

# Computing Trustworthy Reputation in E-Commerce Environments

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**Abstract-** One of the important new capabilities of the Internet is its bi-directionality. Through the Internet, not only organizations reach audiences of extraordinary scale at a low cost but also for the first time in human history, an individual can make his/her personal thoughts, reactions, and opinions easily accessible to the global community of Internet users. Word-of-mouth is one of the most ancient mechanisms which are being given new significance by this unique property of the Internet. *An online feedback mechanism, also known as trust reputation systems, uses the Internet's bi-directional communication facility in order to artificially engineer large-scale word-of-mouth networks in which individuals share opinions and experiences.*

**Keywords:** Text mining, knowledgebase, TRS.

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## I. INTRODUCTION

Trust is an important aspect in any transactions whether it is done personally or using the modern internet facilities available. In traditional practice, a buyer can often see both the seller and the product. Having verified product's quality, a buyer negotiates with the seller. It is possible for both the parties assess the trustworthiness of the other and for the buyer to be convinced about the product goodness. However in the modern e-commerce context, there is hardly buyer seller interactions and transparency which lack direct trust assessment. A buyer often prefers well-known brands but found reluctant to trust on new arrived or newly introduced sites offering more benefits. There are many issues involved in this thought process right from the quality of product being offered and security provision by the portal with respect to transaction being performed and sensitive information being exchanged. Although many technologies, as cryptography, electronic signatures and certificates helps buyer to make the transaction more secure, but they remain insufficient to build a helpful and trustful influence about a product or a service. As a result, users are not able to conceive a reputation or the product without any additional help.

In such circumstances, a feedback evaluation system can assist buyers to evaluate trustworthiness of product or services being offered so as to boost trustworthiness among a group of participants according to transaction factors and to their historic path in the web transaction. In fact, e-commerce users choose to focus on user's point of view about a product, in order to believe their own trust and reputation experience. Therefore feedbacks, scores and any other information submitted by users are very important and need to be truthful and trustful, because many other ecommerce transactions will be built on them.

For designing feedback evaluation system, experienced people with interesting knowledge on the targeted product/service will be considered. The evaluation system we are proposing will assist user to use security, trustworthiness score and feedbacks associated to any product. Indeed, this system is an essential technique that aim to distinguish malicious interventions of users whose intention is just to falsify the score associated to the product positively or negatively to misguide the online buyers or to defame the reputation of a particular product or service.

## II. RELATED WORK

E-commerce has been growing industry in which buyers and sellers conduct transactions on the internet. Various e-commerce companies such as Amazon.com or e-commerce Web sites such as eBay.com have created filthy profitable businesses. In both e-commerce and e-service applications, a seller's reputation is a big concern for buyers prior to placing an order and making a payment. In the abstract sense, trust is the extent that one party measures that opposite party is willing and able to act in the measuring party's interest [1].

A voting based algorithm is used for generating locally calculated reputation ratings from a semantic network. A mathematical and experimental results show the effectiveness of an algorithm to precisely derive the reputation of a node. TrustMail, an application that uses the network for rating relevant emails [2].

Customer's perceptions will influence the intention to adopt through both psychological routes (i.e. trust in other customers feedback on reputation system) and functional routes (perceived usefulness of the reputation system). An online survey was conducted [3] in which results show that users' perceived information quality and system quality indeed significantly affect their intention to accept the

system, mainly through the functional route, but not significantly through the psychological route.

A user is given weight for his/her recommendation and then redirected to another interface in order to give other users feedbacks to support or not (like/dislike) [4]. This method is used because its intent is to calculate a more trustful score and it consists in calculating a weight for every user recommendation by using the digital certificates.

A personalized recommendation system model [5] based on customer feedback is being developed which focuses on the recommendation algorithm. The system can dynamically adjust the results based on the customer feedback. And then, it improves the overall accuracy of personalized recommendation and the customer satisfaction.

The feedback system analysis has improvised the current system by providing better suggestions to customers in the proposed hybrid model[6]. It has two levels. One is external feedback where the comments are being gathered from outside sources like social media and automobile websites. The other is internal feedback i.e. the feedback is taken from users who have been provided with recommended items. The opinions extracted from such varied comments broaden the system and results.

Tomining e-commerce feedback comments for trust evaluation system propose many different techniques that use a multi-dimensional trust evaluation model, for computing complete trust scores for sellers in e-commerce applications [7]. The system calculates dimension trust scores and the dimension weights. It extracts dimension ratings from feedback comments and to improve the accuracy for mining process by combining natural language processing with opinion mining and summarization techniques in trust evaluation.

### III. RATING SYSTEM AND FEEDBACK APPROACH

Some e-commerce systems use a mutual rating system i.e. after a buyer rates a seller, the seller can rate the buyer as well. However, this could cause buyers to worry about receiving bad ratings if they themselves give a seller a bad rating. The relationship between the rater and the rating receiver is analysed elsewhere. For example, if the rating receiver and the rater are friends, the former might trust the recommended rating. This relationship can form a chain or a graph if multiple parties are involved.

One major obstacle while obtaining trust results is rating noise, which may occur when a friendship or competitor relationship exists between a rater and ratee, leading to low accuracy ratings. For example, if a rater is a friend of the ratee, his or her rating might be high. On the other hand, if the rater is a competitor (or a friend of a competitor) of the ratee, the rating might be low.

Feedback evaluation system design will rely on three tier architecture and an algorithm that will include semantic analysis of a feedback in order to generate most trustful reputation score for a product / service a product since feedbacks affect user's decisions more than numeric scores

alone. The proposed system thus will also be able to improve the selection, storage, generation and classification of textual feedbacks. This proposed algorithm will also calculate and updates the trust score of the user after any participation in the trust evaluation procedure.

An intelligent layer is proposed which displays to each feedback provider, who has already given his recommendation on a product, a collection of prefabricated feedbacks related to the same product. Once the concordance verified, redirect the user to an interface of selected pre-fabricated feedbacks. So as long as we add feedbacks in the data base of origin, a text mining algorithm is going to make pre-fabricated feedbacks with different categories and fill out the knowledge base. The text mining algorithm would contain a part of learning in order to automatically fill out the knowledge base. The user is invited to like or dislike each feedback of the displayed selection. Each feedback has already a degree of trustworthiness which represents the trust degree of the user who is the provider of the feedback.

### IV. SYSTEM ARCHITECTURE

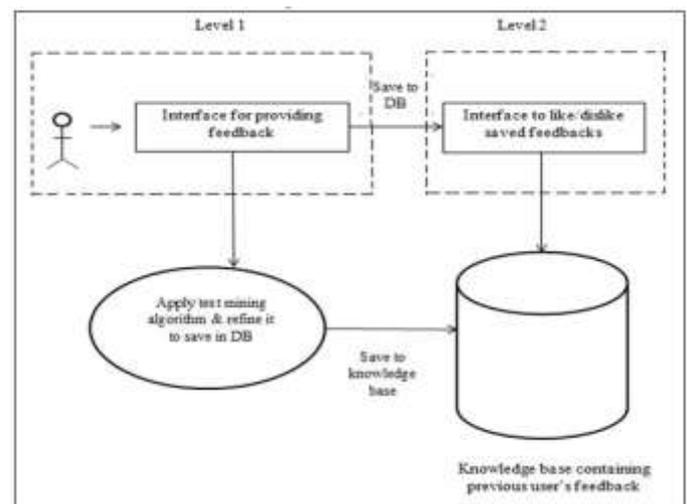


Fig 1: TRS architecture

System work flows are shown in the above architecture diagram.

A proposed model is a coherent adaptive trust model for quantifying and comparing the trustworthiness of feedbacks based on a reputation-based feedback system. There are two main levels of this model. First, reviewer needs to submit his/her feedback to system, after refining the feedback it will be stored in database. In the second level, reviewer is surprised to another interface in which he/she has to like/dislike previous user's comments. Ultimately after comparing all feedbacks provided by reviewer a score will be generated and then stored in database. A score defines how genuine is the feedback submitted by reviewer.

#### Hypothesis about knowledge base

As seen before in the TRS architecture, we need a knowledge base where we can store feedbacks pre-fabricated using users' feedbacks and a text mining

algorithm. Every e-commerce application provide a vast source of information accessible to users, but understandable only to humans. Then, the objective of the knowledge base associated to the text mining algorithm is to automatically collect for each product a number of characteristics and properties which are going to help analyze the meaning of each feedback.

Such a knowledge base would help classify feedbacks by their semantic content, products' categories and properties. Consequently, the knowledge base would enable much more effective retrieval of feedbacks by products' categories etc. With the help of text mining algorithm, we will fill the knowledge base with pre-fabricated feedbacks with different types summarizing other users' feedbacks. We can even choose users' feedbacks which are already summarized and store them directly in the knowledge base.

#### *Proposed reputation algorithm*

Before giving details on the approach of the Reputation algorithm, we will start first with giving an overview on the steps of the algorithm:

1. Verify the similarity between the appreciation (rating) and the textual feedback.
2. Display to the user a selection of the most recent pre-fabricated feedbacks with different types (freshness of feedbacks), if the concordance is verified. This selection of feedbacks is to be liked or dis-liked by the user.
3. Extract data from database concerning the trustworthiness of the liked or disliked feedback and the trust degree of the user.
4. Generate / update the trust degree of the user using the trustworthiness of the feedback and the user's choice (like/dislike).
5. Standardize the trust degree of the user in order to respect the threshold [-10, 10].
6. Generate the global trust score of the product using the user's trust degree as a coefficient.

#### *Extraction of useful data step*

The function "get-infos-click" gets some information in order to calculate the trust degree of the user. The function gets also the previous trust degree of the user if he has already given a rating in the application for instance. The user choices either "like" or "dislike" is an important parameter to determine his trustworthiness. The trustworthiness of the feedback is also needed.

```
Function get-infos-click (intidfeedback) as list
{
doubleFeedtrustworth;
//the feedback trustworthiness stored in knowledg base
// its value is between -10 and 10
```

```
String Userchoice;
// represents the user's choice either it is a "like" or a
"dislike"
String login=get_user_login();

/*to get the user login in order to get his trust degree if he
```

```
had
already done an intervention in the application*/
Feedtrustworth=getfeedtrustworth (idfeedback);

/*this function gets the trustworthiness of the feedback
either
positive or negative value between -10 and 10*/
Double degree_trust_user =get_trust_degree_user (login);
Userchoice=getuserchoice (idfeedback);

// this function get the user choice after the click from
the interface

List listinfos=[Feedtrustworth, Userchoice,
degree_trust_user];
Return listinfos;
}
```

#### *Standardize the trust degree of the user step*

The following algorithm aims to respect the threshold [-10,10]. It applies the trust degree of the user to his feedbacks' trustworthiness.

```
// to respect the threshold [-10;10]
If (Degree_trust_user<-10)
Degree_trust_user=-10;

Else if (Degree_trust_user>10)
Degree_trust_user=10;

Return degree_trust_user;
}

// the end of the function
/* apply the trust degree of the user to the degree of
trustworthiness of his feedback */

Ufeedtrustworth=Degree_trust_user;
```

## V. CONCLUSION AND FUTURE WORK

After considering of user's attitude towards a collection of prefabricated textual feedbacks, we design a Trust Reputation System. We propose a Reputation algorithm attempting to calculate the trust degree of the user according to his subjective choice either "like" or "dislike" and according to the feedback trustworthiness. The proposed reputation algorithm calculates also the global trust reputation score of the product and generates the trustworthiness of the user's given feedback.

In this work, we give some hypotheses concerning a text mining algorithm which is supposed to classify users' feedbacks by categories in a knowledge base and verify the concordance between the given appreciation and the feedback associated to it.

As a perspective, we will relieve these assumptions in our experimental analysis to more extensively evaluate the effectiveness, the robustness and the improvement contribution of our Trust Reputation System.

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REFERENCES

- [1] Steven Tadelis: The Economics of Reputation and Feedback Systems in E-Commerce Marketplaces. Proceedings of IEEE Internet Computing (Volume: 20, Issue: 1), 11 November 2015, pp-12-19.
- [2] J. Golbeck J. Hendler: Inferring Reputation on the Semantic Web. In the proceedings of WWW 2004, May 17-22, 2004, New York, NY USA. ACM.
- [3] S. Komiak: The Effects of Perceived Information Quality and Perceived System Quality on Trust and Adoption of Online Reputation Systems. AMCIS 2010 Proceedings.
- [4] H. Rahimi, H. El bakkali : Toward a New Design of trust reputation System in e-commerce,. In the proceedings of ICMCS (International conference on Multimedia computing and systems, Tangier, Morocco IEEEExplore 2012).
- [5] Hongxia Zhang, Yuan Yang: An E-commerce personalized recommendation system based on customer feedback. Proceedings in the Management and Service Science (MASS), 2011 International Conference, Wuhan, China, 12-14 Aug. 2011.
- [6] Kavinkumar V, R. R. Reddy, Rohit B, Sridhar M, Sridharan K and Dr. D. Venkatraman: A hybrid approach for recommendation system with added feedback component. Proceedings in the Advances in Computing, Communications and Informatics (ICACCI), 2015 International Conference on 10-13 Aug. 2015, Kochi, pp-745 – 752
- [7] YEmayakumaari T, Anathy G: Mining E-commerce feedback comments for trust evaluation. In the proceedings of Engineering and Technology (ICETECH), 2015 IEEE International Conference on 20-20 March 2015. Coimbatore. Pp- 1-5.