Chapter 2.10
Trust-Aware Recommender Systems for Open and Mobile Virtual Communities

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ABSTRACT

This chapter surveys and discusses relevant works in the intersection among trust, recommendations systems, virtual communities, and agent-based systems. The target of the chapter is showing how, thanks to the use of trust-based solutions and artificial intelligent solutions like that understanding agents-based systems, the traditional recommender systems can improve the quality of their predictions. Moreover, when implemented as open multi-agent systems, trust-based recommender systems can efficiently support users of mobile virtual communities in searching for places, information, and items of interest.

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VIRTUAL COMMUNITIES

A virtual community, e-community, or online community is "a group of people that primarily interact via communication media such as newsletters, telephone, email or instant messages rather than face to face, for social, professional, educational or other purposes" (cf. Wikipedia). According to Preece (2000), who has suggested a definition that is broad enough to cover a wide range of communities but precise enough to fit into social science definitions, an on-line community consists of the following elements:

- Socially interacting people, performing special roles or satisfying their needs.
- A purpose, which is the reason behind the community.

- Policies to govern people interaction.
- Computer Systems that support social interaction.

Other authors have additionally distinguished four different types of communities: Competing Communities, Cooperative Communities, Goal-oriented Communities, and Ad Hoc Communities (Rana et al., 2005). El Morr and Kawash (2007) have proposed a more general classification based on three factors: Degree of virtualisation (physical/virtual), Degree of mobility (still/mobile), and Degree of cooperation (notification/collaboration). Following this last classification, this chapter focuses in cooperative and mobile virtual communities.

This chapter focuses also in open communities, which means that members can freely join and leave at any time. The members of an open community can represent different stakeholders with different aims and objectives. Examples of open communities are the Grid (Foster et al., 2001), the Semantic Web (Berners-Lee et al., 2001), the Virtual Organizations (Norman et al., 2004), the Open Agent Architecture (Cheyer & Martin, 2001), e-commerce environments (He et al., 2003), and peer-to-peer networks like for example, Gnutella[1]. According to Preece (2000), the success of open communities depends on their degree of sociability and usability. Many factors affect the degree of sociability and usability; the following list comments the most known:

- **Policies, Privacy, and Trust:** These three elements are necessary to ensure a good reputation for a community, which is a major criterion in attracting new members and convincing existing members to stay in the community.
- **Anonymity:** To limit anonymity of members may increase the sense of responsibility among them and help to establish a notion of reputation and trust in the community (Kawash et al., 2007).
- **Critical Mass:** The number of members is an important issue for the sociability of the community. The size of a community should be significant so that members are more likely to see their requests fulfilled; it is also a prominent factor for attracting new members and retaining existing ones.
- **Presence and Maintenance:** The continual presence is an important feature in all online services: a non-interrupted on-line presence of members is a symptom of wellness of the community. It may be also a criterion to assess the usability.
- **Simplicity:** This factor mainly suggests easy to use interfaces. Indeed, navigating the software that implements the community and using its features should be as simple as possible in order to guarantee better usability for the community.

Another factor that has an impact on the sociability of a community is the number of lurkers, the community's passive members (Elinor, 1990). The ratio of lurkers in on-line communities can range from 40% to 80% (Nonnecke & Preece, 2000). Although a small number of lurkers do not imply a high sociability, a large number of lurkers may compromise the success of the community.

Sharing Rating and Recommendations

One common application for virtual communities is providing and sharing ratings. A rating, in general, is an evaluation or an assessment of something in terms of quality. Ratings are common in e-commerce to evaluate on-line buyers and sellers. In Amazon (www.amazon.com), for example, buyers can leave their ratings after a transaction has taken place; the ratings express an evaluation of the quality of the services as the buyers have experienced.

In addition to provide a feedback to the community of users, ratings are also processed by