Utilization of User Behavior Patterns in Parallel Web Browsing

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Introduction

- **Parallel Web browsing:**
  - Using mechanisms such tabs and/or windows, which allows us to browse multiple web pages in parallel.
- **User behaviour patterns:**
  - How users browse the Web (we care especially how they use tabs, windows).
  - Repeating of events / groups of events.
- **Web Usage Mining:**
  - Process of applying data mining methods with the intention to discover patterns. [1]
  - Web server data, Application server data, Application level data.
  - Association rules, Markov chains.

Motivation

People use tabs everyday, do they all use them in the same way?

- **Tabs usage from Mozilla Firefox study [2]:**
  - short-term visual bookmark,
  - parallel searching (branching from google search result page),
  - opening interesting page in background (without interrupting current page reading),
  - and more…
- **People browse Web and use tabs slightly different but with similar intentions**
  - common users / power users
  - personalization

Solution

- We need a way to:
  - Get application level usage data.
  - Discover most common patterns (intentions).
  - Provide added value (recommend faster way to accomplish intention).
- Web browser extension (Google Chrome):
  - Tabs, Windows usage logging and analyzing (Chrome API).
  - Association rules, Markov chains, etc. to discover patterns (intentions).
  - Provide recommendation (faster way to accomplish intention).

Use cases

- **Use case 1:**
  - **Pattern:** User closed **a couple** of tabs from the same domain within a **time-window.**
  - **Action:** Recommend to automatically close all tabs from that domain.

- **Use case 2:**
  - **Pattern:** User opened new page, raising number of opened pages to **certain limit**.
  - **Action:** Recommend to close **several** least accessed tabs.

Note: We can only guess the numbers here (and they may also vary from person to person). → Collect usage data and provide personalized recommendations.

Tabrec (Google Chrome ext.)

Description: Personalized tab actions recommender based on your browser usage.

Current version 0.2 (November 2014):

- Parallel Web Browsing mechanisms usage logging (Logging actions like : Tab Creating, Closing, Navigating, Reordering, etc.).
- Already published on Google Chrome store (we will get to this later).

Version 1.0 (May 2015):

- Optional usage logging. (Anonymous usage data reporting)
- Personalized tab actions recommendations.

Issues

- **Usage logs (what we have):**
  - Attributes like user_id, tab_id, event_type, url, index_from, index_to, window_id, timestamp (milliseconds).
- **Usage logs (what we think about):**
  - Identifying sessions (listening for chrome shutdown, enter private mode).
  - Not sure if we need this (timestamps differences means different sessions).
- **Privacy (what we have):**
  - Representing user as a randomly generated UUID.

Issues II.

- **Privacy (what we think about):**
  - Securing URLs (splitting to more parts like domain, resource and hashing) [3].
- **Getting feedback (what we think about):**
  - Semi-interactive / Interactive mode (user must accept recommendation - implicit feedback).
  - For expert users (aggressive mode) - scheduled interviews (Q&A forms)
- **Evaluation (what we think about):**
  - % of accepted recommendation.
  - Faster accomplishing of intentions (Tabrec is in **productivity** category).

Resources

1. Jaideep Srivastava, Robert Cooley, Mukund Deshpande, and Pang-Ning Tan. Web usage mining: Discovery and applications of usage patterns from web data. SIGKDD Explor. Newsl., 1(2):12–23, January 2000. ISSN 1931-0145. doi: 10.1145/846183.846188. URL http://doi.acm.org/10.1145/846183.846188.

2. Patrick Dubroy and Ravin Balakrishnan. A Study of Tabbed Browsing Among Mozilla Firefox Users. pages 673–682, 2010.

3. Christian von der Weth DOBBS: Towards a Comprehensive Dataset to Study the Browsing Behavior of Online Users. Talk at DERI institute seminar, April, 2013. URL http://dobbs.deri.ie/

Getting Tabrec

1. http://tabber.fiit.stuba.sk
2. “Add to chrome” / “Pridať do chrome”
3. That’s it!
4. Possible to disable / enable => chrome://extensions