

Observing and Utilizing Tabbed Browsing Behaviour

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In our work, we focus on observing, analysing, logging and utilizing the tabbed browsing behaviour both within adaptive web based systems and on the open Web. Adaptive systems in general make use of information about users (user model), content (domain model), etc. Apart from methods that analyse content, the user behaviour, both as explicit and implicit feedback, is often used to create such models. Tabbed browsing could express implicit user actions and we can possibly improve user models, domain models, or aid in recommendation.

The tabbing (also called parallel browsing) is a more accurate description of user activities during browsing than previous and simpler linear browsing models [1], which considered visits to resources in a linear fashion, where each “click” (a page load) replaces previously opened page. In tabbing models, in the same way as in the real browsing activity, the user can have multiple pages opened at once (opening them in separate tabs) and switch between them at any time during their existence. Users do use tabs in various situations – *reasons for using tabs* [2], such as:

- keeping bookmarks of pages to read by keeping them opened in tabs,
- comparing pages,
- looking for additional information in tabs about topic on a given page,
- opening multiple search results to tabs,
- or even keeping to-do lists expressed as tabs.

The parallel browsing behaviour, however, cannot be reliably inferred from typical server-side logs. It can be observed with the aid of client-side scripts embedded within web pages (observing tabbing activities of all users of the application, but only for pages within such application, no tabbing is observed for other pages) or from a browser extension (observing tabbing on all web applications being visited in the

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augmented browser, but only within a smaller group of users who have the extension installed).

We model the user tabbing behaviour from events sourced either from such a browser extension, where we realized prototype implementation in a Brumo extension framework, or from scripts included in pages served by Adaptive LEarning Framework system (ALEF). The events include traditional page loads, page unloads, but also focus and visibility tracking. These events are tracked per each tab during life-time of a page loaded in it, creating an activity vector. Such vectors from multiple pages are combined and user tabbing activity (e.g. open link in the same tab, open link to a new tab, switch between pages) is reconstructed.

Possibilities of using the tabbing data are for example in item (page) recommendation, where tab switches between items may represent relation between those two items. Another possible usage of user parallel browsing behaviour is in annotating the content in an adaptive system with additional resources from different web pages based on the user tab sessions from the system, across various domains and back to the system. Ultimately, our goal is to augment user and domain modelling in adaptive systems by taking parallel browsing into account. We therefore add another level of inference on top of the processed logs with recognized tabbing actions, where we try to recognize tabbing scenarios and use those to find user interest or content relations.

We are currently modifying the single-application logger (used within ALEF system) to consider tab switch delays and subsequent time spent on the page in a notion that one page rates another one when the user performs switch action and remains there (the time is a weight of the rating). We also propose a browser extension called Tabber, which allows users to view and analyse their usage of browsers tabs, while its data can serve as a dataset of browsing the open Web.

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References

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