

INKA-SUITE: An Integrated Test-Environment for Analyzing Chat Communication

Prof. Dr. Andrea Kienle, Christian Schlösser, Philipp Schlieker-Steens, University of Applied Sciences
Dortmund, Emil-Figge-Str. 42, 44227 Dortmund (Germany),
Email: andrea.kienle@fh-dortmund.de, christian.schloesser@fh-dortmund.de,
philipp.schlieker-steens@fh-dortmund.de

Abstract: This poster is related to the field of chat evaluation. First eye-tracking and its limitations in the case of constantly changing graphical user interface (like in chats) are presented. Then the INKA-SUITE that enables eye-tracking of changing graphical user interfaces is introduced.

Introduction

To evaluate the usability of an application, studies and field tests are conducted. Such usability studies are often based on eye-tracking, which records the eye movements of a test person, who usually is viewing exhibits, projection screens or displays (Duchowski, 2007). The eye movements provide information about what is viewed in what order for how long. Eye-tracking is widely used for the evaluation of user interfaces of stationary single-user systems (Shneiderman & Plaisant, 2006), web applications (Nielsen & Loranger, 2006) and in some cases also in CSSL studies (Nüssli et al., 2009).

Existing eye-tracking systems are usually limited to static content like pictures (e.g., advertisements), websites or programs. Those static contents are at the same position for all participants so that they can be easily compared with each other. For this scenario the corresponding eye-tracking applications provide a large scale of different displaying options to document the results.

However, if this area of interest is not static, but changes its size, shape or position, the evaluation becomes much more complex and requires a certain amount of manual analysis. This is especially the case in cooperative applications such as chats. In particular, the difficulty is, that you can't predict the time of change, because it is permanently caused by user input (e.g., new chat message, scrolling). So the dynamics of the area of interest (AOI) in such applications cannot be foretold. Existing eye-tracking software is therefore not suitable in this situation. They are typically limited to a subsequent definition of those dynamic AOIs, which can be a huge and fault-prone manual effort.

At this point, the own work of the research program "Informationsgestaltung in kooperativen Anwendungen (INKA)" (Design of Information in cooperative Systems, <http://www.inka.fh-dortmund.de>) starts. Further on, this poster presents the INKA-SUITE as an approach for the eye-tracking of dynamic AOIs (for further information see (Schlieker-Steens & Schlösser, 2012)). This software represents a solution for tracking dynamic applications, e.g. chats in fields of the CSSL as widely known from the work of the virtual math team (VMT) project (Stahl, 2011). Especially in the field of linguistics and usability questions about chat communications could be answered.

INKA-SUITE

The base for the INKA-SUITE is the connectivity to the Tobii eye-trackers established with the Tobii SDK (see <http://www.tobii.com>). With a direct connection between the eye-tracker gaze data stream and GUI (C# WPF), the INKA-SUITE identifies AOIs at runtime, regardless of size, shape and position. In fact, every gaze data record is complemented by the underlying GUI element, identified by names, ID's and/or references to other database tables such as chat messages or users. A subsequent manual work is eliminated and the evaluation can be started immediately. This direct identification of AOIs is providing further opportunities, which will be discussed briefly in the outlook. This profound cross-linking between analyses related functions and user software cannot be adapted by existing eye-tracking analysis software.

The INKA-SUITE is based on a three-part application:

- A server to control and manage clients
- A client application for user interaction, which is connected to an eye-tracker
- An analysis component for managing projects and analyzing the collected data

To get a customizable interface, the client does not contain a chat interface. The interface is provided by the server. This procedure is generally called as templating and offers the possibility of a simple way to perform A/B testing with different user interfaces. To control and monitor the clients, a server component is used. At that point, the templates are chosen and assignable and the status of eye-tracking for each participant can be supervised.

The analysis application processes the recorded data and is divided into three parts: Statistic, Replay and Timeline. In the Statistic tool, general information about the chat session and also about each user is presented. For example these are duration of chat, keystrokes per minute, time to first message and messages per minute.

Within the Timeline tool the entire chat session is presented on a timeline for each user (see Figure 1, left). This ensures the comparability between users (e.g., Stellmach et al., 2010). Each users shortcuts, keystrokes, chat messages and fixations are listed separately. Using annotations, important areas can be marked. The displayed output is fully dynamic and can be adapted to the current problem.

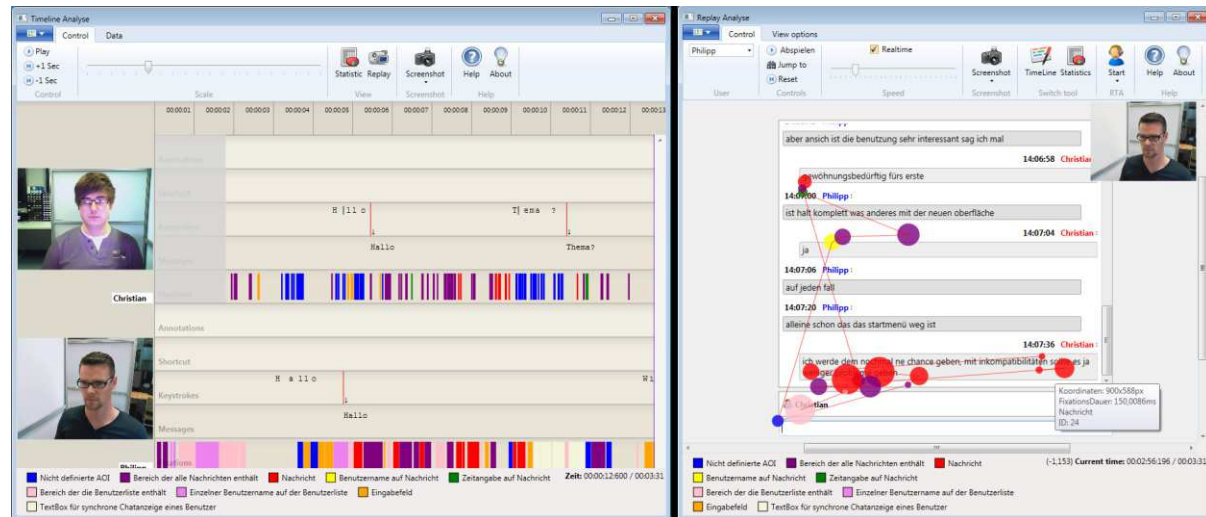


Figure 1. INKA-SUITE Timeline and Replay (Analysis tools).

For replaying the chat from the user's point of view, the so called Replay was developed (see Figure 1, right). This tool is chronology replaying the chat, similar to a screen recording, but with options to select and deselect the data that is output at runtime, also showing fixations and saccades as a scanpath. Because fixations are represented by GUI elements, further information, such as fixation length and underlying AOI, can be retrieved through tooltips. Both applications, Timeline and Replay, provide the opportunity to play back the video of the user cam. Within the Replay a "Retrospective Think Aloud" can be recorded. Timeline and Replay are linked together to jump into each instance to the same position as the active tool. From the Timeline, multiple Replay instances can be started and played in sync to compare several subjects directly.

Outlook

The INKA-SUITE outlined above is a basis for a number of planned extensions. These include an enhanced fixation filter, contextualized communication, extension of simultaneous chats and the internal project called *Chat++*, which is feasible through the realtime AOI identification and could therefore support features like reading awareness, eye-tracking-based referencing and activity and context-awareness.

References

- Stellmach, Sophie; Nacke, Lennart; Dachselt, Raimund: Advanced gaze visualizations for three-dimensional virtual environments. In: Proceedings of the 2010 Symposium on Eye-Tracking Research & Applications. Austin, Texas, 2010 (ETRA), pp. 109–112.
- Duchowski, Andrew T. (2007): Eye Tracking Methodology: Theories and Practice, 2nd Edition. Berlin: Springer Verlag.
- Nielsen, Jakob; Loranger Hoa (2006): Prioritizing Web Usability. New Riders.
- Nüssli, Marc-Antoine; Jermann, Patrick; Sangin, Mirweis; Dillenbourg, Pierre (2009): Collaboration and abstract representations: towards predictive models based on raw speech and eye-tracking data. In: Proceedings of CSCL, 2009.
- Shneiderman, Ben; Plaisant, Catherine (2009): Designing the User Interface: Strategies for Effective Human-Computer Interaction, 5th Edition. Amsterdam: Addison-Wesley.
- Schlieker-Steens, Philipp; Schlösser, Christian (2012): INKA-SUITE: An integrated test-environment for analyzing chat communication. FH Dortmund: Bachelor Thesis (In German).
- Stahl, Gerry (2011): How a virtual math team structured its problem solving. In: Proceedings of CSCL 2011, pp. 256–263.