

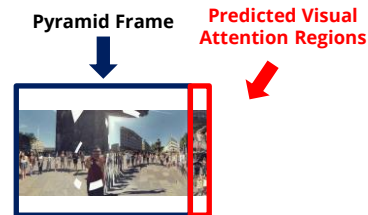
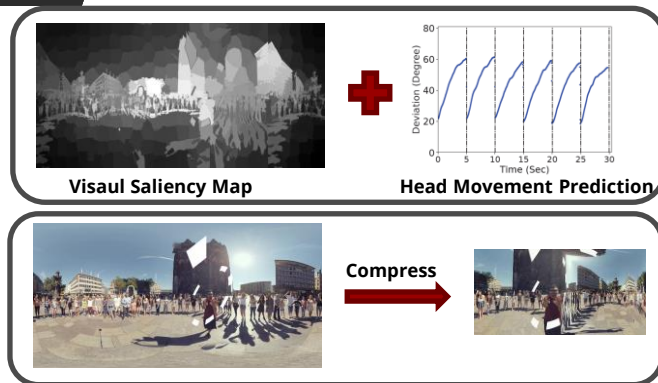
Saliency-based 360° Video Streaming

Duin Baek, Hangil Kang, and Jihoon Ryoo
Wings Lab, AI2S Lab.

Motivation

- To deliver 360-degree video content, significant bandwidth is required
- Many existing works sacrifice the visual quality of 360-degree video to reduce the required bandwidth
- Users in VR space only view a part of 360-video content (Field of View)
- We can predict users' visual attention in 360-degree video content by considering the spatiotemporal information:
 - spatial: visual saliency
 - temporal: head movement pattern over time
- By rendering the predicted visual attention areas, we can deliver the comparable quality of 360-degree videos while reducing the bandwidth usage

Our Suggestion: SALI360



Video attention prediction

- enhance the quality of perception
- visual saliency map + head movement prediction

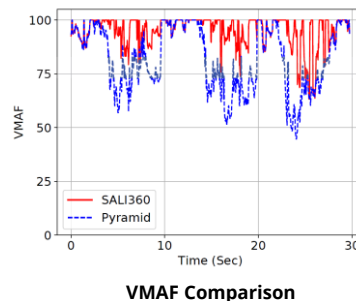
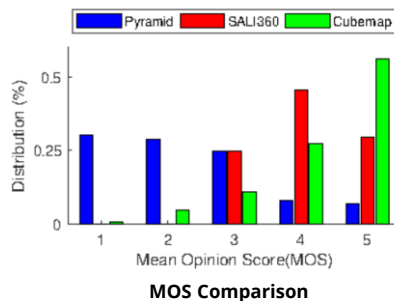
Geometry-based encoding/decoding

- reduce the bandwidth usage
- CUBE to PYRAMID (PYRAMID to CUBE)

KEY FINDINGS

- > In 360-degree VR space, users dynamically move their head horizontally and vertically
- > The existing visual saliency model fails to capture the space context of 360-degree VR content
- > We can predict users' visual attention by combining visual saliency map and head movement prediction
- > By utilizing visual saliency prediction and users' exploring behavior prediction, we can achieve the comparable quality of perception while reducing the bandwidth usage (only 60% of the benchmark: cube-map)

Experiment Results



Mean Opinion Score:

Pyramid	SALI360	CUBE
2.3	4.04	4.34

1. Consumes only 47.3% of the bandwidth Compared to CUBE

PSNR and VMAF Gain:

1. 13.73dB of PSNR gain spending 38% of additional bandwidth, compared to PYRAMID
2. 60% of the bandwidth reduction compared to the cube map encoding.