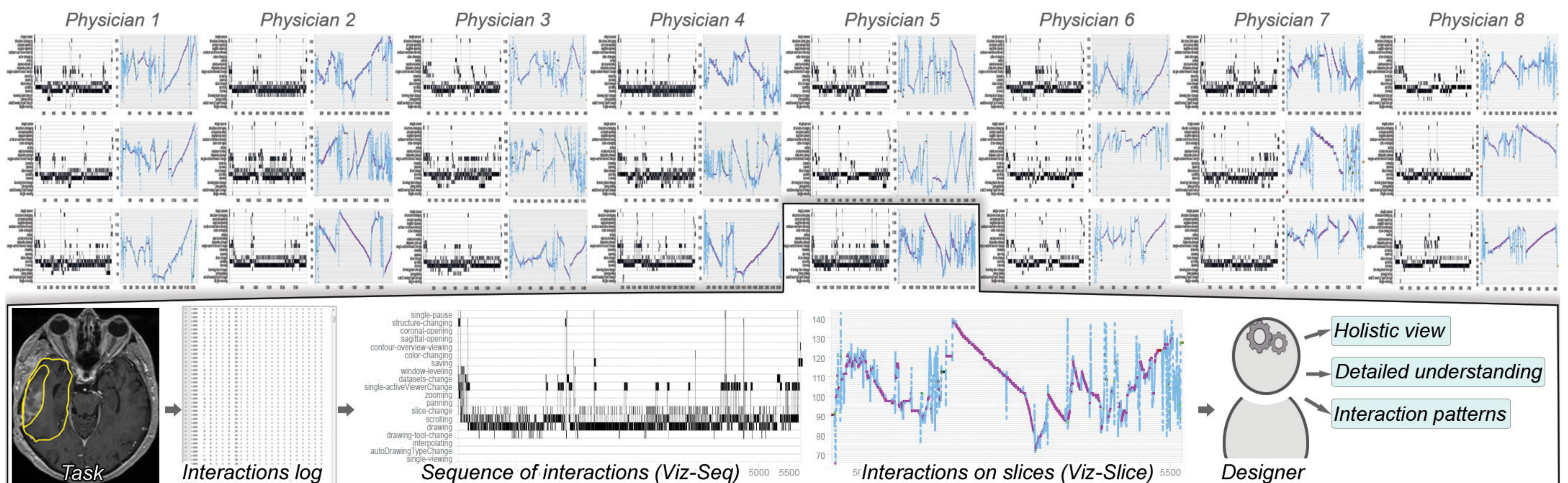


User Interaction Visualization for Design Synthesis

A. Aselmaa, Y. Song, and R.H.M. Goossens



Introduction

During design synthesis, the interaction designer makes sense of the data collected during user research and it can be considered a decisive point in the design process.

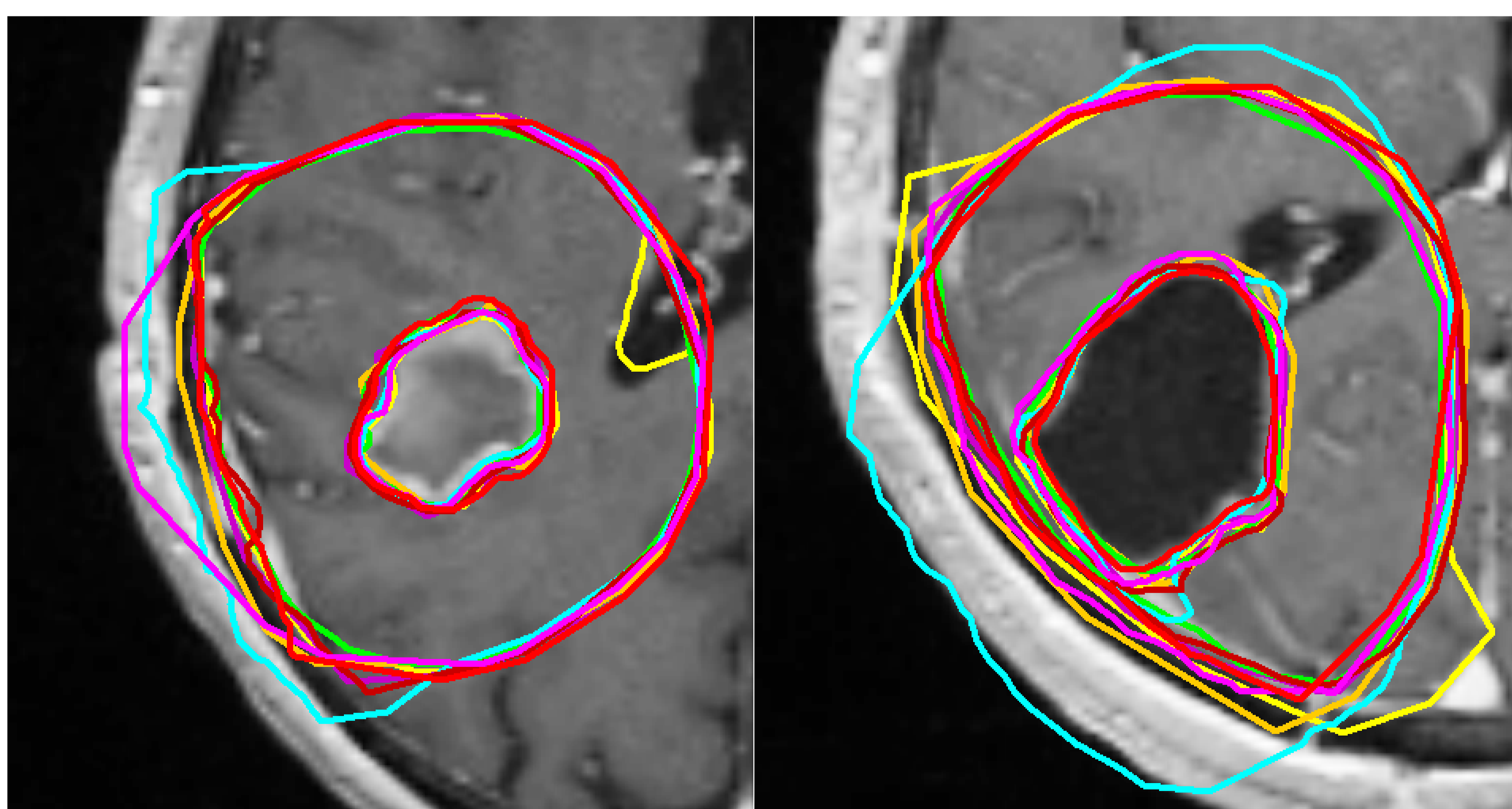
Recording mouse/keyboard/etc., events during user's interaction with a graphical user interface could be a rich additional source of insights. Comprehending such logged data files could benefit greatly from visualization.

We present results from a case study of visualizing logged user interactions of a tumor contouring task.

Case Study

Tumor contouring is a complicated clinical task. The aim of the study was to comprehend user behavior and identify requirements for an improved design.

- Manual tumor contouring (GTV, and CTV) of 3 patients was done by 8 participants (radiation oncologist)
- Mouse and keyboard events together with contextual meta-data were logged during the study
- The log data entries were clustered into meaningful software interactions (e.g., a cluster of mouse-drag events could be "drawing", "zooming", or "panning" interaction)



Combined results from the tumor contouring task (inner contour is GTV, outer is CTV) on single 2D slice from all 8 participants of two patient data.

Interaction Visualizations

We developed browser based visual interaction log exploration tool, consisting of two timeline visualizations.

- Each interaction was presented as a rectangle
- The width of a rectangle represented duration of the interaction
- There was an interactive time range selection possibility
- Quick switching between cases

Timeline of interaction sequences (*Viz-Seq*)

- To support grasping shifts between interactions
- Each interaction had a dedicated horizontal lane with a pre-defined order
- Connecting lines to support easier tracing of interaction sequences

Timeline of interactions on slices (*Viz-Slice*)

- To observe which interaction occurred on which slice
- Each horizontal lane represented a slice within 3D dataset
- Interactions distinguished by color
- Possibility to select which interactions to display

Results

Based on the visualizations, it was possible to explore individual task processes both in a holistic and detailed way.

- Enabled visual comparison of the task process between cases
- Faster than analyzing video recordings would be, while still allowing qualitative exploration
- Enabled building in-depth understanding of the main task phases of tumor contouring
- Three contouring strategies were identified
- Enabled identifying re-occurring interaction patterns that gave further insights into typical software user
- In total four scrolling patterns and five interaction sequence patterns were identified

Conclusion

The two developed interaction log visualizations were supportive for the designer during synthesis phase, enabling getting a holistic view of the task processes as well as getting in-depth detailed understanding.