

Paper Summary & Critique

Paper Title	Using Session Modeling to Estimate HTTP-Based Video QoE Metrics From Encrypted Network Traffic
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Summary

The authors present a methodology - eMIMIC - that infers QoE metrics - average bitrate, re-buffering ratio, bitrate switches and startup time - from encrypted network traffic. eMIMIC achieves this by reconstructing the chunk-based delivery sequence from a video session from packet headers.

Strengths

- eMIMIC does not require training on ground truth data, which is non-trivial to collect for a variety of different network conditions.
- eMIMIC performs well under various network conditions.
- eMIMIC can be run in real-time to detect network QoE degradation.

Weaknesses

- eMIMIC assumes linear video playback, and user interaction such as pauses and skips will lead to inaccurate estimations. The system needs procedures in place to detect and react to user interactions.
- eMIMIC is bound to using TCP headers from HAS, but protocols such as QUIC do not provide TCP headers.
- Although stated to not be commonly used in practice, QUIC and HTTP/2 allows for multiplexing, which eMIMIC is not built to account for, leading to inaccurate session reconstruction.

Applicability to Practice

Given that the system does not need to be trained on ground truth, if an efficient and scalable system can be designed to distribute this model's inference at scale, it could be a valuable tool for internet service providers to detect and remedy network QoE degradation in real-time.

Notes for Improvement

A scalable system will be required to run inference on a model such as this at scale on a real-world network. Additionally, systems need to be put into place to account for user interaction (e.g. play/pause/skip), and to detect and adapt to multiplexing.