Chapter 6
Web Usage Based Adaptive Systems

Pablo Loyola Heufemann, Jorge Gaete Villegas, and In-Young Ko

Abstract. The Internet is becoming an important tool for the realization of day-to-day activities, which leads to a new level of interaction between users and software systems. This new scenario presents endless opportunities as well as enormous challenges. In order to tackle these, user-adaptive software systems have been recently used. These technologies aim to allow computer systems to dynamically modify their content, structure and presentation for better delivery of the available resources, while considering the user’s interest and behavior, and most recently, mobile environments. This chapter overviews the newest technologies in the area of user-adaptive software systems applied to Web environments and proposes a set of directions for the future development of Web Usage Based Adaptive Systems in the new Internet environments.

6.1 Introduction

Web Usage Based Adaptive Systems aim to allow computer systems to dynamically modify their interfaces for better presentation of the available content in
consideration of the user’s interest, past behavior, and abilities \[2\] as well as, most recently, in consideration of mobile environments \[4\], and human-related processing capabilities \[9\].

Adaptation is presented in the literature as the output of a clearly characterized process described by its inputs, outputs and transformation methods \[25\]. Adaptation, then, is the outcome of the interaction between three models taking into account the users and the system’s resources and transformation strategies and functions. In the following chapter, this process will be explained by describing these models, namely the Domain Model (system’s resources), User Model and Transformation Model.

The second section of this chapter overviews these models by describing them and by presenting the interaction between them. The third section focuses on how adaptation is accomplished, by providing the state-of-the-art in adaptation techniques. Finally, given the importance of privacy issues in the future internet context, a legal issues section has been added in order to give a wider understanding of all the aspects involved when personalization is intended.

6.1.1 An Overview on Web Usage Based Adaptive Systems

As Web technology allows companies to exploit the advantages of providing services and aiding customers via the Internet, common users have closer and more frequent interaction with software systems. This represents endless opportunities as well as enormous challenges.

From the system’s point of view, the challenges are related with the issue of supporting the heterogeneous needs of many users. From the user’s point of view, the speed at which new information is being produced and services offered can be overwhelming. Complex software systems are being developed to avoid the limitations of the “one-size-fits-all” \[9\] approach and to effectively support users in their activities by taking advantage of the resources available on the web.

We refer to such software systems as “Web Usage Based Adaptive System”. Such systems are defined in this chapter as software systems in the web domain that are able to modify their structure and content based on how users interact with them. The two major features of these systems are user internalization into the system and the use of resources and data available on the web.

The user is taken into account by a user model in the system design, while the source of resources are the Internet, web browsers and the Internet of things. Web Usage Based Adaptive System usage is extensible to any software system that needs to interact with users on the web, and for which personalization is required. Web Usage Based Adaptive System usage can be found in multiple areas as e-learning, e-commerce, community websites, tourism, medicine, and information retrieval, etc.