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Capturing essential intrinsic user behaviour values for the design of comprehensive web-based personalized environments

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Abstract

Advances in Web-based oriented technologies and services are taking place with a considerable speed around the world. As communications and IT usage become an integral part of many people's lives and the available products and services become more varied and sophisticated, users expect to be able to personalize a service to meet their individual needs and preferences. Due to the heterogeneous users' needs and requirements, user modeling could be considered as a successful step towards the identification of users' preferences. However, could user profiling nowadays be considered complete enough? Are all the vital parameters of users' characteristics are taken into account in order for the Web-based systems to provide them with the most user-centric result? This paper introduces a comprehensive user profiling, incorporating the User Perceptual Preference Characteristics, that serves as the core element for filtering Web-based raw content. It further analyzes the main intrinsic users' characteristics like visual, cognitive, and emotional processing parameters as well as the ''traditional'' user profiling characteristics that together tend to give the most optimized, adapted and personalized result. It finally presents initial experimental results applied on the Educational field based on the abovementioned notions.

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1. Introduction

The explosive growth in the size and use of the World Wide Web as well as the complicated nature of most Web structures may lead 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. To alleviate such navigational difficulties, researchers have put huge amounts of effort to identify the peculiarities of each user group and design methodologies and systems that could deliver an adapted and personalized web-content.

Challenges therefore range not only on adapting to the heterogeneous user needs and user environment issues such as current location and time (Panayiotou & Samaras, 2004), but also on a number of other considerations with respect to multi-channel delivery of the applications concerning Web-based content related to services, educational multimedia, entertainment, commerce etc. To this end, personalization techniques exploit Artificial Intelligence, agent-based, and real-time paradigms to give presentation and navigation solutions to the growing user demands and preferences. To this date, there has not been a concrete definition of personalization. However, many solutions offering personalisation features meet an abstract common goal: to provide users with what they want or need without expecting them to ask for it explicitly (Mulvenna, Anand, & Buchner, 2000). In addition, a complete definition of personalization should include parameters and contexts such as user intellectuality, mental capabilities, socio-psychological factors, emotional states and attention grapping strategies, since these could affect the apt collection of users' customization requirements, offering in return the best adaptive environments to the user preferences and demands.

This paper emphasizes on the adaptation of Web-based content delivery, investigating adaptation and personalization considerations with regards to new user requirements and demands. It analyzes the significance and peculiarities of the user profiling for providing a personalized Web-based result, introducing a comprehensive user profiling that incorporates intrinsic user characteristics such as user perceptual preferences (visual, cognitive and emotional processing parameters), on top of the ''traditional'' ones (such as name, age, education etc.). Lastly, it presents results of experiments taken place at the Laboratory of New Technologies of the University of Athens with regards to Web-based educational content delivery based on specific cognitive styles.

2. Comprehensive user requirements and the personalization problem

''To struggle against the amplification of the digital divide and therefore to think 'user interaction' whatever the age, income, education, experience, and the social condition of the citizen'' (Europe's Information Society, 2007).

The specific theme above reveals exactly the need for user centered content delivery in a personalized and adaptive manner. In many ways, the new technology provides greater opportunities for access. However, there are important problems in determining precisely