthands

Functional Requirements

- `x265`
- `opencv4`
- Python's `cryptography`
- Python's `zlib`
- `ffmpeg`

Corresponding Microsoft Tools

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- `ffmpeg` $\equiv$ `FFmpegInterop`

Non-functional Requirements

- The Video isn't recorded in camcorders which make use of Compressed Sensing.
- The Noise is minimal and patterns in the images remain consistent.
- The Machine on which the Application is used has $\geq$ 8GB RAM.
- This would enable greater compression due to easier Identification of Generic features.

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- `HEVC` is known to better than state-of-the-art Deep Learning Methods (*DeepCoder*) by an additional 50 %.
- Use-case specific optimization in *HEVC* is generically obtained by making use of hyperparameter optimization.
- Feedback functions could also be tinkered to better reflect our Requirements (should they ever change!)

Github Repository

My Actual Github ID is thevaliantthird

I've kept the Video Hackathon submission Repository via another profile, SBI-Video-Hackathon

Video Demonstration

I have demonstrated usage of my application here.

Thank You!

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