Poster: QoE-Based Analysis of Real-Time Adaptive 360-Degree Video Streaming

Cise Midoglu[1], Magnus Klausen[2], Özgü Alay[3], Anis Yazidi[2], Hårek Haugerud[2], Carsten Griwodz[4]
[1]Simula Research Laboratory, [2]Oslo Metropolitan University, [3]Simula Metropolitan Center for Digital Engineering, [4]University of Oslo

ABSTRACT

We propose a QoE-based analysis approach for real-time adaptive 360-degree video streaming measurements, focusing on the correlation between objective video metrics and subjective end-user scores.

1 FRAMEWORK

Evaluating the end-to-end delivery of real-time adaptive 360°video requires the consideration of all relevant metrics in a wholesome manner; from video capture (e.g., omnidirectional video format) to encoding (tiling, codec, bitrate ladder), to delivery (network connection type and operator), to live streaming (video player software, bitrate adaptation algorithm), to playback on end-user devices (platform, OS, browser), and subjective feedback (view time, MOS). Such an approach allows for the benchmarking of different parameters, and can be facilitated by timely and relevant Over-the-Top (OTT) video analytics.

In [2], we design and implement an evaluation framework with the following components: (1) a browser-based video delivery system incorporating multiple video players, (2) a player-agnostic OTT video analytics component capable of providing a large spectrum of objective quality metrics for every streaming session, and (3) a subjective feedback component bringing together a simple and easy-to-use frontend (UI) and a sophisticated backend capable of processing user scores in real-time. In this setup, end-users can access test pages using various devices and browsers. Test pages are designed in HTML and customized per video player, integrating an OTT video analytics component. Each page contains a UI element for collecting continuous subjective QoE feedback from end-users, such as a MOS. Player integrations support live 360°playback, as well as regular Video-on-Demand (VoD) assets.

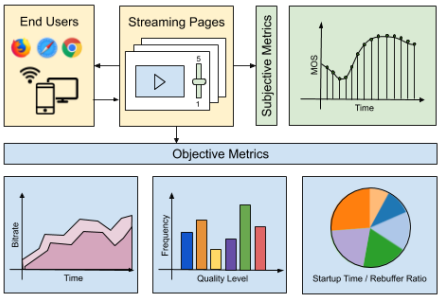

Figure 1: Approach for QoE-based analysis

Figure 1 presents our analysis approach. We adopt the concept of QoE-based benchmarking from [1], and extend it to real-time 360-degree streaming, with continuous subjective input. Through crowdsourced measurements, the correlation between subjective user QoE (represented by view time/engagement and feedback score) and end-user device, codec and tiling parameters, video player software, bitrate adaptation algorithm, network type, available bandwidth, concurrent viewers, video bitrate, startup time, scale factor, and rebuffer ratio, can be studied.

2 CONCLUSION

We describe a QoE-based analysis approach for adaptive 360°video streaming, focusing on correlating objective metrics with subjective user scores. A live demonstration will be possible using an existing measurement framework, where objective QoE metrics are available alongside subjective user scores, per streaming session.

REFERENCES

[1] C. Midoglu et al. Docker-Based Evaluation Framework for Video Streaming QoE in Broadband Networks. *International Conference on Multimedia (MM'19)*, 2019.

[2] C. Midoglu et al. Evaluation Framework for Real-Time Adaptive 360-Degree Video Streaming over 5G Networks. *Wireless of the Students, by the Students, and for the Students Workshop (S3'19)*, 2019.

S3 '19, October 21, 2019, Los Cabos, Mexico

ACM ISBN 978-1-4503-6929-9/19/10.
https://doi.org/10.1145/3349621.3355728