

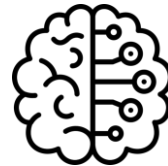
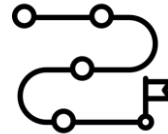
Deep Encode

By Ruihan, Julio and Vinzenz



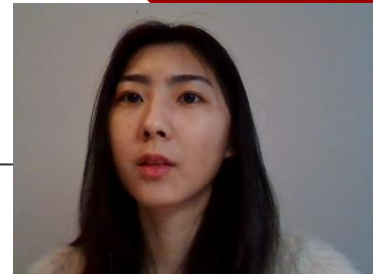
First Presentation

- Problem Statement
- Paper Review
- Schedule/Roadmap
- Machine Learning Algorithm



Problem Statement

- improving conventional per-scene encoding with Machine Learning
- Linear Regression, Gradient Boosting Decision Tree and Convolutional Neural Networks
- predict the bitrate and VMAF pairs
- the data features, which have greater impact on VMAF

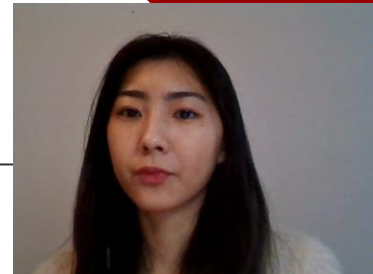


Paper Research

- Constant rate factor (CRF)
 - “constant quality” encoding mode
 - constant quantization parameter

<https://streaminglearningcenter.com/encoding/saving-encoding-streaming-deploy-capped-crf.html>

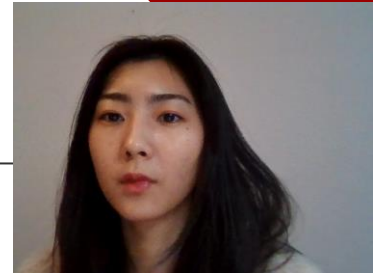
<https://slhck.info/video/2017/02/24/crf-guide.html>



CBR / VBR Encoding

- Constant bit rate(CBR)
 - persist the set data rate
 - not optimize media files for quality but save storage space
- Variable bit rate (VBR)
 - bitrate will dynamically increase or decrease
 - the quality of the media file is superior

<https://help.encoding.com/knowledge-base/article/what-is-the-difference-between-cbr-and-vbr-encoding/>



Paper Research (Complexity-based consistent-quality encoding in the cloud)

- Same bitrate ladder for action movies as well as for cartoons.
- Rebuffering, low-quality displays, and excess bitrate.
- Adaptive Bitrate per title was introduced.

J. De Cock, Z. Li, M. Manohara and A. Aaron, "Complexity-based consistent-quality encoding in the cloud," *2016 IEEE International Conference on Image Processing (ICIP)*, 2016, pp. 1484-1488, doi: 10.1109/ICIP.2016.7532605.

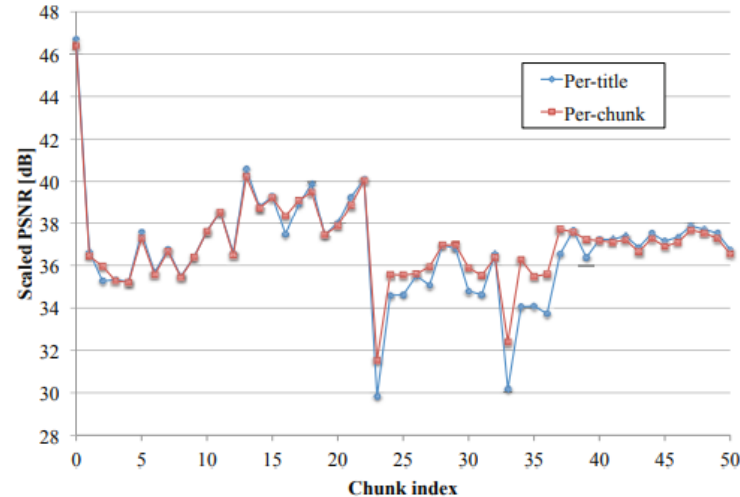
Bitrate (kbps)	Resolution
235	320x240
375	384x288
560	512x384
750	512x384
1050	640x480
1750	720x480
2350	1280x720
3000	1280x720
4300	1920x1080
5800	1920x1080

<https://netflixtechblog.com/per-title-encode-optimization-7e99442b62a2>



Paper Research (Complexity-based consistent-quality encoding in the cloud)

- Per chunk encoding ensures a consistent quality (taking into account a mixture between PSNR and VMAF).
- Effective use of bandwidth with consistent quality.



Paper Research (Complexity-based consistent-quality encoding in the cloud)

- How does Netflix use both psnr and vmaf and not only VMAF?

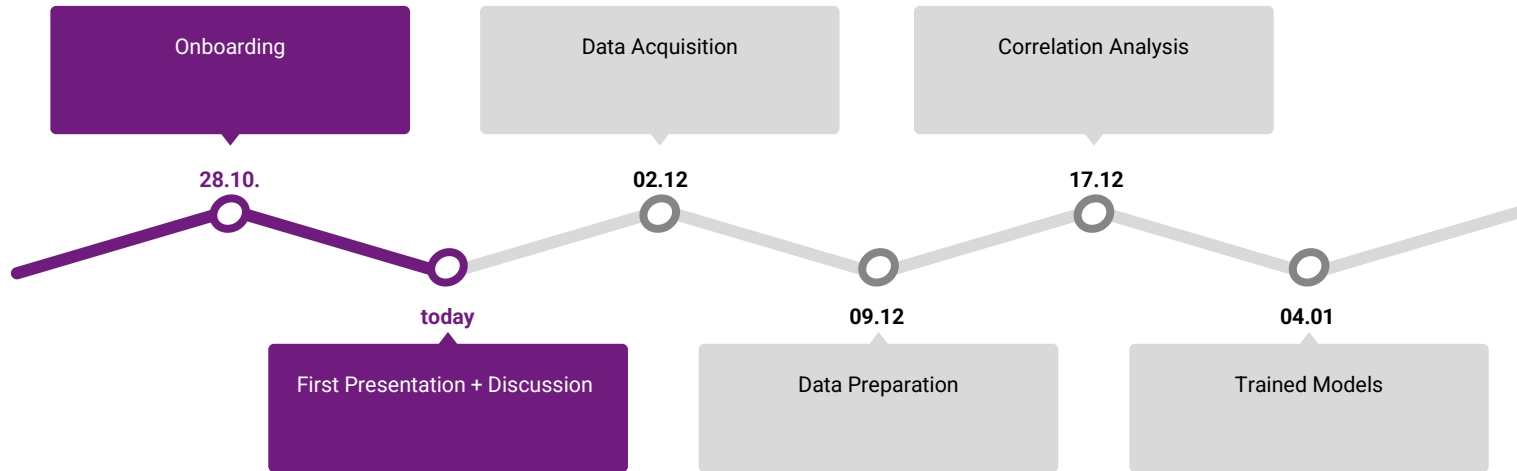
<https://netflixtechblog.com/vmaf-the-journey-continues-44b51ee9ed12> (2018)

<https://thebroadcastknowledge.com/2020/11/19/videomeasuring-video-quality-with-vmaf-why-you-should-care/>

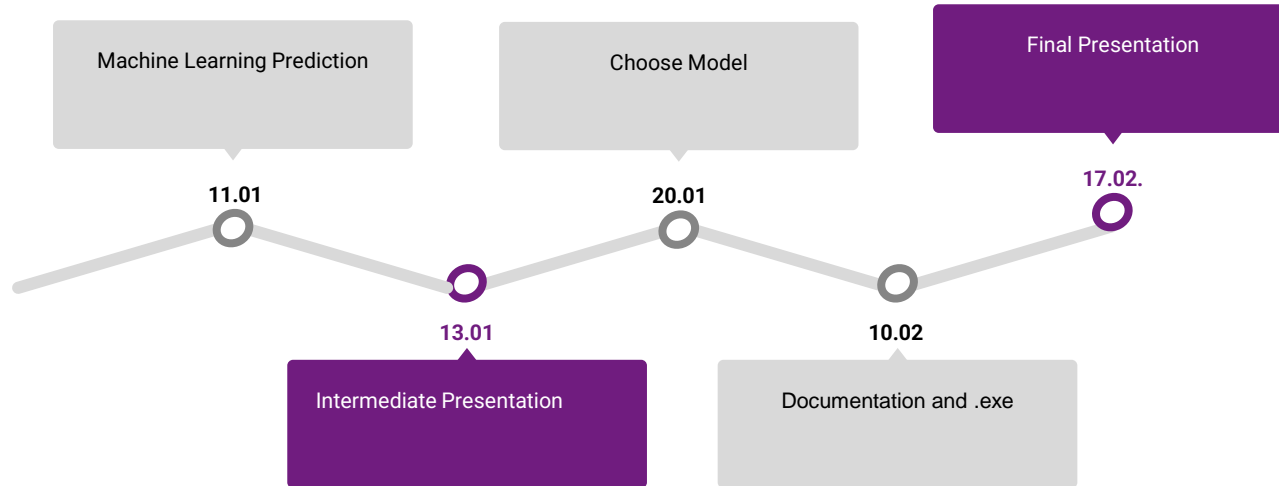
- Per Scene Encoding ladder without the overhead of test encodes.
- More approximation for the Convex Hull with per scene encoding.
- How to avoid computational heavy test encodes? (Deep Encode)



Schedule



Schedule



Machine Learning

Julio: Convolutional Neural Networks

Ruihan: Gradient Boosting Decision Tree

Vinzenz: Linear Regression

