Recommending people to people: the nature of reciprocal recommenders with a case study in online dating

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Received: 28 June 2011 / Accepted in revised form: 10 July 2012 / Published online: 10 August 2012
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Abstract People-to-people recommenders constitute an important class of recommender systems. Examples include online dating, where people have the common goal of finding a partner, and employment websites where one group of users needs to find a job (employer) and another group needs to find an employee. People-to-people recommenders differ from the traditional items-to-people recommenders as they must satisfy both parties; we call this type of recommender reciprocal. This article is the first to present a comprehensive view of this important recommender class. We first identify the characteristics of reciprocal recommenders and compare them with traditional recommenders, which are widely used in e-commerce websites. We then present a series of studies and evaluations of a content-based reciprocal recommender in the domain of online dating. It uses a large dataset from a major online dating website. We use this case study to illustrate the distinctive requirements of reciprocal recommenders and highlight important challenges, such as the need to avoid bad recommendations since they may make users to feel rejected. Our experiments indicate that, by considering reciprocity, the rate of successful connections can be significantly improved. They also show that, despite the existence of rich explicit profiles, the use of implicit profiles provides more effective recommendations. We conclude with a discussion, linking our work in online dating to the many other domains that require reciprocal recommenders. Our key contributions are the recognition of the reciprocal recommender as an important class of recommender, the identification of its distinctive characteristics and the exploration of how these impact the recommendation process in an extensive case study in the domain of online dating.
Keywords  Recommender systems · Online dating · Reciprocity

1 Introduction

Connecting people with other people is a central task in online social websites. Examples include finding friends, professional contacts, communities and people to follow on social networks; searching for partners and matching people in online dating websites; searching for jobs on employment websites and matching job applicants with employers; searching for mentors and matching mentors with mentees. With the exception of a few tasks such as recommending people to follow on Twitter\(^1\) (Garcia and Amatriain 2010), which focus on information sharing, people-to-people recommendations normally involve creating relationships that are reciprocal. In reciprocal relationships, both parties can express their likes and dislikes and a good match requires satisfying the preferences of both people. For instance, in the process of hiring someone for a job, both the candidate and the company offering the job need to assess each other; deciding whether the candidate is fit for the position and vice-versa.

In online dating, reciprocity is fundamental. Users will build a successful relationship only when both parties are interested in each other. Online dating websites provide the means for people to “meet” others virtually. This is in a safe environment, where they can exchange messages, before both users make the decision to meet each other face-to-face. Online dating is a domain that is attracting more and more users who otherwise would find it hard to meet people; in some cases, this is simply due to people’s busy lifestyle (Reuters 2010).

Reciprocity is a core requirement for systems that are designed to facilitate the establishment of reciprocal connection between people. Reciprocity, however, is a factor that standard information retrieval systems or recommender systems have not accounted for. With a few recent exceptions (Diaz et al. 2010; Pizzato et al. 2010b; Kim et al. 2010; Cai et al. 2011; Malinowski et al. 2006), most recommendation and information retrieval tasks consider one-sided relevance (i.e., whether the user receiving the recommendation has interest in the item being recommended). Although products such as movies and books may have particular target audiences that are more likely to benefit from them (e.g. the movie or book content would be better understood by the target group), sellers do not normally decide who can and cannot buy their products, and the actual products are not entities that care about who purchase them. Therefore, traditional one-sided search or recommendation strategies are sufficient for most of the current e-commerce needs.

In previous work, we first introduced the concept of reciprocal recommenders (Pizzato et al. 2010c). We identified some of their properties, used these to inform the design of a recommender and then evaluated the improvements obtained by taking account of reciprocity (Pizzato et al. 2010b). In this article, we draw upon the understanding we have built from these, and subsequent, studies to characterise the

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\(^{1}\) http://twitter.com.