INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student	:	**HEMA KUMAR YARNAGULA**
Roll Number	:	**146101003**
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Name of Thesis Supervisor(s)	:	**Dr. Venkatesh Tamarapalli**
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SHORT ABSTRACT

The works in this dissertation assess, model and improve the quality of experience (QoE) for dynamic adaptive streaming over HTTP (DASH) in mobile devices. We first investigate how the bitrate adaptation algorithms in DASH influence the end-user QoE, particularly operating under highly fluctuating bandwidth conditions such as mobile networks. To this end, we perform video QoE assessment (both subjective and objective assessments) of several popular DASH bitrate adaptation algorithms in mobile clients. We also present and formally define a set of application-layer objective QoE metrics for the objective quality assessment with an end goal to capture the severity of the metrics on the end-user viewing experience. From the insights gained from the detailed evaluation of the experimental results, we provide guidelines for designing bitrate adaptation algorithms, particularly for DASH, with an aim to improve end-user QoE in the presence of realistic mobile network scenarios. Second, we propose a parametric multinomial logistic regression (MLR) model for QoE estimation/prediction by merely taking a set of five objective metrics as input. The proposed MLR model predicts both short-term and long-term QoE scores that closely resemble the end-user viewing experience for a DASH session. Third, We propose an adaptive segment-aware K-push algorithm for DASH/2 with the objective of improving end-user QoE while addressing the request message overhead (a.k.a. request explosion problem) in mobile clients. The proposed adaptive segment-aware K-push algorithm aims to determine an appropriate adaptation push pair (i.e., number of segments and corresponding bitrate level) for the push cycle in DASH/2. Finally, we propose an adaptive segment prefetching strategy with an aim to improve the end-user QoE for DASH in Multi-Access Edge Computing (MEC) networks. The proposed strategy dynamically determines the number of segments and their corresponding video bitrate and prefetch them to the MEC server (located at the 5G/LTE base station) with an objective to improve the end-user QoE, reduce the video segment access latency and improve the backhaul link utilization.