Computer Networks Lab Assignment 1b
(A Video Streaming Application)

Submitted by

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Abstract

1. Purpose: The purpose of this assignment is to evaluate and compare the efficiency and effectiveness of Adaptive Bit Rate (ABR) algorithms by conducting various sets of experiments. The ABR algorithms that will be tested are Dynamic, BOLA, and throughput.

    Tools Used:

- dash.js player: An open-source JavaScript-based media player application designed to support the playback of MPEG-DASH content.
- Apache server: Used for running the website in local host.

2. Overview: This assignment will test and compare the efficiency of three different Adaptive Bit Rate (ABR) algorithms: Dynamic, BOLA, and throughput. The experiments will be conducted using dash.js player, an open-source JavaScript-based media player application that supports the playback of MPEG-DASH content. The website will be run locally using WAMP server. The main goal of the experiments is to determine which ABR algorithm provides the best video experience for users.

Introduction

DASH :

For the playing of MPEG-DASH via JavaScript and compliant MSE/EME platforms, the DASH Industry Forum (DASH-IF) has developed dash.js as a standard client implementation.

It supports subtitles, multi-period manifests, and both live and on-demand content.

With an adaptive-bitrate rules engine, programmable buffer scheduling, and a metrics reporting system, the player is very adaptable.

ABR:

- Adaptive Bitrate (ABR) streaming is a technique used by online video providers to adapt the video quality in real-time based on the user's internet speed, device capabilities, and other factors.

Introduction

Dynamic ABR :

- The dynamic algorithm adjusts the video bitrate based on the current network conditions.

- However, this algorithm may result in frequent changes in video quality, which can be distracting for some viewers.

BOLA ABR

- Bitrate adaptation using lookahead (BOLA) is an algorithm that predicts the future bandwidth availability to decide which video bitrate to stream.

- This algorithm relies on the user's past playback history to make predictions about future bandwidth availability.
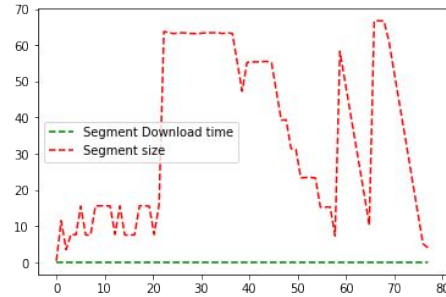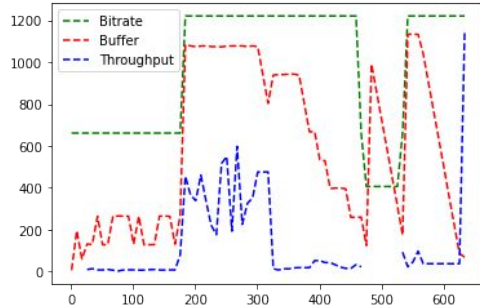
Throughput ABR

- The throughput algorithm adjusts the video bitrate based on the average bandwidth available to the user over a longer period.

- This algorithm is less responsive to sudden changes in network conditions but provides a smoother and more consistent video quality for viewers.

Implementation

- To conduct experiments and compare the efficiency of Adaptive Bit Rate (ABR) algorithms, the following steps need to be followed:

1. Save the HTML file on the local system.

2. Modify the HTML file to capture performance metrics at an interval of 8 seconds.

3. Download a localhost server such as Wamp for Windows or Apache2 for Ubuntu.

4. Start the localhost server and run the modified HTML file using the dash.js player to play the video.

5. Repeat step 4 for each ABR algorithm, including Dynamic, BOLA, and Throughput.

6. Collect the experiment results by either using a log file or Blob.

7. The performance metrics that need to be collected include bitrate, buffer level, throughput, segment download time, and segment size.

- Overall, the objective of these steps is to evaluate and compare the effectiveness and efficiency of different ABR algorithms in providing the best video experience to users.
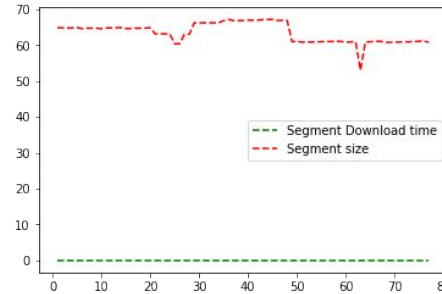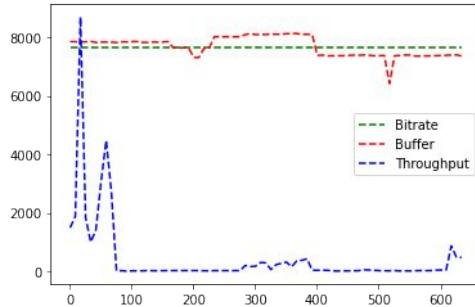
Observations

Dynamic ABR : From the graph we can see the significant changes when we switch from fast3G to No throttling. The segment size is constant when it is in Fast3G and there is a surge when we change it to No throttling.
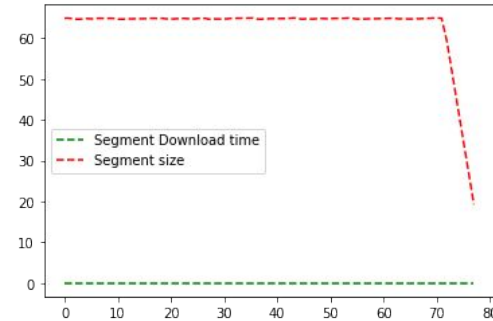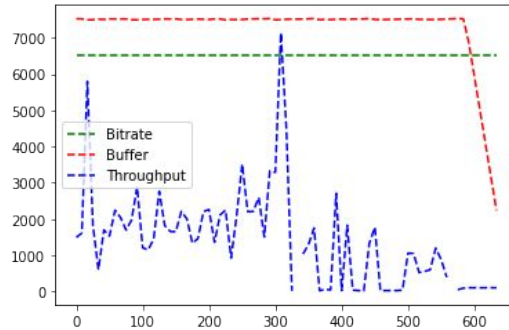
Observations

BOLA ABR : This graph is obtained by using the BOLA ABR. BOLA ABR can predict the future bandwidth availability, by this BOLA can minimize the buffering time.

Observations

Throughput ABR : From the graph we can see that the Throughput ABR is easily adapting to the changes that are happening in the network.

THANK YOU