Chapter I
An Assessment of Human Factors in Adaptive Hypermedia Environments

Nikos Tsianos
National & Kapodistrian University of Athens, Greece

Panagiotis Germanakos
National & Kapodistrian University of Athens, Greece

Zacharias Lekkas
National & Kapodistrian University of Athens, Greece

Constantinos Mourlas
National & Kapodistrian University of Athens, Greece

George Samaras
University of Cyprus, Cyprus

ABSTRACT

The plethora of information and services as well as the complicated nature of most Web structures intensify the navigational difficulties that arise when users navigate their way through this large information space. Personalized services that are highly sensitive to the immediate environment and the goals of the user can alleviate the orientation and presentation difficulties experienced by the relatively diverse user population. User profiles serves as the main component of most Web personalization systems. Main scope of this chapter is to present the various techniques employed by such systems with regards to user profiles extraction and introduce a comprehensive user profile, which includes User Perceptual Preference Characteristics. It further analyzes the main intrinsic users' characteristics like visual, cognitive, and emotional processing parameters incorporated as well as the "traditional" user profile characteristics that together tend to give the most optimized personalization outcome. It finally overviews a Web adaptation and personalization system and presents evaluation results that further support the importance of human factors in the information space.

INTRODUCTION

The unprecedented and constant expansion of the World Wide Web coupled with the obscure and multi-component nature of its structure, result in orientation difficulties, as users often lose sight of the goal of their inquiry, look for stimulating rather than informative material, or even use the navigational features unwisely. As the e-Services sector is rapidly evolving, the need for such Web structures that satisfy the heterogeneous needs of its users is becoming more and more evident.

To alleviate such navigational and presentation difficulties, researchers have put huge amounts of effort to identify the peculiarities of each user group and analyze and design methodologies and systems that could deliver up-to-date adaptive and personalized information, with regards to products or services. Since to date, there has not been a concrete definition of personalization. The many adaptive hypermedia and Web personalization solutions offering personalization features meet an abstract common goal: to provide users with what they want or need without expecting them to ask for it explicitly (Mulvenna et al., 2000). Further consideration and analysis of parameters and contexts such as users intellectuality, mental capabilities, socio-psychological factors, emotional states and attention grabbing strategies, that could affect the apt collection of users' customization requirements offering in return the best adaptive environments to their preferences and demands should be extensively investigated. All these characteristics, along with the "traditional" user characteristics that is, name, age, education, experience, etc., constitute a comprehensive user profile that serves as the ground element of most of these systems.

Some noteworthy, mostly commercial, applications in the area of Web personalization that collects information with various techniques from the users based on which they construct their user profile and further adapt the services content provided, are amongst others the Broadvision's One-To-One, a commercial tool for identification of on-line users; Microsoft's Firefly Passport (developed by the MIT Media Lab); the Macromedia's LikeMinds Preference Server, which identifies behaviours of on-line customers and it further predicts new purchases of a user; Apple's WebObjects, which adapts the content to user preferences, etc. Other, more research oriented systems, include ARCHIMIDES (Bogonicolos et al., 1999), which adapts the raw content based on the structure reorganization of a Web server. The structure is depicted as a semantic tree through of which there is a dynamic selection of the content nodes according to the users' preferences; Proteus (Anderson et.al., 2001), is a system that construct user models using artificial intelligence techniques and adapts the content of a Web site taking into consideration also wireless connections; WBI (Maglio & Barret, 2000; Barret et. al, 1997) and BASAR (Thomas & Fischer, 1997), use static agents for the personalization of the content while other systems employ mobile agents over mobile networks for this purpose, like mPERSONA (Panayiotou & Samaras, 2003). Significant implementations have also been developed in the area of adaptive hypermedia, with regards to the provision of adapted educational content to students using various adaptive hypermedia techniques. Such systems are amongst others, INSPIRE (Papanikolaou et al., 2003), ELM-ART (Weber & Specht, 1997), AHA! (De Bra & Calvi, 1998), Interbook (Brusilovsky et. al., 1998), and so on.

Although one-to-one Web-based content provision may be a functionality of the distant future, user segmentation is a very valuable step in the right direction. User segmentation means that the user population is subdivided, into more or less homogeneous, mutually exclusive subsets of users who share common user profile characteristics enabling the possibility of providing them a more personalized content. The subdivisions could be based on: Demographic characteristics (i.e. age, gender, urban or rural based, region); socio-eco-