Chapter 11

Summary

Websites have become an essential part of every profession, making a strong impact on the image of every company. Therefore, it is of high importance that websites are designed such that users can find the information they seek easily. However, good design and management of websites is not straightforward as websites are growing in size and becoming more and more complex due to dynamic content. The number of web pages and the complexity make websites very difficult to manage and to maintain. Therefore, optimizing websites in a static and non-autonomous way is a time-consuming and laborious process, which is often not feasible in practice. In this thesis, we bridge this gap by developing a model for dynamic website optimization through autonomous management of design patterns.

11.1 Search behavior & design patterns

The World Wide Web (WWW) is growing with millions of web pages every day. It has an enormous economic value through e-commerce. But, before a website becomes economically relevant, the website has to be found first and needs to have a navigation structure such that users can find relevant information easily. Website optimization (WSO) is a new research area and is a process of improving internal (e.g., layout of web pages and content) and external (e.g., promotion of the website and link building) aspects of web pages to increase the traffic the website receives from search engines. Findability heavily depends on how people search for information. Therefore, we first observed people in “non-web” situations (e.g., shopping malls and
city centers) to find out how people search in “non-web” situations and how their goals are influenced (see Chapter 4). Our main observation was that participants deviated from their initial goals because of parallel goals and because of state triggers that influenced their interests.

The WWW is a relatively new context for people to search in. We did not know whether the search behavior on the WWW would be the same as the search behavior in “non-web” situations. Therefore, we observed the search behavior of people on the WWW (see Chapter 5). We observed that web design problems can cause website visitors to adapt their search behavior. We also observed similarities between searching in “non-web” settings and searching on the WWW. To improve searching on the WWW, the WWW should support all search behaviors (e.g., wild searching) that are accepted in our daily life outside the WWW. To make this possible we formulated design patterns for static website optimization. We also formulated a design pattern for wild searching as wild searching is not supported very well on the WWW.

### 11.2 Dynamic website optimization

Many design patterns are suggested by experts for common design problems [231, 4, 248, 225, 2]. In this thesis we have defined some new design patterns and discussed the relevance of those design patterns. It is very hard to decide which design pattern optimizes your website the best as there are many design patterns. A combination of different design patterns might enforce each other to improve the website or might have adverse effects that are not known beforehand. Moreover, the design patterns (or sub patterns) can also be used in different styles leaving room for a lot of freedom in usage. It is often not feasible to try all the combinations of the design patterns in a static and non-autonomous way to optimize websites. This would be a time-consuming and laborious process. Therefore, we have developed a mathematical model to optimize websites dynamically (as opposed to Google Website Optimizer) through autonomous management of design patterns. We discussed and implemented the model (see Chapter 10) and built a proof of concept on a real webserver. Our model automatically selects the right website version out of a set of versions with different implementations of the design patterns based on automatic analysis of web visitor behavior (see Section 10.3 and 10.4 for examples). Experiments demon-
strated that the model has very good performance and automatically selects the optimized website. With this model we contribute to the WSO area as there is little to none dynamic and autonomous ways to optimize websites until now.

11.3 Future directions

Our adaptive and self-learning model optimizes websites on the basis of the search behavior of web visitors. We know that websites generate a lot of data (e.g., which browser the web visitor is using, what webpage the visitor previously visited, the path that the visitor followed on the website, what links the visitor clicked on, how long the visitor spent on a webpage, how many times the visitor visited the website, what operating system the web visitor is using, what is the web visitor’s IP address). Website owners use these data to build profiles for the different web visitors and to show them content based on this profile (see e.g., http://www.amazon.com). Based on these profiles it is possible to personalize websites to match the interests of the web visitor. Hence, by extending the model with more information, the model is able to optimize websites based on a population of web visitors in which it differentiates based on profiles. We described such an example in Section 10.4 to illustrate how a website could be optimized for two different types of groups of web visitors who have different domain knowledge.