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Ideally the information systems that people use should adapt themselves to individual users or to groups of users and to changes in their information content. Here we consider adaptive websites: websites that are designed and constructed manually but are able to adapt themselves to how they are used. The goal of adaptation on which we focus in the work described here is minimising the time that a user needs to find the information that he is looking for. This work is restricted to menu-based interfaces, although some of the results can be used in other types of interfaces such as search engines and the use of procedures.

The first study concerns a simple idea. The goal is to identify bad labels in menus. A label is bad if it causes users to make the wrong choice. A wrong choice is one that is not on the path to a piece of information that the user wants. In the logfiles we identify the items that a user was looking for. In the case of implicit feedback, we use a threshold on the time between two server requests. This gives a usable approximation because the page are similar in length. A single user may have more than one target in a single session. Next we compare the users trace with the paths to the targets and try to locate where a user left the shortest path. There are two possible causes for a bad choice that can both apply: the label of the correct choice was bad or the label of the incorrect choice was bad. Analysis from a large number of logs can indicate that one of these possibilities is more likely. An experiment in which the server logs of three websites were analysed and used to identify bad labels showed that this method is effective. Although the websites were carefully designed and maintained our system discovered several bad labels that were subsequently changed by the site owner - manually. A nice aspect of the method is that it makes hardly any assumptions on the data. It uses "raw" logs of server requests, to which standard preprocessing is applied.

Changes to labels are made by a human. Finding good labels for pages and thereby for labels of menu items is a topic in a followup project.

A second study [1] addresses the menu structure. Menus are designed with different goals in mind. Here we focused on minimizing the time that a user needs to find the information that he is looking for. Again we assume a menu-based interface. Search time has several components: times needed for reading a label, reading a menu, clicking through to the next menu or content and the (average) length of a search path to a single target content page. The time for reading a menu depends on the structure of the menu and the experience of users. If the items on a menu are ordered then the user can exploit this to avoid reading the list from top to bottom. Similarly, if a user has experience with the menu he

may know where to find the item he needs. From the server logs we estimate the average label reading time. Menu traversal time is estimated by selecting a linear or logarithmic function type and plugging in the label reading time. From the distribution of the target content page sets we can now estimate the distribution of reading times. This is used for a heuristic search for changes to the menu order or the composition of menus that reduce the average expected search time. This method proposes changes to the menu structure that are presented to a webmaster who decides if they are actually implemented.

An evaluation study showed that the system produces useful results. The proposed changes were not all accepted by the webmasters because they would violate other requirements on the menu structure that the webmaster found more important.

References

1. V. Hollink, M. Someren, and B. J. Wielinga. Navigation behavior models for link structure optimization. *User Modeling and User-Adapted Interaction*, 17(4):339–377, 2007.