A social referral appraising mechanism for the e-marketplace

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ABSTRACT

With the popularity of social media, in order to achieve word-of-mouth marketing, many marketers and individual sellers are actively engaged in achieving positive ratings in the e-marketplace. Although many seller review mechanisms have been developed, e-commerce market operators and consumers still face trust fraud issues. Trust is one of the major issues that confuse online purchase activities. In this paper, we develop a social referral mechanism to verify sellers based on the experiences of friends within a buyer's social network. The proposed framework estimates the trust values of sellers from the perspective of the social network in order to stop buyers from making transactions with fraudulent sellers in the online marketplace.

1. Introduction

With the advance of the Internet, social media allows users to seek and share information among them. Customers rate and share experiences on all aspects of electronic commerce (EC), such as the quality of products or services and transaction experiences with vendors (individual sellers or enterprises) [27]. Online reputation is defined as the collective measurement of the trustable ratings given by the members in a community [27] to help other customers select a superior target such as seller, product, service, and shop. In recent years, word-of-mouth (WOM) marketing has become one of the most significant and best-known marketing strategies. In order to use the power of WOM, many marketers pay for high ratings or positive reviews to increase sales. According to the business report provided by Gartner [16], enterprises continue to increase marketing spending on modeling online ratings and reviews. Analysts also predict that approximately 15% of all online ratings and reviews will be fake by 2014, implying that ratings and reviews are purposely modeled by companies.

To facilitate commercial activities, most EC platforms manage trust among buyers and sellers by adopting three-level ratings (positive, neutral, and negative) and opinion feedback. After transactions are completed, buyers can leave their ratings and opinions on sellers. Intuitively, positive and negative ratings would change the trust scores of sellers. However, most existing reputation systems quantify the reputational value of users or items by accumulating rating records without taking the trust concept for raters into account. That is, the overall trust score of a seller is simply calculated by the accumulation of rating records. Although many seller review mechanisms have been developed, EC market operators are still facing a trust fraud challenge. For example, fraudulent sellers on eBay enhance their reputations by trading positive seller ratings [6,11]. In addition, Zhang et al. [55] use the Taobao, which is now in the prime position in China's EC market, as an example to present the generations of development of trust fraud techniques for faking the trustworthiness of sellers. This means that trust fraud issues have existed for many years and put buyers at the risk of making transactions with fraudulent sellers. Therefore, it is necessary to define and measure the seller's reputation by considering the trustworthiness of raters, which makes the online rating system more reliable for buyers. In other words, how to design a referral mechanism to effectively overcome the phenomenon and diminish this effect of feedback manipulation by sellers is an important issue.

Nielsen [38] shows that approximately 70% of consumers trust online product reviews. At the same time, the report also shows that 92% of consumers trust the reviews and recommendations of their friends and family members. Trust is one of the major issues that confuse online purchases because of distrust [36]. The plausibility of the evaluation of reputation of sellers provided by the public evaluation system on the EC platform is one of the major concerns of buyers when they want to make an online transaction. In order to increase sales, sellers may attempt to improve their reputations. For example, sellers on eBay may launch an auction at a very low price and include some specific words, for example

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"feedback," in the title or product description, which hints at positive feedback [6,11]. It was easy and cheap to manipulate the trust values until eBay prohibited sellers from including any words when they raised auctions [13]. Another example is Taobao in China, where a third-party platform emerged to help sellers obtain positive feedback ratings at the end of 2006 [54]. A seller purposely sells a product at a low price (e.g., RMB 10) and publishes the offer on a third-party platform, and then the platform deducts RMB 10 from the seller. One registered member of the platform would purchase the product, confirm the receipt of the product, and offer a positive rating on Taobao. Finally, the third-party platform would transfer RMB 10 to this member. Currently, because fraudulent sellers manipulate fraud in careful and secret ways [4,55], fraud strategies are very hard to detect. The aim of this research is to use the power of social networks of specific buyers to help them prevent trust fraud issues in the online marketplace.

In this research, instead of merely relying on the feedback from the public, which is possibly manipulated by sellers, we use the opinions expressed by the close and trusted friends extracted from a buyer's social network to build a new reputation system – a social referral mechanism (SRM). Most existing public reputation systems aggregate the evaluations of sellers without taking the trustworthiness of the evaluators into consideration. The proposed framework identifies the feedback given by trustworthy evaluators (i.e., friends) to evaluate the credibility of sellers and to avoid the risk of loss on purchasing a product from a bad seller, who may have a good public reputation. Further, from a practical perspective, to our knowledge, most social network-based EC mechanisms focus on the evaluation of products rather than on sellers. Therefore, it would be helpful to consumers and expedite EC activities if a more plausible seller evaluation mechanism could be equipped in the electronic market. In this paper, we aim to develop an SRM to verify the credibility of sellers based on the experiences of friends within a buyer's social network.

The remainder of this paper is organized as follows. The basic concepts and literature related to our research topics are provided in Section 2. In Section 3, we present the social referral model combined with social tie analysis and expertise level analysis. Section 4 describes the processes of the experiment and discusses the empirical results. Section 5 provides several concluding remarks and future research directions.

2. Literature review

2.1. Social referral

In the new world of consumer-driven content and reliance of customers on the recommendations of others, the referral engine prescribes an approach to generate and harness customer WOM for competitive advantage [48]. Product-buying decisions of customers are influenced by friends. In EC, most applications of social referral programs are used for end-to-end marketing strategies. For example, Buzz Referrals [7] is an interactive marketing agency focused on referral marketing and email acquisition. Referral Rock [43] is an online customer referral service for small businesses, which could build a customer referral marketing program in

minutes and get more referrals. Discovering influential social nodes for expediting the diffusion of marketing information is a common referral program [12,29]. For example, Cho et al. [9] take diffusion speed and the cumulative number of adopters into account to select the opinion leaders from a social network for marketing. Kiss and Bichler [29] provide a wide review of the general centrality measures used to select influencers from customer networks for online marketing. Recommender systems are another usage of social referral programs. Kautz et al. [28] combine social networks and collaborative filtering (CF) to recommend personalized experts and generate referral paths from a user to a recommended expert. Amin et al. [1] leverage the connections between users and their reputations to generate content recommendations. It is much more effective if content providers generate recommendations according to the reputation information consolidated from the social networks of target users [2,34]. In this paper, we develop an SRM to verify the credibility of sellers according to the experiences of friends within a buyer's social network. The proposed framework estimates the trust values of sellers from the perspective of the social network in order to stop buyers from making transactions with fraudulent sellers in the online marketplace.

2.2. Source credibility theory

Credibility refers to a person's perception of the truth of a piece of information. Source credibility theory has been proposed in WOM communication studies of consumer psychology and marketing [14,45,46]. For decades, marketers, professionals, and researchers of various fields have found that if information is given by a high credibility source, it has a higher impact on changing the beliefs, attitudes, or behaviors of the audience [42]. According to source credibility theory, the credibility of an information source has been commonly identified to consist of expertise, trustworthiness, co-orientation, and attraction [10,14,24,42,48]. Each factor is described in Table 1.

The basic idea of the trust and reputation system is to derive a score for users. The concept of source credibility theory is commonly used for building collaborative systems. Kwon et al. [30] employ the credibility attributes of expertise and calculate the similarity between users to estimate the trust for building a collaborative neighbor selection recommendation. Cho et al. [10] propose a collaborative reputation system based on expertise and co-orientation factors to compute a trust score. Xiong and Liu [52,53] use feedback records, similarity, and the relational context to compare the trustworthiness of peers. The aim of this research is to appropriately quantify each credibility factor for raters to adjust an online reputation system and make it more reliable for users. This is expected to decrease transaction risk for buyers.

2.3. Social network and recency, frequency, and monetary (**RFM**) *analysis*

Social network analysis is one of the most important mathematical and graphical analyses for identifying tie strength by investigating social interactions. The connections between

Table 1
The key factor descriptions of source credibility theory.

Factor	Description
Attractiveness	The extent to which a source elicits positive feelings from audience members, such as a desire to emulate the source in some way
Expertise	The extent to which a source is perceived as being capable of providing correct information
Co-orientation	The degree to which a source is similar to the target audience members or is depicted as having similar problems or other characteristics relating to the use of a
Trustworthiness	The degree to which a source is perceived of as providing information that reflects the source's actual feelings or opinions