

Chapter XXXIV

User-Adapted Information Services

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ABSTRACT

This chapter describes personalization strategies adopted in digital libraries. Personalization and individualization are introduced as means to improve the usability of digital library services. The goal of personalization for digital libraries is mainly the presentation of individual results to the user. This can be modelled based on a user interest model which is applied during the search process. Two users with the same query can receive different results based on their interest profile maintained by the system. Typical approaches and systems for individualizing the results of information retrieval systems are presented. The retrieval process is described. Knowledge sources and common knowledge representation for personalization are elaborated. Most common, the search history and documents accessed in the past are exploited for modelling the user interest. Finally, the chapter mentions drawbacks and success factors for personalization and individualization systems.

INTRODUCTION

For a long time, information systems like digital libraries followed a “one size fits all” approach. However, people who use these systems are different. Consequently, systems should adapt to the individual needs and preferences of the users in order to best accommodate them. The main focus of this chapter will be the adaptation in information retrieval for digital library services.

BACKGROUND

Adaptivity can be achieved by either an active user or an active system. In the first case, the user himself has means to modify the system in some way that it better fits to her individual desires. The user himself takes the initiative for the process. More challenging is the development of systems which adapt by themselves to the needs and preferences of the users. In order to do that,

the system needs to identify the user, collect knowledge about him, and draw consequences from this knowledge.

In the early days of user adaptation, user modeling in the context of artificial intelligence applications was in the focus. User modeling began with stereotyping users (Rich, 1979) and has evolved into more refined knowledge-based strategies (Kobsa, 2001). Currently, there is a trend to rely on machine learning algorithms which associate similar users or objects in order to serve personal interests.

PERSONALIZATION AND INDIVIDUALIZATION

Users are Different

Users can differ in many ways like age or culture. Most important for knowledge work which is supported by information system are cognitive differences. Users may differ in their knowledge about the interaction with the system and the domain. The differences between beginners and advanced users are an issue which is often exploited for personalization. At the same time, users may be different according to their knowledge (e.g., in a e-learning system, they may have reached different levels of knowledge). Resistance to change, intelligence, intro-/extroversion, fear of failure, and creativity are further personal features. For some interfaces, the spatial orientation capabilities may be of importance. Users can have different preferences in interaction styles. Some may prefer the keyboard, others the mouse, and again others, spoken language. Obviously, adaptation does contradict the human-computer interaction principle of consistency for interfaces. As a consequence, adaptation needs to improve the system up to an extent which exceeds these potential shortcomings. Certainly, adaptation is of specific value for beginners who start to use a system. However, for this group, it is hard to acquire knowledge.

ACQUIRING KNOWLEDGE ABOUT USERS

Systems can collect the knowledge explicitly or implicitly. Explicit knowledge gathering means that the user is asked to provide information about himself. Implicit knowledge gathering does not require time and effort from the user. The system collects this knowledge from the behavior (click data, log files) or the context (who, where, when, what, how) (Abowd & Mynatt, 2000).

In addition to collect the knowledge, the system needs to assign it to one specific user. A login is very reliable but puts a high effort on the user. Technological means like RFID chips, IP addresses, and unique mobile telephone numbers can also be used for the identification. If no means are available, the adaptation can be effective only for one session.

MODIFYING A SYSTEM

The modification of the system can affect the user interface (functions, appearance, way of interaction), the content (different knowledge objects), or the presentation (sequence, level of detail). For a digital library all of these three aspects can be of interest, however, content adaptation has been attracted most research in the digital library community. Content adaptation will be thoroughly discussed in the following section. Typical content adaptation is implemented by recommender systems which suggest new content items to users in e-commerce applications.

User interface adaptation has been the focus of much research. The adaptation initiated by users has been integrated in many systems for many years. Menus, tool bars, and other aspects of graphical user interfaces can be changed by users. Some aspects like desktop background pictures or ring tones for mobile phones are heavily used to express individuality through aesthetic elements.

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