Trust reputation system in E-commerce

In an e-commerce environment where millions of transactions take place between the providers and users, a need for the establishment of the validity of the service provided arises. A customer feedback system has been provided by the marketplace operators in order to fulfill such need. But the feedback generated may not be always relied upon. The feedback may positively or negatively affect its sales, instead of showcasing the actual genuineness of the product or service, in customer's point of view. Our work proposes an enhancement to traditional feedback system by introducing a Trust Reputation System (TRS) which helps to filter out the valid customers using a set of algorithms, thereby creating a trust degree for the user.

The consumers in the online market face the problem of filtering out the best products from a list of a variety of options. There are various marketplace operators who provide a feedback system to help the customer identify quality products, by reviewing the customer opinion and accordingly choose the product. Most of the consumers buy products based on product reviews.

This either negatively or positively affects the sale of the products. Also, this paves a way for spammers for decreasing the sale of the product. To eliminate this, the paper focuses on enhancing the feedback system by introducing the concept of trustworthiness.This can be done through Trust Reputation System. TRS are programs that allow users to rate each other. Using such methods can help decrease the number of spammers, thereby potentially increasing the number of genuine reviews. The advantage of such reviews is it helps in determining the genuineness of the product.

Sentiment analysis has been studied in the wide area of the domain such as movie review, teaching review, product review, e-learning, hotel review and many more. Most scholars focused on quantitative data analysis. However, some studies have been done on qualitative data using sentiment analysis, we found six works that mentioned the idea of using opinion mining and sentiment analysis in education.

Algorithms such as Naive Bayes, k-means and Support Vector Machine are used in opinion classification. The paper also focuses on the truth reputation system. There exists several truth reputation system architectures having different algorithms to calculate the reputation score related to the product.

Many authors have proposed in their work several TRS architectures with different algorithms to calculate reputation score related to the product. Also, a few academic works on Truth

reputation system has been devoted to the inclusion of the semantic analysis of feedbacks in the calculation of the trust score of the product and especially the trust degree of the user. Even in studies attempting to provide more complex reputation methods, some issues are still not taken into consideration, such as the credibility of referees, the update of the trust degree of the user at any intervention, the age of the rating and the feedback or the concordance between the given rating which is a scalar value and the textual feedback associated to it. In contrast to the mentioned TRS, our proposed design overcomes these issues and makes use of an algorithm which includes analysis of textual feedbacks in order to calculate the trust degree of the user giving the feedback and a trustful reputation score for the product.

The consumers in the online market face the problem of filtering out the best reviews or feedback for the purchase of the products. We try to eliminate the problem by listing out the best reviews so that it becomes easy for the customers to decide on a product by analyzing other consumer experiences, by allowing them to post their reviews. Consumers dealing with the online market might sometimes buy substandard products. Though the e-commerce company provides facilities like return and exchange of products, the process becomes a tedious task sometimes. The project aims to provide the costumers an opportunity to select the desired products based on the rating of the item they wish or plan on to buy, which has been evaluated on the basis of rating and reviews contributed by the consumers with the help of a Truth Reputation System (TRS).

The Opinion Mining of our project will be based on Sentiment analysis algorithms & methods and also on Truth Reputation System algorithm.Trust Reputation Systems (TRS) will provide the necessary information to support relying on parties in taking the right decision in an 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 the proposed architecture, for each user who wants to leave a rating (appreciation) and a feedback (semantic review), we analyze the customer's attitude towards a number of short and selected feedbacks 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). As a result, we need to know the trust degree of the user and determine the trust degree of the feedback.[4]

Trust Reputation System Design

A. Algorithm Description

The customer starts by giving a rating and a textual feedback about a specific product. When they click on submit, in order to validate the given information, we are going to redirect the user to another interface showing this message for example: “please give us your opinion about the following feedbacks before validating the information you gave below:” In this interface we will find chosen feedbacks from the database from different types. Those feedbacks can be fabricated in order to summarize numerous users feedbacks stored in the database. The generated feedbacks can be stored in another knowledge base. So as much as we add feedbacks in the ordinary database, we will fill the knowledge database with prefabricated feedbacks using text mining algorithms and tools. However, some users can give already summarized feedbacks that can directly be included in the knowledge database. Indeed, there are many text mining and data mining algorithms and tools that could search the most appropriate feedbacks that are first of all related to the product and that can recapitulate and summarize most of each type of the users? feedbacks.

Actually, before sending the customers feedback and appreciation about the product to the trust reputation system, we have to verify the concordance between them in order to avoid and eliminate contradiction or malicious programs attacking our system. In the redirected interface, we will display several feedbacks from different types. However, the user can specify the number of feedbacks to be liked or disliked. Of course, we can also specify the minimum and the maximum number of feedbacks to be displayed by the user.

In fact, we are trying through this redirection to detect and analyze the user intention behind his intervention on the e-commerce application. Hence, we examine and evaluate his intention using other prefabricated feedbacks with different types. Of course, we have already the trustworthiness of each feedback. Consequently, we use our reputation algorithm studied in section [4.2] in order to generate the user trust degree which plays the role of a coefficient and then rectify his appreciation according to his trust degree and generates the score of the feedback. Indeed, each feedback has trustworthiness in a threshold [-5,5]. The closest is the trustworthiness to 5, the most trustworthy the feedback is. The closest is the trustworthiness to -5, the very untrustworthy is the feedback. If the feedback is trustworthy its score would be included in [0,5] else it would be included in [-5,0].[4]

B. TRS algorithm

Reputation algorithm used in this TRS is using semantic feedbacks analysis in order to generate a trustful reputation score for the product. Actually, we have 3 types of feedbacks:

** Positive feedbacks: represent opinions that expressing a positive point of view about the product. Those ameliorative opinions contain a positive content concerning the product. Then, the adjective positive is referring to the nature of the content of the feedbacks, not its

trustworthiness. However, each feedback whatever is its type can have either a positive trustworthiness or a negative trustworthiness. Either positive trustworthiness or negative one, it is gradual: it has degrees as a float in a threshold of [-5.5].

**Negative feedbacks: represent opinions talking negatively about the product. Logically, the users giving such opinions are not satisfied with the commented product. This feedback could be telling the truth or apart from the truth or could be far from the truth. That's why each feedback has its trustworthiness represented by a float number between -5 and5.

**mitigated feedbacks: represent feedbacks that are talking positively about some aspects of the product and negatively about other aspects. They are also characterized by trustworthiness included in [-5.5].

**contradictions feedbacks: represent feedbacks with a contradiction content, for example, a feedback where the user is not talking about the specified product but another one or he/she is affirming that the camera of a mobile phone is great and later in the same opinion is saying that the camera is very bad. In fact, we have to start by detecting the contradictions feedbacks. Then we are in need of a semantic analysis algorithm and tool that can detect the contradiction in a specific content related to a product. We can personalize the analysis according to the product. For instance, if the user says that "the swimming pool of the hotel which does not afford one is not clean", the algorithm must be able to detect this great contradiction. We can give to the algorithm for each product as an input the property of the algorithm; if there is no similarity we can consider it as a contradiction. But the agreement includes the meaning of course. Because if the customer writes that the negative thing about this hotel is that there is no swimming pool. He is telling the truth then obviously the presence of an absent property in a feedback doesn't mean that there is a contradiction. Actually, before sending the customers feedback and appreciation about the product to the trust reputation system, we have to verify the concordance and the alliance between them so we don't have a contradiction.

After verifying the concordance between the appreciation and the textual feedback we are going to redirect the user to the selection of prefabricated feedbacks. Then the user is going to click on like or dislike according to each feedback. The event of a click will be managed in order to get some information needed in the calculus of the trust degree of the user. The function uses as a parameter the id of the feedback in order to get from Knowledgebase its trustworthiness. We need to get also the previous trust degree of the user if he has been already engaged in a transaction or he has used the application for rating purpose. The user choices either "like" or "dislike" is an important parameter to determine his trustworthiness.[4].

Initially, the user gives a rating and a textual feedback about the purchased product. Then we validate the information provided through an interface. In fact, in this interface, we will find

chosen feedbacks from the database from different types. The feedback can be used to summarize numerous users feedbacks stored in the database. The generated feedbacks can be stored in another knowledge base. So as much as we add feedbacks in the ordinary database, we will fill the knowledge database with prefabricated feedbacks using text mining algorithms and tools. However, some users can give already summarized feedbacks that can directly be included in the knowledge base. Actually, before sending the user?s feedback and appreciation about the product to the trust reputation system, we have to verify the concordance and the alliance between them so we don’t have a contradiction.

Test for measuring the contradiction in the feedback.

Pseudo-code to verify the concordance between the rating and the textual feedback: Boolean concordance; concordance =Test_ concordance (in appreciation, string feedback) ; If (concordance) URL (url_feedbacks_interface); //redirection to the feedbacks interface Else URL (url_page); // we thank the user for his intervention and we put him temporally in a //blacklist for unconformity

After measuring the concordance the feedback is sent to Trust Reputation System for further processing.At the final stage, we get only filtered feedback.Hence only genuine feedback about the product is generated.

Lack of information regarding particular products leads to the wrong selection of a product which in turn leads to huge holes in pockets of the customers. Thus we aim to provide the accurate and true reviews about the particular products which will help customers in picking up the right product. We attempt to calculate the trust degree of the user according to his subjective choice either “like” or “dislike” and according to the feedback. Those results such as trust weight and scores help users making a decision about purchasing or not a product from an e-commerce application. However, those scores are not always truthful. Then, they can falsify the weight and the ratings. Semantic feedbacks are more meaningful than single scores.

The consumers dealing with our website would be able to access precise data and reviews of the consumer's feedback and use it intelligently for product selection and for buying of it as well. This software would be useful for any similar e-commerce business dealing with problems regarding the issues of trustworthiness of reviews. The provision of visual representation can be used by customers to buy genuine products. To some extent, it would also help the marketplace operators and vendors to filter out their potential customers. In today’s time data is said to be the biggest asset for any company or organization. Thus, it is of immense importance to analyses the data and gets some results out of it.

We sincerely thank our guide Mrs. Purvi Sankhe, our HOD Dr. Rajesh S. Bansode, our Dean

Dr. Kamal Shah and our principle Dr. B. K. Mishra for his/her guidance and support for carrying out our project work.