

AdViSE: Adaptive Video Streaming Evaluation Framework for the Automated Testing of Media Players

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ABSTRACT

Today we can observe a plethora of adaptive video streaming services and media players which support interoperable formats like DASH and HLS. Most of the players and their rate adaptation algorithms work as a black box. We have developed a system for easy and rapid testing of media players under various network scenarios. In this paper, we introduce **AdViSE**, the **A**daptive **V**ideo **S**treaming **E**valuation framework for the automated testing of adaptive media players. The presented framework is used for the comparison and testing of media players in the context of adaptive video streaming over HTTP in web/HTML5 environments.

The demonstration showcases a series of experiments with different media players under given context conditions (e.g., network shaping, delivery format). We will also demonstrate the real-time capabilities of the framework and offline analysis including several QoE metrics with respect to a newly introduced bandwidth index.

CCS CONCEPTS

•Networks →Network performance modeling; Network experimentation; Network reliability; •Information systems →Multimedia streaming;

KEYWORDS

Evaluation framework; AdViSE; Adaptive streaming; Media players; MPEG-DASH; Network emulation; Automated Testing; Mininet; Selenium; Quality of Experience; Metrics

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1 INTRODUCTION

Adaptive video streaming over HTTP is becoming more and more the primary technology for video delivery in the open internet. For example, Netflix and YouTube alone account for more than 50% of the traffic [12] thanks to open, interoperable formats such as MPEG-DASH [14] or HLS [11]. In the past, we have witnessed many deployments in web environments implemented using Javascript by utilizing HTML5 and media source extensions (MSE) enabling a plugin free video streaming.

The technology behind adaptive video streaming over HTTP implies media representation switching (e.g., bitrate/resolution) depending on context conditions such as network characteristics and client device properties. An integral part of each player implementation is the usage of an appropriate rate adaptation algorithm which aims to follow dynamically changing context conditions. Thus, we are in a situation with many unknown variables and the problem of choosing the appropriate media player for video streaming and playback arises.

In this demo paper, we introduce **AdViSE**, an **A**daptive **V**ideo **S**treaming **E**valuation framework which enables the automated testing of media players — and, thus, rate adaptation algorithms — under various context conditions (e.g., client devices/platforms, network characteristics/conditions). The main focus of AdViSE is the provisioning of tools for easy and rapid experimentation with media players and algorithms as they appear on the market including updates thereof which become available in relatively short periods.

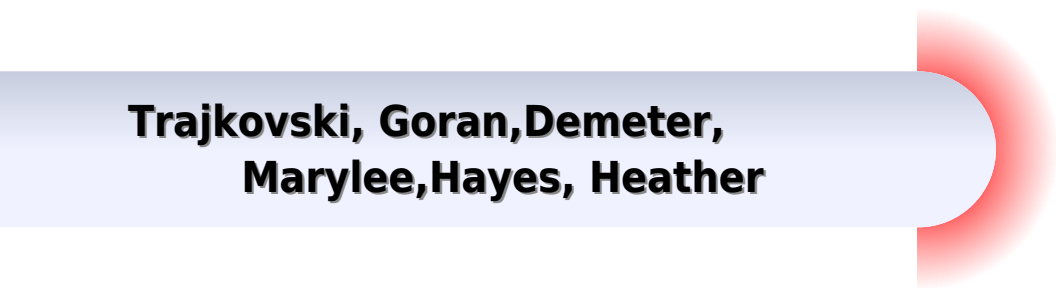
The rest of this paper is organized as follows. Section 2 describes the underlying scientific problems leading to the development of AdViSE. In Section 3, we present the architecture of the designed system and its components. Section 4 provides a brief description about the demo itself and Section 5 concludes the paper.

2 UNDERLYING SCIENTIFIC PROBLEM

Nowadays, there exists a large number of different players/algorithms (including commercially available ones) and most of them have been implemented in JavaScript. However, no common performance evaluation framework/system

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**Trajkovski, Goran, Demeter,
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From Multimedia Communications to the Future Internet Stefan Schulte, Boris Koldehofe, 2024-09-15 This Festschrift is dedicated to Ralf Steinmetz on the occasion of his retirement The honoree is a full professor at the Technical University of Darmstadt in Germany where he leads the Multimedia Communications lab He has supervised over 105 successful PhD students and remains committed to his vision of achieving seamless adaptive multimedia communications He has been widely recognized for his contributions to the field prestigious accolades include an Honorary Doctorate from RWTH Aachen University and a Chair of Excellence at the University Carlos III de Madrid He is also a fellow of several esteemed professional organizations including the IEEE the ACM the GI and the VDE ITG A pioneer in multimedia and networking Ralf Steinmetz's work opened up further research in topics such as distributed systems e learning and serious games The contributions in this volume reflect his huge impact on research technical developments and careers in the areas of multimedia and networking in Part I the chapters discuss past research results and their impact often applying a survey style in Part II researchers present current results and in Part III the chapters give an outlook on future research directions

Computing, Internet of Things and Data Analytics Fausto Pedro García Márquez, Akhtar Jamil, Alaa Ali Hameed, Haixin Wang, Yuxian Zhang, Junyou Yang, 2025-08-15 This proceedings book offers a multidimensional exploration of the latest advancements in data science and technology providing valuable insights for researchers professionals and enthusiasts in the rapidly evolving field Each chapter delves into specific topics offering a blend of theoretical foundations practical applications and future perspectives to keep readers abreast of the cutting edge developments in these critical domains *Applying Data Science and Learning Analytics Throughout a Learner's Lifespan* Trajkovski, Goran, Demeter, Marylee, Hayes, Heather, 2022-05-06 Research in the domains of learning analytics and educational data mining has prototyped an approach where methodologies from data science and machine learning are used to gain insights into the learning process by using large amounts of data As many training and academic institutions are maturing in their data driven decision making useful scalable and interesting trends are emerging Organizations can benefit from sharing information on those efforts *Applying Data Science and Learning Analytics Throughout a Learner's Lifespan* examines novel and emerging applications of data science and sister disciplines for gaining insights from data to inform interventions into learners journeys and interactions with academic institutions Data is collected at various times and places throughout a learner's lifecycle and the learners and the institution should benefit from the insights and knowledge gained from this data Covering topics such as learning analytics dashboards text network analysis and employment recruitment this book is an indispensable resource for educators computer scientists faculty of higher education government officials educational administration students of higher education pre service teachers business professionals researchers and academicians *Digital Design Essentials* Rajesh Lal, 2013-06 Through hundreds of photographs this dynamic guide demonstrates how to expertly apply design principles in a

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digitalization and transformation of cities into smart cities Together their contributions reflect the complexity and diversity of challenges and opportunities underpinning future cities Future Cities City Futures intends to be a platform for trans disciplinary urban discourse *SUPERCOMM/ICC '94* ,1994 **Documentation Abstracts** ,1995 *Current Index to Journals in Education* ,1985 *Sociological Abstracts* Leo P. Chall,1977 **Index to IEEE Publications** Institute of Electrical and Electronics Engineers,1997 Issues for 1973 cover the entire IEEE technical literature *User-controlled Adaptive Video Streaming* ,2013 We are in the midst of a multimedia communications revolution This revolution has become possible due to the rapid advances being made in the fields of wireless and processor technologies Until a few years ago multimedia technologies were growing at a faster rate than wireless This resulted in a lot of high quality content being generated but the lack of bandwidth to handle such high quality content was a major impediment to content sharing Recent advances in the wireless technologies especially the deployment of Long Term Evolution LTE networks has provided the fillip that was missing thus far Further advances in processor technologies have made the creation and consumption of high quality multimedia content on low power hand held devices like smartphones and tablets ubiquitous The time is ripe to study how to best utilize the available network resources in order to achieve the best possible multimedia communications experience both from the user perspective and from the codec and network utilization perspective Adaptive streaming technologies are becoming ever so popular as a means to achieve this goal In a broadcast multicast setting protocols such as Apple s HTTP Live Streaming HLS Microsoft s Smooth Streaming SS and MPEG s Dynamic Adaptive Streaming over HTTP DASH address this problem Importantly all these protocols are in the public domain The focus of this thesis however is on adaptive streaming techniques for two way telephony applications The motivation for studying two way telephony is due to the renewed interest in this form of communication as evidenced by the popularity of applications such as FaceTime and Skype Currently however there are no equivalents for the HLS SS or DASH for two way telephony Existing solutions are either closed FaceTime proprietary Skype or require access to proprietary vendor solutions for hardware acceleration ooVoo Also these solutions are hidden under the hood and provide the user no control on switching decisions In this thesis we provide a framework for user controlled adaptive two way telephony The proposed framework is software based and furthermore based off of open source software The user can vary the three basic settings of the encoder bit rate frame resolution and frame rate dynamically without having to tear down and recreate the session The user can switch to a higher bit rate or resolution only when needed for example to show a skin lesion and switch back to a lower bit rate otherwise The user can also reduce the frame rate when a high bit rate video is transmitted The outline to dynamically change resolution is also provided An Android application has been developed to demonstrate the proposed scheme As an impressive outcome of our experiments we observed savings in bandwidth consumption as well as improved video quality when demanded

Peer-to-Peer Video Streaming Eric Setton,Bernd Girod,2007-09-30 Peer to Peer Video Streaming describes novel

solutions to enhance video quality increase robustness to errors and reduce end to end latency in video streaming systems
This book will be of use to both academics and professionals as it presents thorough coverage and solutions for current issues with Video Streaming and Peer to Peer architectures Key Features Provides overview of today s state of the art video streaming technology Presents adaptive video coding and streaming techniques for performance enhancement of conventional client server systems and P2P multicast Focus on throughput limited environments where congestion often hampers interactivity and fast response times Results derived from experiments carried out over large scale simulated peer networks Detailed appendix incorporates various additional experiments

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