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## Chapter 2

# Site Structure and User Navigation: Models, Measures, and Methods

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## Abstract

*The analysis of the structure of Web sites and patterns of user navigation through these sites is gaining attention from different disciplines, as it enables unobtrusive discovery of user needs. In this chapter we give an overview of models, measures, and methods that can be used for analysis purposes as well as for user-adaptive navigation support. Specific attention is given to the problem of identifying users getting lost. We conclude with a discussion on various personalised navigation aids that benefit from the techniques presented in this chapter.*

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## Introduction

At first sight, surfing the Internet is a relatively easy task. However, Web users frequently report being frustrated because they cannot find what they are looking for (Lazar, Bessiere, Ceaparu, Robinson, & Shneiderman, 2003). Web sites allow users to access the information they need in the order they prefer (Chen & Macredie, 2002). This

freedom comes at a price, though, as users must invest effort to keep track of their locations. This will cause few problems in sites that a user is already familiar with; most people will not get lost in their hometown either. In many cases users will find their way in unfamiliar sites as well, making use of their previous browsing experiences and knowledge about the domain; most experienced drivers will not have too much trouble driving all the way from Amsterdam to Rome, even if they have not done that before. However, if users fail to understand the way a site is structured, they will most likely not succeed in finding the things they are interested in. Most people will end up getting lost when dropped in a big forest with poorly indicated trails, especially if they do not walk forests on a regular basis.

Most larger Web sites can be compared with forests, offering many trails that can be followed and that intersect quite often. Each page offers a number of choices where to go to, which means that users continuously need to (Thüring, Hanneman, & Haake, 1995):

- identify their current position in the Web site,
- reconstruct the way that led to this position, and
- distinguish among different options for moving on from this position.

When users fail to do so, they might arrive at a particular page and forget what was to be done there, they might neglect to return from interesting sidetracks, or they might miss some pages that contain relevant information. In hypermedia research, this phenomenon is called the problem of users getting *lost in hyperspace* (Otter & Johnson, 2001).

Fortunately, most Web sites offer navigation support that helps the users in keeping track of their positions. These so-called *contextual navigation aids* — such as menus, index pages, and site maps — not only enable users to navigate, but they reveal elements of the site structure as well, therewith allowing the users to establish a sense of their current location. As will become clear at the end of this chapter, many different forms of context information can be thought of, each addressing different user needs. However, too many navigation aids will clutter the screen and confuse the user (Park & Kim, 2000). For this reason, it is important that users are provided with those navigation aids that support them in understanding the site structure, and that less helpful navigation aids are omitted (Thüring, Hanneman, & Haake, 1995). Adaptive navigation support is an answer to this problem. With knowledge of the users' navigation behaviour and interests, navigation support can be customised to their specific and individual needs (Eirinaki & Vazirgiannis, 2003).

One way to discover user needs is to gather them explicitly, for example through online questionnaires. As an alternative that does not ask extra effort from the user, the analysis of user navigation paths is receiving more and more attention from both the research community (McEneaney, 2001) and the e-commerce community (Rozanski, Bollman, & Lipman, 2001). However, at the moment of writing, claims of success have been limited. One reason for the limited success is that the content and structure of sites have been overlooked (Cooley, 2003).

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