

PhD Literature Review

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1 Introduction

2 Interaction

In [Atterer et al., 2006] a monitoring system for web-based interactions is defined – called UsaProxy. By requesting the users of the system to re-route all of their connections through a proxy server, HTML pages are modified with JavaScript tracking code before they are delivered to the user. The code collects data on mouse movements, keyboard input, along with other, fine-grained interaction metrics.

The capture solution presented above, in [Atterer et al., 2006] is modified in [Apaolaza et al., 2015] to allow deployment by adding JavaScript code to the web pages rather than requiring users to set their browser to re-route all connections through a proxy server. Data; low-level mouse movements, clicks, and keystrokes, in this experiment are recorded from a high-traffic website continuously for two years. They find that users, rather than interacting with the website quicker as they become more familiar, have increased periods of mouse inactivity. Continually, the users also spend more time on the website as they become more familiar. And finally, they find that there is no need to collect specific information about users, such as any disabilities they may have, as their problems can be identified through emerging behaviours in the experiments [Apaolaza et al., 2013].

Problematic situations encountered by users with visual impairments and the tactics they employ to overcome them are explored in [Vigo and Harper, 2013b]. Through developing several algorithms, and packaging them together into a web-usage monitoring tool, the employed tactics are identified and isolated automatically, in mouse and keyboard data, and treated as markers to infer the user is having an issue. In [Vigo and Harper, 2013a], more detail is presented about the particular type of tactics and an expansion on the analysis process by going deeper into the tactics the users employed and how they react to problems (do they give up or carry on).

In [Gledson et al., 2016, Bull et al., 2016], a fully-fledged, desktop application with an aim of trying to detect mild cognitive impairment in older computer users, through their interactions with the computer, is presented. The monitoring system collects data on operating system events, web browsers, and applications. Furthermore, mouse movements are collected but the complexity is reduced by

only recording dragging movements and the time periods between clicks. They have early evidence that this is a promising method to detect cognitive impairments.

3 Engagement

A broad review of measuring and defining user engagement in a range of scenarios is presented in [Brown and Glancy, 2015]. The focus is on the understanding of initial reactions to media-based content and what engagement means in this context. They find that if the audience is emotionally invested in the content then their level of engagement is subsequently higher.

In [Jennett et al., 2008], the authors perform an investigation to test if immersion can be defined quantitatively through experiments. They devise three experiments; switching from an immersive to a non-immersive task, changes in eye movements during an immersive task, and measuring the effect of an externally imposed pace of interaction which alters the flow of the participant. Immersion is well defined here and has three features; lack of awareness of time, loss of awareness of the real world, and a sense of being in the task environment (a video game). They find that immersion can be measured subjectively, through questionnaires given to the participants before and after the event, and objectively, through task completion and eye movement. The authors apply Spearman's Rank-Order correlation on the mouse click data (the mean number of mouse clicks vs the mean number of fixations on the non-immersive condition), relying heavily on this in their analysis.

4 Sequential Data Mining (plus others(?))

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