

# Using Parallel Web Browsing Patterns on Adaptive Web

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Internet and especially its service Web have changed greatly in the last years. Web browsing became one of the most common activities in professional and also private life for many of us. An interface made for this purpose, web browser was arguably not changed very much from the early days of Web. However, some new features, including the possibility of parallel browsing using tabs, were introduced. They (tabs) became very popular and widely used feature, which is present in every modern web browser.

This feature has an unquestionable impact on how people browse Web pages today. Parallel browsing in basic (see Figure 1) occurs when Web browser user is browsing multiple Web pages using multiple browser windows or by using tabs inside these windows. Users have many reasons why they use tabs and parallel browsing in general, such as those found in Mozilla browser user study [1]:

- short-term, visual bookmark,
- parallel searching (branching from search result page),
- opening interesting link on background without interrupting the current process.

Users therefore certainly have motivation to use the tabs as the best tool to perform parallel browsing. According to the research [2], 57% of all tab sessions involve parallel browsing and users are multitasking by splitting their browsing activity into different tabs rather than viewing more pages overall. The same research also expressed the belief that this type of behavior has been growing recently and we foresee this continuing to gain popularity and that studies of this type of navigation behavior have been lacking in Web and hypertext communities, despite parallel browsing capturing fundamental interactions with hyper-links.

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That's why we have decided to focus on analyzing the parallel Web browsing behavior and identifying patterns in it. Our main goal is to utilize these patterns via some kind of appropriate recommendation aimed for the Web browser user.

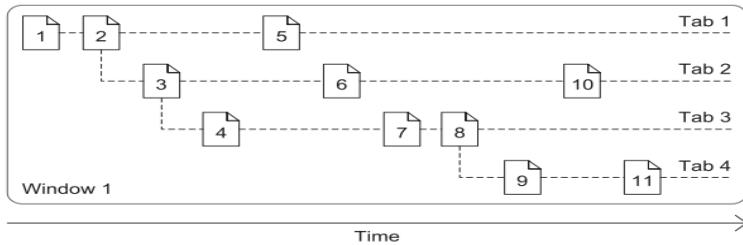


Figure 1: An example of Web browsing session with multiple tabs over time. [3]

In order to detect repeating patterns in parallel Web browsing behavior we will, in the beginning, use data from Brumo project, which is aimed at browser based user modeling. The data have been already optimized for parallel browsing actions detection. After the pattern detection stage, we will analyze the recommendation possibilities. Currently we are thinking about two basic concepts of recommendation:

- Web content recommendation (within ALEF domain or on open Web)
- Web browser actions recommendation (suggesting that the user should bookmark this page, etc.)

There is also a possibility that we discover such a pattern, which will lead to other and possibly a very different kind of recommendation.

The main output of this work, web browser extension, will be capturing parallel browsing activity and also providing recommendation. We plan to implement it as a Google Chrome Web browser extension.

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## References

- [1] Patrick Dubroy and Ravin Balakrishnan. 2010. A study of tabbed browsing among mozilla firefox users. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '10)*. ACM, New York, NY, USA, 673-682.
- [2] Jeff Huang and Ryon W. White. 2010. Parallel browsing behavior on the web. In *Proceedings of the 21st ACM conference on Hypertext and hypermedia (HT '10)*. ACM, New York, NY, USA, 13-18.
- [3] Jeff Huang, Thomas Lin, and Ryon W. White. 2012. No search result left behind: branching behavior with browser tabs. In *Proceedings of the fifth ACM international conference on Web search and data mining (WSDM '12)*. ACM, New York, NY, USA, 203-212.