Chapter IV
Adaptive User Profiles

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ABSTRACT

A major opportunity for collaborative knowledge management is the construction of user models which can be exploited to provide relevant, personalized, and context-sensitive information delivery. Yet traditional approaches to user profiles rely on explicit, brittle models that go out of date very quickly, lack relevance, and have few natural connections to related models. In this chapter the authors show how it is possible to create adaptive user profiles without any explicit input at all. Rather, leveraging implicit behaviour on social information networks, the authors can create profiles that are both adaptive and socially connective. Such profiles can help provide personalized access to enterprise resources and help identify other people with related interests.

INTRODUCTION

There are many ways to deal with the challenges of collaborative knowledge management and discovery within enterprises. This chapter focuses on personalized, adaptive approaches, leveraging user behaviour on social information systems.

A major challenge for enterprise information systems is presenting the information that users want in a way that makes sense to them. In traditional approaches to information filtering, the user has to explicitly create his or her profile, and manually keep the profile up to date. Can we take advantage of the popularity of collaborative tagging systems, such as delicious.com or flickr.com, and use the recorded tagging behaviour to construct implicit, yet realistic and dynamic user profiles?
The use of profiles for personalization is not new, but such systems typically rely on an explicit, manually entered user profile. This imposes a burden on the user, both at initial creation time, and more importantly over time as the user’s skills and interests change, so the profile has to be updated. Typically, the created user profiles go out of date, fast.

Of course, this problem has been well understood for decades and much research has focused on the possibility of creating implicit user profiles. Put simply, such approaches attempt to ‘look over the user’s shoulder’ so to speak, and create a profile out of normal behaviour. The advantage with these approaches is that the mined profile should evolve simply and naturally with ongoing changes in user behaviour patterns.

There are some drawbacks with these approaches. It is, for example, difficult to mine accurate user profiles from observed behaviour. Another problem is dealing with the changing nature of user interests. How can one distinguish between long term characteristics (as for example defined by a user’s profession), medium term interests (such as ruby or agile_management for software engineers), and transient foci of attention (this year’s holiday planning, news articles)? How does one choose the right level of ‘forgetfulness’ in the user’s profile? A more subtle problem is that implicit user profiles are not examinable, or *scrutable*. Without some control over their profiles, users are likely to become distrustful of systems that use these profiles, particularly if they make egregious errors. While users do not want to spend excessive time doing ‘profile gardening’, they would like the facility to examine and tweak the profiles to correct errors or to proactively direct the system. A related issue is that of privacy: certainly on the public Internet, users are increasingly wary of the amount of information that is being gathered without their explicit consent.

So we are in a situation where we would like to generate realistic, dynamic user profiles which are scrutable and privacy preserving. Where can we find such profiles? This chapter is primarily concerned with collaborative tagging systems, but this is just one possibility. Many of the principles discussed in this chapter are equally applicable to any system that a user interacts with on a regular basis. The use of folders in email, web browsing and document management is one possibility. User queries, both on the intra/internet and to enterprise systems, are another. Communities of interest, such as forums and mailing lists, provide yet another rich source of user behaviour to observe and to mine.

The basic operation of collaborative tagging systems is very simple. Users annotate a resource of interest, often a web page, with an arbitrary number of free text tags. These tags, personal or communal, can be used to browse a community’s resources, both documents and people. The popularity of such systems provides a useful store of personally identifiable user behaviour which can be used to create implicit user profiles. In this chapter we will survey related work on user profiles. Then, taking collaborative tagging systems as an exemplar of a source from which we can construct user profiles, we will present

1. algorithms for creating such profiles
2. approaches to profile analysis and evaluation
3. methods for dynamic visualization of the generated profiles
4. a discussion of the potentials of using such profiles for personalized access to enterprise data sources.

**User Profiles**

Both academia (Gauch et al, 2007) and enterprises (Karat et al, 2003) have experimented with user profiles for personalization. Indeed, user profiling is a prominent feature of many modern content management systems like Microsoft Office Sharepoint Server¹. The trouble with such systems,
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