Reengineering in Agent Based Feedback Management Model for Online Auctions

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Abstract— Current e-commerce applications such as online auction systems are not trust worthy due to lack of effective feedback management models. This paper is aimed at the stipulations which arise in the traditional online auctions as a result of various anomalies in the reputation and feedback calculation mechanism. We try to improve the scalability and efficiency of the online auctions by providing efficient feedback management methodology considering several factors into consideration. A comparison between the performance of the auctions system with and without the agent methodology is also done.

Keywords— Agent Technology, JADE, Optimal Price, Feedback Management

I. INTRODUCTION

The internet's computational power and flexibility have made auctions a widespread and integrated part of both consumer and business markets. The economic impact of this auction is rapidly growing. For instance, United Technologies has been using free market to conduct auction among its supplies. The company expects to save between 6% - 8% on the low end and 20% - 30% on the high end. This translates into expected auction savings of about &1.2 billion in 2002 (Teaster 2001). But many online auction houses such as μBid and eBay however, current online auction systems are still suffering from a major weakness: lack of trustworthiness is fraud related to payment, delivery and sellers anonymity. An online auction is simply defined as a virtual marketplace hosted on the Internet to match buyers and sellers of goods around the globe regardless of the physical limitations of traditional auctions such as geography, presence, time, and space. Online auctions operate different protocols including English, Dutch, First-Price Sealed Bid and Vickery with different properties for each one of these protocols. Here in this system we implement the different auctions and also help the users to decide upon the optimal price of the product considering a specific set of parameters. Our main interest would be to work on the reputation and trustworthiness of the participants in the online auctions. Since the participants in the auctions do not know the details of the seller, they have no other option rather than to trust the feedback mechanisms provided implicitly. This leaves a lot of scope for improvement in this field regarding the exact portrayal of real time scenarios of online auctions. There is also the problem of the need for constant human monitoring.

II. RELATED WORK

The present e-commerce applications on the web either use the accumulation model in the ratio methodology to calculate the trustworthiness of a client. The accumulation model uses the summation of the feedbacks of other users which can be either 0 or 1 or-1. He ratio model refers to the ratio of positive feedbacks to the total number of feedbacks. But these both neglect the possibility of malicious users and do not take the credibility of the person who is rating the other client into account. But, the above method does not take the weight values of rater's into account. There is also the problem of reputation squeeze which is caused because all the products are treated equally without any consideration to the transaction value.To avoid this problem a new method of considering weight values for the rater was found. The introduction of vectors was done. Here the weight values are in the closed interval of 0 to 1 and these are used to calculate the final feedback values which are used to compute the trust. But, the semantics of this computed value were not clear and it was difficult to interpret it. It could be interpreted as a probability of behavior, and also could be interpreted as the trustworthiness of the user too. Thus a problem arises. The defense which is proposed against a collusive attack is very crude and depends on many random factors. When a collusive user does a good rating of the target user, the member of a collusive user is assuming that there is no similarity in the evaluation of users other than the target user. On the contrary, it is thought that no collusive attack exists when there is a similarity in the evaluation. The defense against any possible collusive attacks was left to the tolerance of the system, putting weight on the evaluation value by using this similarity. These present mechanisms do not take the dynamic nature of these online auctions into consideration and thus several subtle features like the decay of feedback and recent trust values etc are ignored. The calculation of trust at run time can be very scalable in certain situations but it leads to congestion in the network in most of the cases due to reasons like people who bid opportunistically. The present day auction sites mostly require the users to constantly monitor the proceedings of the auction in which they are involved. This can be a rather tiresome business. To avoid this problem we use concept of agent technology

III. FRAMEWORK

The frame work consists of various components like Auction agents, Feedback management agent. An agent is defined as a software entity that can perform information-related tasks without ongoing human supervision. This methodology is achieved by the usage of JADE agent technology. The auction agent deals with the implementation of the type of auction specified. It also deals with the support provided to the user regarding the optimal price taking the parameters of quantity and priority of sales into account. The auction agent takes responsibility for the implementation of the negotiation autonomously. It takes the amount as input from the user and uses this as a threshold and bids on behalf of the user and thus the user need not monitor the proceedings at all times.
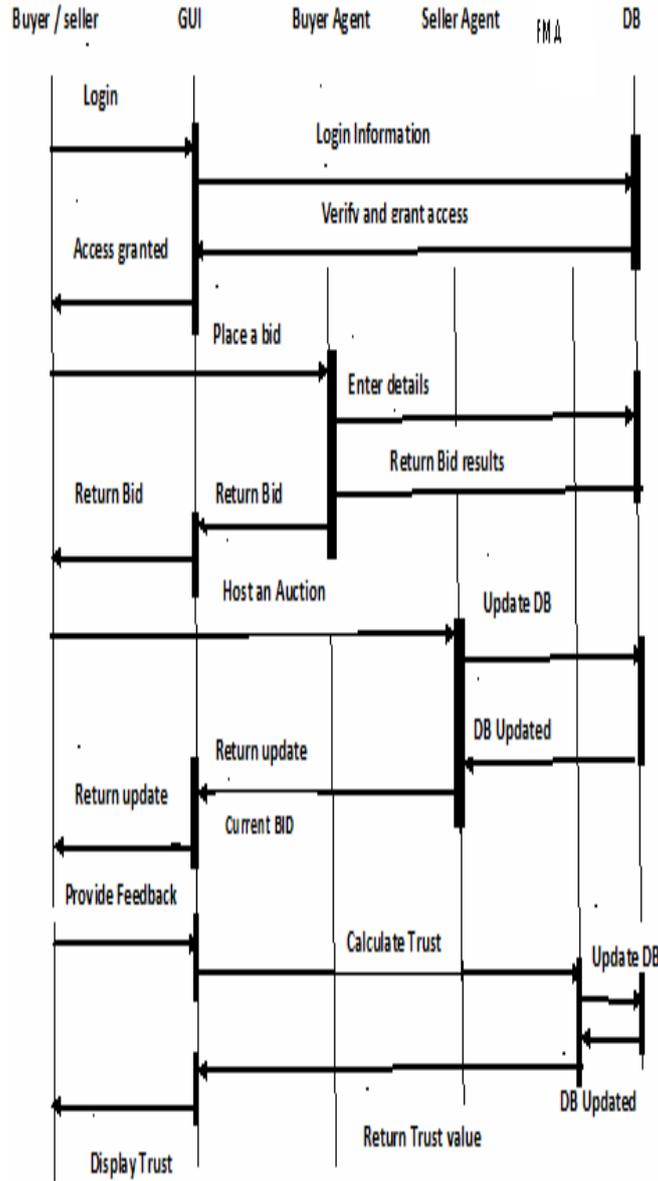

Fig.1: Sequence Diagram

The feedback management agent is used to calculate the reputation of all the users taking part in the auctions either directly or indirectly. By trustworthiness, we mean that we are finding the weight value of the rater or user. This can be done on the basis of several factors like feedback decay, recent price, rater's trustworthiness etc. In feedback rating the rater generally rates the host according to several critical attributes which may be the quality of service provided, the type of technical support provided, the delivery of the product, the item's condition on delivery etc. Thus feedback rating as considered in the present methodologies is not a scalar but a vector quantity. Thus it can lie in the closed interval of -1 to 1 and not strictly one of the extremes. The feedback management agent calculates the reputation and trust worthiness of the client taking into consideration the number of participants from the time t-1 to t. The feedback management agent involves the functionalities of all the previous methods such as the accumulative, the ratio and the weight value models.

Fig.1 represents the sequence diagram which depicts the entire flow of the auction system which includes the working methodologies of the various agents such as the buyer agent, seller agent, feedback management agent etc. There are three methodologies depicted in the above figure. They are the purchasing part, the hosting of an auction and the final

part is the feedback and trust calculation methodology. These are accomplished by the various agents which are made use. FMA represents the Feedback Management agent.

IV. AGENT TECHNOLOGY

Agent technology is used for the task of automating e-commerce business processes in view of bringing efficiency, scalability and profitability to businesses and individual users. Agent technologies can be used to depict the real world scenarios in the field of e-commerce onto the virtual screen.
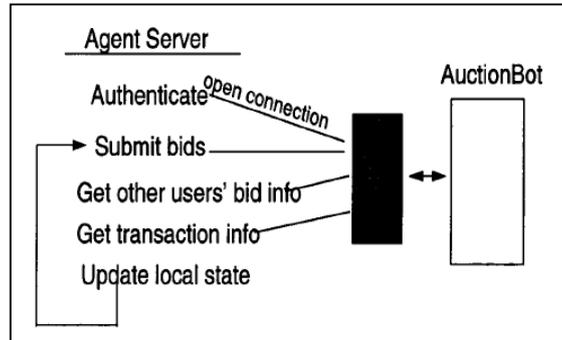

Fig.2: Communication with Agent

JADE 3.1 agent platform is used to implement the agents. JADE is one of the best modern agent environments. It is open-source and is FIPA compliant and runs on a variety of operating systems which include Windows and Linux. It's very scalable because as the load on the server increases the Jade agent technology can be used for the load balancing phenomenon. The negotiations which take place between the host of the auction and the customer are performed in Jade containers. The Main container and the other containers are used to take care of the scalability issues.

V. FEEDBACK MANAGEMENT

The trust calculation is done based on the reputation of the person who is rating. Consider 'x' as the person whose weight value is needed for the trustworthiness. Let 'y' be another user who has a common partner set with 'x'. E.g. the common partner set means that suppose x and y are clients who have won auctions hosted by some common set of people. The weight value of the trust worthiness of x is calculated by comparing the ratings given by x to each and every element of the common set as compared to the ratings given to the same element by y. Several critical attributes are taken into consideration while the rating procedure is done.

(i) Weight value of x is calculated as

$$\sum_{a \in Common(x,y)} \frac{\sum_{i=1}^{N(Critical\ attributes)} fcr(i)(x,a).fcr(i)(y,a)}{\left|\sum_{i=1}^{N(Critical\ attributes)} fcr(i)(x,a)\right| + \left|\sum_{i=1}^{N(Critical\ attributes)} fcr(i)(y,a)\right|} \Big/ N(common(x,y))$$

((ii) The Optimal price is calculated as

Initial price + $\sum_{i=1}^{n(days)}\{(0.1).(initial\ price) - (pi-0.5).(priority)\}$

(iii) Time component is calculated as

f((n-1)th auction) − (f((n-1)th auction)/ time since last auction)

(iv) Trust value of x =
e(weight value of x)(weight value of optimal price)(time component)(exp)

Here,
- $f_{cr(i)}(x,a)$ denotes the rating awarded by x to a for the critical attribute of i.
- N(common(x,y)) denotes the number of users common to x and y.
- n(days) denotes the number of days in which the auction should be complete.
- f(n-1 auction) is the feedback the person had until the last auction he hosted was complete.
- Exp is the experience value. The experience values are calculated based on the number of auctions participated and the number of auctions won.

The comparison between the trust value which is calculated and also the experience value which is obtained shows behaviour of the particular user and this can be left to the discretion of the other co users. The complexity of this

proposed model is comparatively less and the processing time is also reduced since the numbers of operations made on the database are reduced. Apart from the feedback model which is provided, there are lot of psychological factors that affect the feedback management methodology inherently. Thus several factors which affect the performance of the site are listed below. The focus should be on avoiding distrust building factors because trust can only be built over time and multiple interactions. But a negative influence spreads in a very short span of time with very little information and negative information weighs more heavily in human judgment. Some of the factors are

- **Credibility:** Professional appearance of the website, ease of use, up-to-date information, Good interaction, photographs of the staff and several other factors contribute to credibility.
- **Security through 3rd party:** Globally recognized security must be used.
- **Added Incentives:** Trust can be built easily if the customer thinks that he has nothing to lose. So giving advices regarding what else did the other customer buy with this product, and information regarding the offers available and efficient feedback model help the cause.
- **Experience:** Feedback facility should be provided to share the experiences as previous experiences which can be self or transferred play a major role.

VI. CONCLUSION AND FUTURE WORK

Work is done on the task of increasing the reliability of these feedback mechanisms taking certain parameters into consideration. The impact of malicious feedbacks is reduced. There are many other real time factors which are necessary to be taken into consideration to depict the dynamic nature of the present world scenario of e-auctions. To generalize the agents to participate in other types of auctions such as stock exchanges, which are asynchronous double auctions would be a good future prospective. Another future enhancement will be to add additional bidding strategies. Detailed performance statistics will be collected to determine which strategies perform better under which types of auctions. Comparison of these strategies with the human strategies is also an option.

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