Eye Tracking of Dynamic Stimuli
Presenter: Kuno Kurzhals
Motivation

Eye tracking of videos

- Analyzing viewing behavior of numerous viewers
  - Commercials
  - Movies
  - Animated visualizations

Goals

- New data visualizations
- Support quantitative evaluation of dynamic Areas of Interest (AOIs)
Overview

- Motivation
- Challenges of Dynamic Stimuli
  - Smooth Pursuit
  - Definition of AOIs
- Common Visualization Techniques
- Beyond Standard Heat Maps and Gaze Replay
  - Motion-Compensated Heat Maps
  - Space-Time Cube for Eye Tracking Videos
  - Examples
- Conclusion & Future Work
Challenges: Smooth Pursuit

- Common fixation filtering insufficient for videos
- Smooth pursuit of AOIs problematic
Challenges: Definition of AOIs

- Dynamic AOIs change position and size
  - AOI tracking
  - Overlaps

- Definition of AOIs
  - Computer vision approaches
  - Manual editing
  - Hybrid approaches
Common Visualization Techniques
Common Visualization Techniques

Bee Swarm

➢ Gaze points during video playback
  ▪ Requires sequential analysis
Common Visualization Techniques

Gaze Replay

- Animated scan path with fixation durations
  - Difficult interpretation over time
  - Multiple users cause clutter
Common Visualization Techniques

Heat Maps (static)
- Aggregated data of numerous viewers
- Dynamic content hard to interpret

Heat Maps (dynamic)
- Dynamic adjustment of distribution of attention
- Sequential analysis still needed
Beyond Standard Heat Maps and Gaze Replay
Motion-Compensated Heat Maps

- Static heat map with motion compensation
- Optical flow information
- Gaze points move with the flow
- Hot spots remain on observed objects
Space-Time Cube for Eye Tracking Videos [1]
Gaze Point Visualization

- Color mapping based on density
- Filtering of sparse data reveals attentional synchrony
Clustering

- Spatiotemporal clustering of gaze points
- Information about the most important AOIs
- Mapping of AOIs to objects needed
Conclusion & Future Work

Presented Visualizations
- Motion-compensated heat maps
- STC for eye tracking data of videos

Future Work
- Analysis of individual users and groups
- Studying analysts’ strategies
- Automatic conversion from clusters to object AOIs

More Information
- http://go.visus.uni-stuttgart.de/stva
References