E-COMMERCE REVIEWS BASED ON SENTIMENT SIMILARITY ANALYSIS FROM TRUST USERS

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Abstract—Consumers' reviews in E-commerce systems are usually treated as the important resources that reflect user's experience, feelings, and willingness to purchase items. All this information may involve consumers' views on things that can express interest, sentiments, and opinions. Many sorts of research have demonstrated that people are more likely to trust each other with the same attitude toward similar things. In this paper, I consider seeking and accepting sentiments and suggestions in E-commerce systems somewhat implies a form of trust between consumers during shopping. Following this view of point, an E-commerce system reviews mining oriented sentiment similarity analysis approach is put forward to exploring users' similarity and their trust. I divide the trust into two categories, namely direct trust, and propagation of trust, which represents a trust relationship between two individuals. The direct trust degree is obtained from sentiment similarity, and I present an entity-sentiment word pair mining method for similarity feature extraction. The propagation of trust is calculated according to the transitivity feature. Utilizing the proposed trust representation model, I use the shortest path to describe the tightness of trust and put forward an improved shortest path algorithm to figure out the propagation trust relationship between users. A large-scale E-commerce website reviews dataset is collected to examine the accuracy of the algorithms and feasibility of the models. The experimental results indicate that the sentiment similarity analysis can be an efficient method to discover trust between users in E-commerce systems.

1. INTRODUCTION

Reviews from consumers are very significant data in E-commerce systems. Many online shops have developed reviews system for users to post their reviews. With the quick development of person to person communication media, more and more people will share their feelings, sentiments and suggestions on their purchased items with their friends or even strangers in interpersonal organization applications or E-commerce systems. These reviews can be very useful for people's decision making in many different scenarios, for example, users' preference mining and personalized recommendation [1], [2]. At present, more and more review mining based applications are being applied to make our decision process easier than before. These applications have greatly changed people's behavior patterns, especially in E-commerce activities. For example, when people need to purchase an item, book a hotel or restaurant, they normally request advice from their friends as well as refer to reviews available online. To adjust to this change, many acclaimed E-commerce companies, for example, Amazon, eBay and Taobao (China), have developed well-function consumer review systems.

Online experience from different people can help one make decisions. In this case, people and their experience are required to be trusted by others. It makes sense that we ordinarily request advice from our friends or relatives before we make a decision. Yet, the question is, the reason people are inclined to rely on strangers in cyber space to make decision? Researchers locate an essential reason for that is their absence of trust in companies that they just experience through the web medium [3], [4]. The virtual nature of the web medium challenges conventional understanding of customer trust.

In E-commerce scenario, customers have no possibility to have a face-to-face interaction with a salesman or a direct physical experience with the store and the items they need to purchase. On one hand, their experience is mediated through the web which is a two-dimensional graphical showcase. They for the most part feel somewhat lost and need someone to give them advices. Then again, reviews from consumers who purchase an item have direct physical experiences with it, are seem to be more reliable than vendor's advancements or advertising words.

However, E-commerce websites as a rule accumulate large scale text based reviews which records authentic commentary around one subject or item. Ordinarily, consumers are unable to recognize which reviews can be trusted under so large data. Different consumers can hold different aspects and standpoints in viewing things. And their attitudes, interests, preferences, etc. will fluctuate greatly towards the items or services. Some users give a positive rating because they like certain attributes of the item, while others give a negative rating because they don't like these attributes. Therefore, it is impossible for a consumer to judge whose reviews are suitable and which users can be trusted. The consumers urgently need to be established a trust between other users, which give the reviews he can trusts, provide him with a sentiment reference, and shield the untrusted comments to prevent misleading to the user when he needs to purchase an item [1], [5].

Many researchers have spent a lot of effort on the phenomenon of trust relationship between strangers in E-commerce environment and found an interesting result: people are more ready to confide in the people who are comparative with them in whatever number respects as could be allowed. The similarity factors include the brought items, the sentiment style of reviews, the words used, etc. [6][8]. Here are many studies attempting to explore the relationship between people's common trust and their similarity quantitatively, and find that a solid correlation between both trust and interest similarity [9][12]. Despite the fact that certain relationship between the trust of users and the similarity of users, this relationship isn't an undeniable linear relationship between trust and similarity, and it additionally includes many other influential elements. The most effective method to correctly discover the relationship between trust and similarity actually faces great challenges.

Due to its human-related properties, trust is difficult to be consistently defined or even precisely described. By far most of existing studies focused on trust development and maintenance between customers and companies over time and after repeated experiences. While limited effort is spent on trust between consumers and potential consumers in E-commerce systems. Clearly, in the field of E-commerce reviews, people are more concerned about the credibility of reviews and the trust of user who post the reviews. In my work, I expect to investigate trust between users in E-commerce systems quantitatively by exploring their reviews and evaluations regarding to different commodities, services, businesses, and other related subjects.

Based on sentiment examination of large-scale text reviews in E-commerce website, I center around sentiment similarity between users to establish their trust, which can provide potential help for further implementation of trust related recommendation service.

The rest of the paper is organized as follows. In section II, I described the related works to examination, remembering the existing studies for trust and its calculation, issue of sentiment and similarity investigation, correlations between trust and similarity. In section III, Methodologies system related work, In section IV, a general approach of user direct trust computationis proposed based on sentiment similarity mining. Also,detailed steps of sentiment analysis and users' propagationtrust relation exploration algorithms are described. In section V, Result analysis and output. In sectionVI, In the last section, I conclude the paper anddiscuss with possible points which need to be furthered in thefuture.

II. RELATED WORKS

A. TRUST COMPUTATION

The concept of trust has been studied by researchers all over the world in diverse contexts and from various disciplines, including Economics, Management, Computer Science and Sociology [8], [13], [14]. In the field of economic research, trust is explained from the theory of rational choice, and defined as a rational activity to make a choice of whether to give a trust after careful idea and cost calculation. That is, individuals are inclined to make rational and boosting benefit choices, which is usually called computational trust in existing research work [1].

In trust calculation, Here are two core sorts of trust as direct trust and indirect trust [15]. Trust can be established concurring observations on whether the previous interactions among the subjects, and can be called direct trust. Direct trust is used for reflecting the trustworthiness between direct connected users. Typically, many direct historical interactions data, such as behaviors, reviews, or other various evidences, are used to compute the direct trust degree among users [16], [17]. Dimah explore the potential of social data derived from micro-bloggings as a source of user relevant recommendations. They proposed a methodology ISTS that can exploit two components from online social network: the sentiment orientation in friends posts about certain items and the trust relations between friends [18]. Li and Dai [19] proposed a promising methodology to handle the trust mechanism for P2P network. They let parties rate each other after the completion of exchange, and use the aggregated evaluations of a given gathering to derive a trust score.

B. TRUST AND SIMILARITY

Over the past few years, many works have focused on the relationship analysis between trust and similarity. The similarity analysis based on sentiment has become a significant research way to deal with establish trust relationship. Many studies have indicated that there is profoundly correlation between trust and similarity. They demonstrated that individuals with similarities also have a serious extent of trust in certain areas.

These similarities include interest, content, behavior, etc. Cai-Nicolas Ziegler and J. Golbeck investigated correlations between trust and interest similarity. They established a formal framework for investigating interactions between trust and similarity. They used a mathematical model to compute similarity and presented calculation algorithms for prole and prole similarity. They used two experiments to analyze possible positive correlations between similarity and interpersonal trust. At meanwhile, through the analysis of the data from the Film Trust Web site, the results show that when the similarity of users changes inside a certain range, the trust

between users changes in like manner. This change indicates that a very solid relationship between trust and similarity [10]. Li proposed a node interest similarity based trust model, which took both node interest bias and reputations in each interest domain into consideration, and used interest domain reputation vector to keep up the behaviors of node in specific interest domain. They used interest similarity between nodes to weight domain local trust recommendation [36]. These innovative studies proved that a correlation between trust and similarity, and they had presented the corresponding calculation method.

Golbeck studied the trust and nuanced prole similarity in online social networks. They investigate features of prole similarity and how those relate to the manner in which users determine trust. Through a controlled report, they isolated several favorable to le features beyond overall similarity that affect how much subjects trust a hypothetical user [39]. Hossein proposed a method that employed user similarities to extract trust values with no need of direct evaluating. User similarity is calculated from prole data and shared text by means of text mining techniques [40]. Melika proposed a method that is tried users rating of certain areas to be gathered and the similarity of users or items are measured, and realized and recommended the most suitable and nearest item of user's preference. Then the available way to deal with measure similarity is recommended to the target user and the trusted user will be found [41]. Zhang et al. [42] presented a behavior similarity inspection module to trust inspection as per the behavior similarity rule of the human society and the definition of the mathematic likelihood. Guoming et al. [43] presented a connivance bunch detection trust model based on behavior similarity.

However, a large portion of the existing studies on the relationship between similarity and trust are based on prole similarity calculation, interest or exchange content, and is no research on trust based on sentiment similarity.

C. SENTIMENT SIMILARITY ANALYSIS

The concept of trust has been studied by researchers all over the world in diverse contexts and from various disciplines, including Economics, Management, Computer Science and Sociology [8], [13], [14]. In the field of economic research, trust is explained from the theory of rational choice, and defined as a rational activity to make a choice of whether to give a trust after careful idea and cost calculation. That is, individuals are inclined to make rational and expanding benefit choices, which is usually called computational trust in existing research work [1].

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D. PROBLEMS AND OUR SOLUTIONS

Over the past few years, many works have focused on the relationship analysis between trust and similarity. The similarity analysis based on sentiment has become a significant research way to deal with establish trust relationship. Many studies have demonstrated that there is exceptionally correlation between trust and similarity. They demonstrated that individuals with similarities also have a serious extent of trust in certain areas.

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III. PAPER ORGANIZATION

PROPOSED SYSTEM

In my proposed system we show the utility of sentiment similarity classification in two tasks, namely, Indirect yes/no Question Answer Pairs (IQAPs) Inference, Sentiment Orientation (SO) classification. In IQAPs, the answer of a question-answer pair does not explicitly contain a clear yes or no word, but rather gives information which can be used to infer such an answer. As the second application, I classify the sentiment orientation of words using SO. The SO method is an effective method to classify the sentiment similarity between word pairs at the sense level.
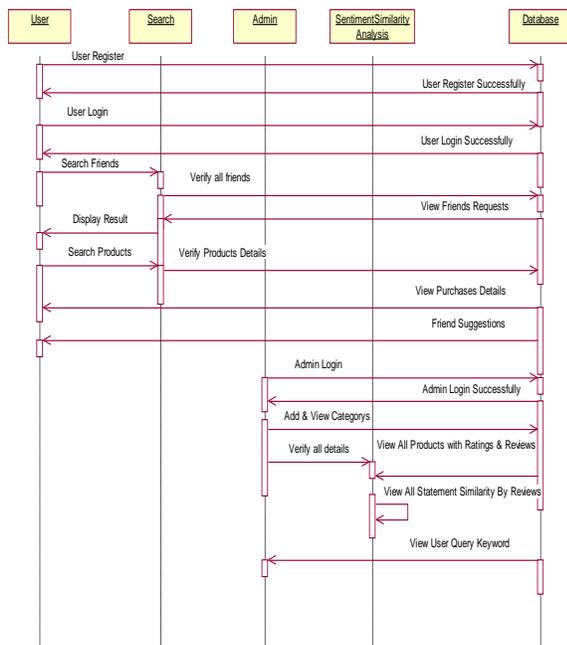

Fig 2.1: Sequence Diagram

METHODOLOGIES
USER INTERFACE DESIGN

In this module I design the web page for the project. These web pages are used for secure login for all users. To connect with server user must give their username and password then only they can able to connect the server. If the user already exits directly can login into the server else user must register their details such as username, password and Email id, into the server. Server will create the account for the entire user to maintain upload and download rate. Name will be set as user id. Logging in is usually used to enter a specific page.

ADMIN

Admin is the second module in this project, where he will be playing a very crucial role in the entire

Admin: His roles and responsibilities in the project are given below in bullet points.

View Authorized users: Where he can see all the registered users.

Add and View Category: He will be adding the products to be sold according to the category.

View All Products with Ratings: All the user purchased products with rating can be seen here

View All Product Reviews: All the user purchased products with reviews can be seen here

View All Statement Similarity by Reviews: Product rating & review according to the sentiment similarity will be sorted here.

View Purchased Products: All products purchased by the users can be seen here.

View User Query Keyword: Most searched keywords by the users will be displayed here for evaluation purpose.

SENTIMENT SIMILARITY ANALYSIS

The methods take the similarity analysis as an important and basic content, which consider the sentiment and emotion as the evaluation factors for trust. Additionally, sentiment and affective similarity analysis have been studied extensively in natural language understanding, data mining and statistical analysis.

Fig. 2.2 Data Mining and Statistical Analysis

USER

In this module all the operation will be done by the user. User has following operations displayed below.

Profile: He can view his profile, and if wants he can update his profile also.

Search Friends: In this module I will be giving a search box for the user where he will be able to search his friends. (If they are registered in the site).

View Friend Request: If any one sends a request to other users present in the site they can see the status here.

View My Friends: All users friends can be viewed here.

**Delete My Friends:** user can delete their friends in this module.

Search Products and Buy: User can search the products which are uploaded by the admin and can purchase them.

View Purchases: All the user purchased goods can be viewed here & he can give review and rating for those products where sentiment similarity will be calculated.

Friend Suggestions: If any friends suggests him any product he can see them here.

ENTITY-SENTIMENT WORD PAIRS EXTRACTION

In entity-sentiment word pair's extraction, the elements typically are things or thing phrases which speak to some specie articles, highlights, or attributes, and so forth. The sentiments are modifiers or intensifiers which express feelings, opinions, or inclinations, and so on. I apply the affiliation rules to extricate often happening things or thing phrases as elements, and I utilize the descriptors or verb modifiers as sentiment which has the nearest data separation to the article.
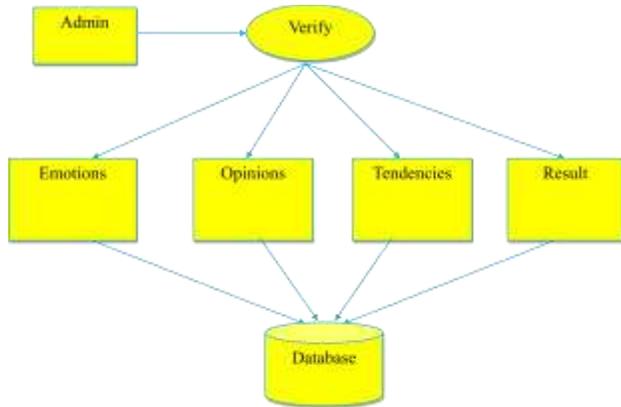
IV. CALCULATION METHOD OF TRUST

A.   ENTITY-SENTIMENT WORD PAIRS EXTRACTION

In entity-sentiment word pair's extraction, the elements ordinarily are things or thing phrases which speak to some particular articles, highlights, or attributes, and so on. The sentiments are descriptive words or modifiers which express feelings, assessments, or propensities, and so on. I apply the affiliation rules to extricate often happening things or thing phrases as elements, and I utilize the descriptive words or qualifiers as sentiment which has the nearest data separation to the article.

The extraction of entity word is accomplished by part-of-discourse labeling. In survey sentences, the property of an entity is generally spoken to by a thing or a thing expression. I utilized the NLProcessor phonetic parser to parse each audit to part message into sentences and to deliver the part-of-discourse tag for each word. NLProcessor yields semantic data by legitimately checking text with XML labels: tokens are spoken to as "W" components, word-class part-of-discourse data is given in their "C" property, thing and action word bunches are set apart as NounGroup and VerbGroup components and sentences are set apart with "S" components. For instance,

```
<S>
```

```
<NounGroup><W CDNNP>Children</W>
</NounGroup>
<VerbGroup><W CDVBZ>love</W>
</VerbGroup>
<NounGroup><W CDNNS>toys></W>
</NounGroup>
</S>
```

The extraction of sentiment word is accomplished by high frequency words showing up in the audits text. For each sentence in the audit dataset, in the event that it contains a successive element, I remove all the descriptive words and verb modifiers. Simultaneously, additionally consider utilizing the current vocabulary of sentiment words, for example, Word Net. On the off chance that the word has a place with the vocabulary, I extricate them as sentiment word however it's anything but a high frequency word in the surveys.

The extraction of entity-sentiment word pairs is executed by the shared data calculation that being existed and ordinarily utilized in data measure field. The common data technique can be utilized to speak to the connection between two sorts of data or proportion of the measurable importance of two arbitrary factors.

Distinctive word pairs in entity-sentiment word pairs are not the same as the sentiment quality communicated, and it is important to portray the level of these word pairs. The level of entity-sentiment word pairs can be estimated by TF-IDF (Term FrequencyInverse Document Frequency) technique [47].

B.   INDIRECT YES/NO QUESTION ANSWER PAIRS (IQAP) INFERENCE AND SENTIMENT ORIENTATION (SO) CLASSIFICATION

In this section I explain how sentiment similarity can be used to perform IQAP inference the sentiment orientation of words respectively. IQAP Inference in IQAPs, the adjectives in the question and its corresponding answer are the main factors to infer yes or no answers. Here employ the association between the adjectives in questions and their answers to interpret the indirect answers. The algorithm I used for this purpose. Note that SS(.,.) indicates sentiment similarity computed by our method. As I discussed before, the positive SS between words means they are sentimentally similar which can vary from weak to strong, this leads to infer weak-yes or strong-yes response that conveys yes. However, negative SS indicates that the words are not sentimentally similar and results in weak/strong-no which leads to the no response.

Sentiment Orientation: My aim to compute more accurate sentiment orientation (SO) using our sentiment similarity method than any other semantic similarity measures.

Input:

SAQ: The adjective in the question of the given IQAP.
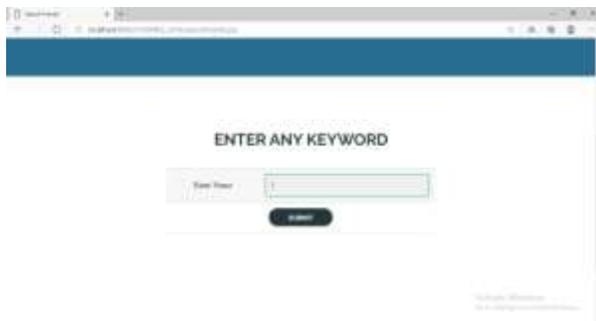
SAA: The adjective in the answer of the given IQAP.

Output:

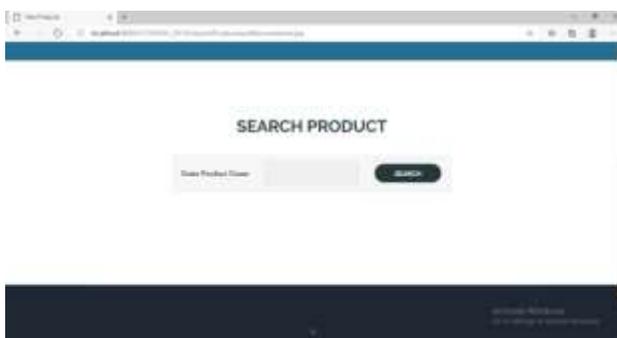answer $\in \{yes, no, uncertain\}$

Algorithm:

1. if *SAQ* or *SAA* are missing from our corpus then
2.   answer=*Uncertain*;
3. else if $SS(SAQ, SAA) < 0$ then
4.   answer=*No*;
5. else if $SS(SAQ, SAA) > 0$ then
6.   answer=*yes*;

Decision procedure of employing sentiment similarity to IQAP inference.

V. RESULT

Fig.5.1 Search key word

Fig.5.1 Search Product

Fig.5.1 Add new category

Fig.5.1 Sentiment similarity result

VI. CONCLUSION AND FUTURE WORK

In my work, I address the problem of mining clients trust in E-commerce framework. By characterizing two sorts of trust relationship, specifically, direct trust and propagation trust, I move the point of exploring trust between clients into calculation of sentiment similitude of their audits. With the assistance of entity-sentiment word pairs mining, sentiment likeness of audits can be determined and direct trust relationships can be obtained through sentiment closeness investigation, which contains of sentiments and appraisals viewpoint. These two angles can be utilized jointly to break down the sentiment direct trust relationship. I set up a gauged trust chart model for propagation trust computing. Propagation trust is the utilization of the propagation qualities of trust. It is a roundabout trust between two clients without direct trust and is obtained through intermediate clients who have direct trust between these two clients. The propagation trust calculation approach depends on the improved shortest path algorithm, and the time complexity is O(V2), where V is the quantity of node in the diagram. An approach to improve the computational complexity of the algorithm is another problem that requirements further examination in light of the fact that the moderately huge number of clients in modern internet business framework.

It very well may be said with conviction that the client's trust relationship can be obtained through the closeness of them. Be that as it may, the client's trust isn't basic normal direct with the client's closeness. How to precisely portray

this relationship will be the focus in further examination. Simultaneously, Here are a few important investigations of sentiment similitude and trust.

Online business field later on: (1) Not every client gives their audits on everything, so the client's surveys information are normally inadequate for a particular thing. how to explore closeness of clients with incredibly inadequate audits information, for example by planning more proficient algorithm to overcome the test; (2) how much people trust others is distinctive for various things.

Under more rigid prerequisites, it is also important to recognize the categories of trust focuses in subtleties. how to incorporate other information, for instance, buy thing category, brand and other exercises, into client sentiment calculation framework and (3) how to incorporate temporal factors to catch clients' comparability change will be the focus of future examination.

In my proposed system further examination show the utility of sentiment similarity classification in two tasks, namely, Indirect yes/no Question Answer Pairs (IQAPs) Inference, Sentiment Orientation (SO) classification. In IQAPs, the answer of a question-answer pair does not explicitly contain a clear yes or no word, but rather gives information which can be used to infer such an answer. As the second application, I classify the sentiment orientation of words using SO. The SO method is an effective method to classify the sentiment similarity between word pairs at the sense level.

REFERENCES

[1] H. Liu, F. Xia, Z. Chen, N. Y. Asabere, J. Ma, and R. Huang, ``TruCom:Exploiting domain-specific trust networks for multicategory item recommendation,''IEEE Syst. J., vol. 11, no. 1, pp. 295304, Mar. 2017.

[2] P.-Y. Hsu, H.-T.Lei, S.-H.Huang, T. H. Liao, Y.-C.o, and C.-C. Lo,``Effects of sentiment on recommendations in social network,'' in ElectronMarkets. Berlin, Germany: Springer, 2018, pp. 110, doi: 10.1007/s12525-018-0314-5.

[3] C. Qin, W. Siyi, and A. Lin, ``The joint beta distribution with refund ratein online C2C trust building: A theoretical study on Taobao,'' in Proc.Int. Conf. E-Learn. E-Technol. Educ. (ICEEE), Lodz, Poland, Sep. 2012,pp. 191196.

[4] S. Kraounakis, I. N. Demetropoulos, A. Michalas, M. S. Obaidat,P. G. Sarigiannidis, and M. D. Louta, ``A robust reputation-based computationaldel for trust establishment in pervasive systems,'' IEEE Syst. J.,vol. 9, no. 3, pp. 878891, Sep. 2015.

[5] P. De Meo, E. Ferrara, D. Rosaci, and G. M. L. Sarné, ``Trust and compactnessin social network groups,'' IEEE Trans. Cybern., vol. 45, no. 2,pp. 205216, Feb. 2015.

[6] M. G. Ozsoy and F. Polat, ``Trust based recommendationsystems,'' in Proc. IEEE/ACM Int. Conf. Adv. Social Netw. Anal.Mining (ASONAM), Niagara Falls, ON, Canada, Aug. 2013,pp. 12671274.

[7] L. Sheugh and S. H. Alizadeh, ``A fuzzy aproach for determination trustthreshold in recommender systems based on social network,'' in Proc.9th Int. Conf. E-Commerce Developing Countries, Focus E-Bus. (ECDC),Isfahan, Iran, Apr. 2015, pp. 15.

[8] Y. Ruan, L. Alfantoukh, and A. Durresi, ``Exploring stock market usingtwitter trust network,'' in Proc. IEEE 29th Int. Conf. Adv. Inf. Netw. Appl.,Gwangiu, South Korea, Mar. 2015, pp. 428433.

[9] C.-N. Ziegler, Social Web Artifacts for Boosting Recommenders, vol. 487.Berlin, Germany: Springer, 2013.

[10] C.-N. Ziegler and J. Golbeck, ``Investigating interactions of trust andinterest similarity,'' Decis. Support Syst., vol. 43, no. 2, pp. 460475,2007.

[11] N. Lathia, S. Hailes, and L. Capra, ``Trust-based collaborative ltering,''in Trust Management II, vol. 263, Y. Karabulut, J. Mitchell, P. Herrmann,and C. D. Jensen, Eds. Boston, MA, USA: Springer, 2008, pp. 119134.

[12] D. H. Alahmadi and X.-J. Zeng, ``ISTS: Implicit social trust and sentimentbased approach to recommender systems,'' Expert Syst. Appl., vol. 42,no. 22, pp. 88408849, 2015.

[13] M. Koufaris and W. Hampton-Sosa, ``The development of initial trustin an online company by new customers,'' Inf. Manage., vol. 41, no. 3,pp. 377397, 2004.

[14] H. Zhong, S. Zhang, Y. Wang, and Y. Shu, ``Study on directed trust graphbased recommendation for E-commerce system,'' Int. J. Comput. Commun.Control, vol, no. 4, pp. 510523, 2014.

[15] M. Li, Y. Xiang, B. Zhang, and Z. Huang, ``A sentiment delivering estimatescheme based on trust chain in mobile social network,'' Mobile Inf. Syst.,vol. 2015, Sep. 2015, Art. no. 745095, doi: 10.1155/2015/745095.

[16] A. Jøsang, R. Ismail, and C. Boyd, ``A survey of trustand reputationsystems for online service provision,''Decision Support Syst., vol. 43,no. 2, pp. 618644, 2007.

[17] B. Zhang, R. Yong, M. Li, J. Pan, and J. Huang, ``Ahybrid trust evaluationframework for E-commerce in online social network: A factorenrichment perspective,'' IEEE Access, vol. 5, pp. 70807096, 2017,doi: 10.1109/ACCESS.2017.2692249.

[18] D. Alahmadi and X.-J. Zeng, ``Improving recommendation using trustand sentiment inference from OSNs,'' Int. J. Knowl. Eng., vol. 1, no. 1,pp. 917, 2015.

[19] Y.-J. Li and Y.-F. Dai, ``Research on trust mechanism for peer-to-peernetwork,'' Chin. J. Comput., vol. 33, no. 3, pp. 390405, 2010.

[20] B. Zhang, Y. Xiang, and Q. Xu, ``Semantics based information trustcomputation and propagation algorithm for semantic Web,'' in Proc. 5thInt. Conf. Wireless Commun., Netw. Mobile Comput., Beijing, China,Sep. 2009, pp. 14.

[21] Y. Sun, Z. Han, and K. J. R. Liu, ``Defense of trust management vulnerabilitiesin distributed networks,'' IEEECommun. Mag., vol. 46, no. 2,pp. 112119, Feb. 2008.

[22] P. H. Andersen and R. Kumar, ``Emotions, trust and relationship developmentin business relationships: A conceptual model for buyersellerdyads,'' Ind. Marketing Manage., vol. 35, no. 4, pp. 522535, 2006.

[23] T. DeWitt, D. T. Nguyen, and R. Marshall, ``Exploring customer loyaltyfollowing service recovery: The mediating effects of trust and emotions,''J. Service Res., vol. 10, no. 3, pp. 269281, 2008.

[24] F. Alam and A. Paul, ``A computational model fortrust and reputationrelationship in social network,'' in Proc.Int. Conf. Recent Trends Inf.Technol. (ICRTIT), Chennai, India, Apr. 2016, pp. 16.