

Mining Scanpath Sequences with R and TraMineR Packages: A Hands-On Introduction

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Abstract

As sequences of visual attention locations, scanpaths can help uncover observers' task and problem solving strategies. Researchers are often faced with questions, such as "How different are these groups of scanpaths?", "Did a manipulation result in more optimal scanning?", or "Which scanning subsequences were exhibited by all participants?" Answering these and other questions across many conditions and participants can be a significant computational problem that is made easier with tools such as 'R' and 'TraMineR'. Although these tools can normally present a high learning threshold to researchers, this hands-on, full-day tutorial will provide an easy, applied introduction to sequential scanpath analysis. With this knowledge, attendees should be able to write scripts to process, compare, and visualize groups of eye tracking scanpaths.

Target Audience and Background

Both seasoned researchers and current students are welcome. Attendees need not have any prior experience with 'R', but should have general background in eye tracking, statistical analysis and computing scripting methods. Some scripting within the 'R' environment will be conducted. Each workshop attendee will need to bring a computer with 'R' and 'TraMineR' pre-installed. (Instructions will be provided in advance of the workshop.)

Tentative Outline

Morning I: Tutorial & R Introduction

- Attendee & Speaker Introductions & Motivations
- Importance of Sequential Analysis Methods
- Intro to R and RStudio
- Exporting/Importing Scanpath Data
- Scripting; R Markdown
- Handling Data
- Coffee Break

Morning II: Using TraMineR

- Event vs. State Sequences
- Creating Sequence States and Alphabets
- Transforming Between Sequence Formats
- State Sequence Visualizations

- Sequence Metrics: turbulence, entropy, complexity
- Finding Subsequences in Scanpaths
- Lunch Break

Afternoon I: Comparing and Visualizing Scanpaths

- Finding Pairwise Matches and Common Subsequences
- Clustering, Agglomerative Hierarchical Clusters
- Creating Dendrograms
- Visualizing Cluster Patterns
- Coffee Break

Afternoon II: Additional Scanpath Analysis & Visualization Topics

- Google Charts API
- Additional Scanpath Analysis Metrics
- Wrapup