Chapter II

Knowledge-Based
Personalization

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ABSTRACT
We present a novel method for software personalization. Personalization is understood broadly as a set of mechanisms by which an application is tailored to a particular end user and his or her task. The presented method outlined here is motivated by and remedies a few widely recognized problems in the way customization is carried out. The proposed method has been used in a collaborative system called Writer’s Aid. It relies on a declarative specification of preconditions and effects of system’s actions and applies artificial intelligence, automated reasoning, and planning framework and techniques to dynamically recognize the lack or availability of the personal information at the precise time when it affects a system action and initiates an interaction with the user aimed at eliciting this information in case it has not yet been specified.

INTRODUCTION AND MOTIVATION
Personalization has been identified as a key task to the success of many modern systems. As Riecken writes in the editorial of the special issue of Communication of the ACM devoted to this subject (Riecken, 2000, p. 28)
“personalization means something different to everyone.” There are various forms personalization can take; however, it can be broadly described as the set of mechanisms by which an application is tailored to a particular end user and his or her goal. Modern systems are increasingly more sophisticated, designed to carry out a multitude of tasks or operate using the enormous wealth of information available on the Internet. The effectiveness of a system helping a user achieve his goal, and the user’s satisfaction from interacting with the system depends critically on the user’s ability to identify and use relevant customizable options, configuring the system for optimal performance with his individual preferences and task-related information. However, the user’s ability to provide this kind of personal information is often greatly impaired by the following drawbacks in the way personalization is implemented.

- Customization is carried out as a separate process that is taken out of context of the task in which such personal information is used, thus obscuring from the user the purpose and advantages of supplying such information.
- The amount of potentially useful personal information is sometimes overwhelming, thus the systems are installed with a set of settings that are considered typical. Further customization has to be initiated by the user. However, inexperienced users rarely take advantage of customization even if they are aware of potential benefits due to the lack of information on the available options. As a result, experience demonstrates (Manber, Patel & Robison, 2000) that the many users shy away from the customization while they can benefit from it a great deal.

The items above characterize the shortcomings in the user interaction model. On the other hand, there are problems developers of software face in designing for personalization. As Pednault (2000) points out, the underlying representation of “the human-side and the technology-side” is the key; however, representations currently in use at times lack flexibility to be easily adjustable and reusable. This is largely a consequence of the absence of a rigorous model of what constitutes personalization. The lack of such a model results in ad hoc representations used by most systems.

The approach to personalization that we present here is inspired by the view of interfaces as means for collaboration between humans and computers in solving the problem, rather than means of humans controlling the computers as articulated in Shieber (1996). As a theoretical framework, collaboration theory and its existing philosophical and formal mathematical accounts (Bratman, 1992; Grosz & Kraus, 1996; Cohen & Levesque, 1991) can inform both design and usability analysis of systems as well as give rise to new representations, highlight problems that need to
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