Chapter 16

Evaluating Usage of Dynamic Web Site Structures through Visualisation

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Abstract

Web-based content is increasingly delivered via dynamic methods. Visualisation tools are required which reveal how users interact with such data structures in order to improve site design and structure, and to form the basis of adaptation rules. Using our DMASC system we describe a method for logging and visualising individual user paths through a database-driven Web site. We outline the visualisation challenges posed in representing dynamic data structures and representations of user movements within those structures. We introduce two new terms to describe approaches to visualising dynamic structures, template structure and served structure. We present a series of maps generated from real usage data and, through these, identify anticipated and unanticipated surf patterns. Through the presentation of case study material, we argue that visualisations are a useful part of good adaptive multimedia strategies and help form user model attributes.

Introduction

This chapter seeks to demonstrate the value of a broad approach to adaptive system design, incorporating accurate data capture and visualisations of user movements through Web sites. The system we present may be used early in the life cycle of the development of an adaptive system, both as a means of establishing a user model component and for evaluating the success of existing adaptive systems. We are concerned here with investigating how Web structures are navigated, in order to ultimately improve system design.

Typically, an adaptive hypermedia system:

- includes a domain model composed of a set of elementary pieces of knowledge and their relationships in information space,

- maintains a user model that records individual user properties, and

- is able to adapt some visual or functional parts of the system according to the user model.

    (Ekland & Brusilovsky, 1998)

The user model, therefore, is a crucial component of any adaptive system and has to be based on accurate data, preferably logged by non-invasive means (Chan, 2000). Typically a user model for a Web-based adaptive system consists of user information such as pages visited, content consumed, expertise level, declared interests, and search strategies (Chi & Card,1999; Chan, 2000) — some achieved through algorithmic calculations, others through questioning actual users. None of these components enable us to improve the actual structure of a site beyond the addition of 'more convenient' links on particular pages, and none inform the evaluator about the success or failure of the navigation scheme. In this chapter we show that accurate user movement capture and analysis can be a useful initial process in establishing a user model. Here we present a means by which user movements through Web sites can be accurately logged in a non-intrusive manner. Issues of server access log accuracy are discussed in this chapter, together with our alternative method for logging user movement.

User models can be constructed using a variety of methods, including Bayesian networks, machine learning, overlay methods, and stereotype methods, with rules initially declared and subsequently controlled by computer scientists and programmers. We argue that, in addition, there is room for another type of adaptation ruling, declared and controlled by the designer or Web administrator. In order for this to occur, we have to present user model data, in this case, user movements, in such a way for designers to easily understand them, analyse them, and subsequently form adaptation rulings from them.

This chapter outlines a new system for visualising user paths through Web sites, in order to facilitate understanding of user behaviour. A method is presented below by which designers can identify individual user movements through Web sites and, through this,

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