

Chapter VI

Intelligent Information Personalization: From Issues to Strategies

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ABSTRACT

*This chapter introduces intelligent information personalization as an approach to personalize the web-based information retrieval experiences based on an individual's interests, needs and goals. We present intelligent techniques to dynamically compose new personalized information by adapting existing web-based information in line with a dynamic user-model, whilst simultaneously addressing linguistic, factual and functional requirements. This chapter will highlight the different facets, tasks and issues concerning intelligent information personalization to guide researchers in designing intelligent information personalization applications. The chapter presents intelligent methods that address information personalization at the content level as opposed to the traditional approaches that focus on interface level information personalization. To assist researchers in designing intelligent information personalization applications we present our information personalization framework, named **AdWISE** (**Adaptive Web-mediated Information and Services Environment**), to demonstrate how to systematically integrate various intelligent methods to achieve information personalization. We will conclude with a commentary on the future outlook for intelligent information personalization.*

INTRODUCTION: INFORMATION PERSONALIZATION

The access to and consumption of relevant, useful and correct information is paramount to Web

users. However, the sheer volume of information available over the Web has led to the much-cited information overload problem; users are finding it cognitively stressful and difficult to find the 'right' and 'relevant' information. Notwithstanding the

efficacy of information retrieval technologies, it is argued that solutions to tackle the information overload problem need to pursue a shift in focus—i.e. move from searching for information guided by the user's query towards personalizing the available information guided by the user's immediate needs and interests.

Information retrieval services such as Google, Yahoo, CiteSeer are now the preferred gateways or mediators to the vast information artefacts available over the Web (Shahabi et al. 2003). The term *information artifact* is used to broadly denote a document, image, media file and any other medium to represent information. Such information artifacts may either be structured, semi-structured, or unstructured. Functionally speaking, such information services aim to address the information overload problem by (a) finding a subset of information artifacts from a larger space of information artifacts (i.e. the Web) based on the user's search preferences; and (b) presenting a list of relevant information artifacts to the user—the user is required to subsequently choose from the list of retrieved information artifacts. Indeed, this alleviates the information overload problem to some extent but it does not fully solve the cognitive overload problem because the user is still required to *filter* the retrieved information based on contextual priorities, and then *adapt* it based on personal preferences.

Information users are different in nature—they manifest heterogeneous information seeking behaviours, needs and expectations. Yet, we note that most information retrieval services purport a *one size fits all* model whereby the same information is disseminated to a wide range of information users despite the individualistic nature of each user's needs, goals, interests, preferences, intellectual levels and information consumption capacity. We believe that this leads to a sub-optimal model because information seekers who are intrinsically distinct are not only compelled to experience a generic outcome but are further required to manually adjust and adapt the recommended information

artifacts according to their immediate needs or preferences in order to achieve the desired results (Abidi et al, 2004a; Abidi et al, 2006). Therefore, we argue that there is both a case and the need to design information services that take into account the individuality of information seekers, and in turn aim to *personalize* their information seeking experiences and outcomes (Belkin et al, 1992; Abidi, 2002; Fink et al, 2002; Shahabi et al, 2003; Brusilovsky et al, 2006).

Intelligent Information Personalization can be defined as the dynamic and intelligent *adaptation* of generic information based on salient user characteristics—such as the user's demographics, knowledge, skills, persona, interests, taste, preferences, purpose, needs, goals, plans, behavioural attitudes and any other user-specific criteria—to effectuate a personalized information mediation experience for the user. Information Personalization (IP) activities aim to: (a) minimize the cognitive stress typically faced by users due to information overload; (b) improve the potential uptake of the information by the user; and (c) establish an implicit *trust* relationship between the user and the information service. IP involves two key activities: (i) a *user modelling* activity to develop a *user model* that characterizes the user in terms of a set of discernible characteristics or features. Each user is described in terms of feature values, such that the aggregation of feature-value pairs realizes a potentially unique user-model; and (ii) an *adaptation* activity that leverages a 'rich' user-model to personalize the information by dynamically modifying the information content, the information presentation style and/or the information composition structure. The adaptation algorithms perform an explicit mapping of the elements of a user model to specific adaptation directives—i.e. they determine that given the presence of certain user-defining features the following information artifacts are to be selected for adaptation, and what elements of the information artifact to adapt and how to adapt it. A key issue for IP is to ensure both the relevance and the util-

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