A New Reputation Algorithm for Evaluating Trustworthiness in E-Commerce

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***Abstract* — Robust Trust Reputation Systems (TRS) provide actionable information to support relying parties taking the right decision in any electronic transaction. In fact, as security providers in E-services, TRS have to faithfully calculate the most trustworthy score for a targeted product or service. Thus, TRS must rely on a robust architecture and suitable algorithms that are able to select, store, generate and classify scores and feedbacks.**

In this work, we propose a new architecture for TRS in E-commerce application which includes feedbacks' analysis in its treatment of scores. In fact, this architecture is based on an intelligent layer that proposes to each user (i.e. "feedback provider") who has already given his recommendation, a collection of prefabricated feedbacks summarizing other users' textual feedbacks. A proposed algorithm is used by this architecture in order to calculate the trust degree of the user, the feedback's trustworthiness and generates the global reputation score of the product.

Keywords— Trust Reputation System, Security, Algorithms, Feedbacks, Global Reputation Score.

I. INTRODUCTION

Trust is an important factor in any social relationship and especially in commerce transactions. In the e-commerce context, there is a lack of direct trust assessment. Although cryptography, electronic signatures and certificates assist users in order to make the transaction more secure, they remain insufficient to construct a trustful reputation about a product or a service. As a result, users are not able to conceive a reputation for the product without any additional help.

In such circumstances, Trust Reputation Systems (TRS) are solicited in e-commerce applications so as to create trustworthiness, among a group of participants, toward transactions' circumstances, products' characteristics and toward users' passed experiences. In fact, e-commerce users prefer to focus on users' opinions about a product, in order to conceive their own trust and reputation experience. Users believe in their common interest which is to know about the trustworthiness of the transaction and product. Therefore feedbacks or reviews, scores, recommendations and any other information given by users are very important for the trust reputation assessment. However, the reliability of this information needs to be verified.

TRS are indeed essential mechanisms that aim to detect malicious interventions of users whose intention is to falsify the Reputation score of a product positively or negatively. In the literature, there are many works such as that propose algorithms for calculating a reputation or defining a specific set of possible reputations or ratings. However, few of them such as have been devoted to the semantic analysis of textual feedbacks in order to generate a best trust degree of the user.

In contrast to these papers, we analyze the attitude adopted by the user toward specific prefabricated textual feedbacks. This selection of reviews is fabricated thanks to a text mining algorithm which is not detailed in this paper. In fact, the user is going to give his opinion (like/dislike) on those prefabricated feedbacks. Each prefabricated feedback has a degree of trustworthiness. However, hypotheses concerning the text mining algorithm are analyzed in term of availability and realization. In fact, the text mining algorithm is supposed to classify users' feedbacks by categories in a knowledge base depending on their semantic content. The text mining algorithm is supposed to verify also the concordance between the user's appreciation on a product and the review associated to it.

II. LITERATURE SURVEY

Many work such as propose TRS architectures together with different algorithms to calculate the reputation score related to a product. Nevertheless, few research works on TRS has considered the semantic analysis of feedbacks and especially the trust degree of the user in the calculus of products' trust scores.

Even in studies attempting to provide more complex reputation methods such as some issues are still not taken into consideration, such as the inclusion of the trust degree of the user in the calculus of a trustful reputation score for a product, the update of the trust degree of the user "at any intervention", the freshness of the rating and especially the feedback, the concordance between the given rating which is a scalar value and the textual review associated to it.

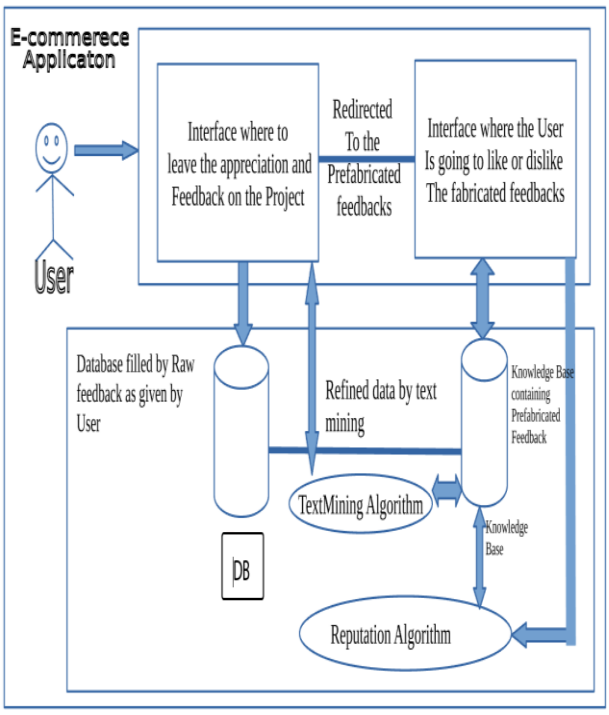
Unlike those TRS, our proposed design treats these issues and uses a reputation algorithm that includes semantic analysis of textual feedbacks in order to calculate the trust degree of the

user. This proposed reputation algorithm calculates also the global reputation score of the product using the trust degree of the user as a coefficient

For example, the authors of propose a method that uses subjective logic in order to analyze trust network (TNA-SL). Hence, this method aims to model in a simple way the relationship between different agents. A single arc means a single trust relationship between two nodes A and B [A: B] meaning that A trusts B. However, this trust should have degrees that can represent how much A trusts B. This issue is not taken into account in the paper. However we should calculate the trust degree of the arc and also the trust degree of the nodes.

In the proposed architecture, for each user who wants to leave a rating (appreciation) and a textual feedback (semantic review), we analyze his attitude toward a number of short and selected feedbacks prefabricated and stored by product in the knowledge base. This user's review is going to be reached by any other user. Then, we suppose that we have a path relaying all the users (the nodes). Any feedback can be an arc between 2 nodes or more. As a result, we need to know the trust degree of the user and determinate the trust degree of the feedback.

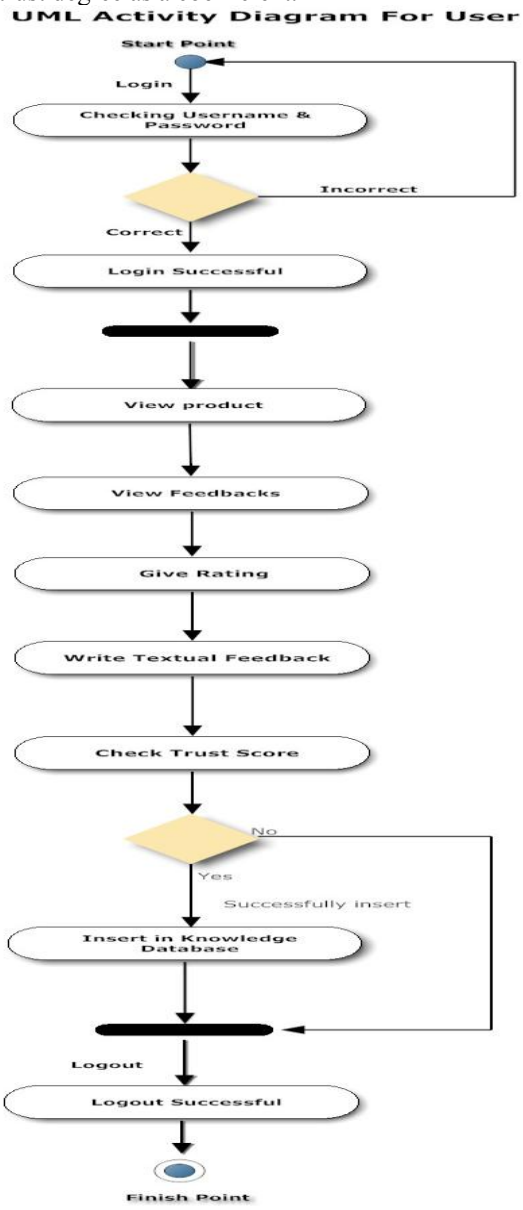
III. SYSTEM ARCHITECTURE



System Architecture Diagram

Algorithm:

1. Verify the concordance between the appreciation 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 data base 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.



Activity Diagram

IV. REQUIREMENT ANALYSIS

Functional Requirements:

- The designing system will immediately help the reviewer to differentiate between the fake and the genuine review.
- The system will help to generate a concordance between rating review and comment section.
- These systems will also a produce a list of spoofed IP's.

Non Functional Requirements:

- Performance – Performance of the system should be maintained.
- Availability – The system should be available to each and every user without any difficulty.
- Reliability – The system should be reliable and it should perform better irrespective of any problems.
- Security - The system should be secure so that the user can use the system without any external disturbances.

V. PROPOSED SYSTEM

At the beginning, the user gives an appreciation (rating) and a textual feedback on a specific product. The TRS need a text mining algorithm which aims to get the given information and verify the concordance between the user's given appreciation and the textual feedback, so as to avoid and eliminate any contradiction.

Once the concordance verified, we 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 (Fig. 1shows the architecture). 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 dis-played selection. Each feedback has already a degree of trustworthiness which represents the trust degree of the user who is the provider of the feedback. The

User can choose the number of short feedbacks like and dislike (min=4 and max=10).

Then the proposed reputation algorithm gets the user's opinion on each review (like/dislike) in addition to the trust worthiness degree of the liked/disliked feedback and uses them to generate a trust degree for the user. The architecture hereafter represents the connection between the e-commerce application and the solicited TRS showing the intervention of both the text mining and the Reputation algorithm.

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