Predicting and diagnosing QoE issues for video streaming in the Cloud

***Abstract*—**

- **QoE issues occur often but hard to identify.**
- **When streaming from Cloud, the QoE is harder to predict as it would be impacted by more factors, such as interference etc.**
- **Chunk response time determines QoE.**
- **When streaming from the Cloud, chunk response time is correlated with various system measurements.**
- **We propose a regression model, lasso, to predict chunk response time in order to predict QoE issues.**
- **The advantage of lasso is 1) time variant, 2) selecting important variables.**
- **Thus, we cannot only predict large response time that will lead to QoE issues, but also select variables that weigh higher in the response time increase.**
- **Furthermore, the higher weighted metric can be used to infer the issues that cause QoE issues.**
- **Results show ...**

I. Introduction

- Various VoD providers migrate to the Cloud. Cloud environment bring new challenges to guarantee QoE. However, QoE is important for Video streaming.
- Challenges of guaranteeing QoE in the Cloud.
- QoE is important and various QoE issues impact user engagement.
- What is QoE and what impact user QoE — Chunk response time.
- Our contribution:
  - Predict QoE issues via predicting chunk response time.
  - Diagnosing QoE issues in real-time via selecting metrics impacting response time.

II. System Design

A. System Overview

B. Metrics

Subsection text here. Citation [1]

C. Prediction Model

Response time ¿ buffer length
Subsection text here. Citation [1]

D. Diagnosis

$\delta x > x\%$ Subsection text here. Citation [1]

III. Methodology

A. Lasso Regression

B. Lasso Variable Selection

IV. Cloud Experiments

A. Setup

Google Cloud
DASH streaming
anomalies injected
Subsubsection text here.

B. Prediction Evaluation

Prediction curve

C. Diagnosis Evaluation

Selected variables for each type of anomalies.

D. Timeliness

How fast the QoE issue can be predicted and diagnosed.

V. Conclusion

- We propose a QoE issue prediction and diagnosis system for video streaming in the Cloud.
- We apply the idea of big data by using large volume of system measurement to predict chunk response time, which further determines QoE.
- Thus, we predict QoE issues and select key metrics that weigh higher in predicting the response time.
- By applying lasso method, we show that the QoE issue can be timely predicted via blindly modeling the chunk response time as a function of big data set of system measurements.
- The causes of QoE issues can also be diagnosed without knowing the domain knowledge.
- We provide a big data solution to handle such complicated issue.

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REFERENCES

[1] A. Smith, C. Jones, and E. Roberts, “Article title,” *Journal*, vol. 1, no. 1, pp. 1–10, January 1999.