Semantic Aware View Prediction System for 360-degree Video Streaming

Jounsup Park, Ph. D.
California Baptist University

Address information
Email: joupark@calbaptist.edu | Tel: | 951-552-8690
Web: https://sites.google.com/view/jounsup/home

Abstract
Future view prediction for a 360-degree video streaming system is important to save the network bandwidth and improve the Quality of Experience (QoE). Historical view data of a single viewer and multiple viewers have been used for future view prediction. Video semantic information is also useful to predict the viewer's future behavior. However, extracting video semantic information requires powerful computing hardware and large memory space to perform deep learning-based video analysis. It is not a desirable condition for most client devices, such as small mobile devices or Head Mounted Display (HMD). Therefore, we develop an approach where video semantic analysis is executed on the media server, and the analysis results are shared with clients via the Semantic Flow Descriptor (SFD) and View-Object State Machine (VOSM). SFD and VOSM become new descriptive additions of the Media Presentation Description (MPD) and Spatial Relation Description (SRD) to support 360-degree video streaming via the DASH framework. Using the semantic-based approach, we design the Semantic-Aware View Prediction System (SEAWARE) to improve the overall view prediction performance. The evaluation results of 360-degree videos and real HMD view traces show that the SEAWARE system improves the view prediction performance and streams high-quality video with limited network bandwidth.

Bio

Dr. Jounsup Park joined California Baptist University in the Fall of 2022 as an Assistant Professor of Electrical and Computer Engineering at Gordon and Jill Bourns College of Engineering. Before he joined CBU, he was an Assistant Professor at The University of Texas at Tyler. He completed his postdoctoral training in the Coordinated Science Lab at the University of Illinois at Urbana-Champaign, Illinois, in 2020. Dr. Park received his Ph.D. in Electrical Engineering from the University of Washington, Seattle, Washington, in 2018. He received his B.Sc. and M.Sc. in Electrical Engineering from Korea University, Seoul, Korea, in 2006 and 2008, respectively. From 2008 to 2012, Dr. Park was with the Cooperate Research Institute of Samsung Electro-Mechanics, Inc., Suwon, Korea. His research interests are Multimedia Networking, Wireless Communications, and Machine Learning.