

Fake Bidding Detection

Saloni Pandya, Shubhangi Patil, Sharvari Patil
Student, Student, Professor
Universal College of Engineering

Abstract - Online auction frauds constitutes one of the largest part in internet frauds. Many fraudulent buying and selling behaviors occur in online auctions such as shill bidding. Shill bidding can be defined as the illegal practice of a seller placing bids on his or her goods in order to drive up the price. Human cheating has become a great barrier to establish trust among various users. At present, shill bidding has become the most persistent form of cheating. By using bidding behavior and user history, the proposed auction system prevents, monitors and detects the shill activities in real time. The system also takes necessary actions at run time against shill activities. The experimental results show that, by prevention and detection of such activities, the system keeps the auction users secure from shill bidding and hence establishes trust among users of the online auction system.

Keywords - online auction, shill bidding, e-commerce

I. INTRODUCTION

Among all online crimes, auction frauds are one of the most reported, about 35.7% in 2007 (IC3 [Internet Crime Complaint Center], 2007), and the top five in 2011 (IC3, 2011). The Internet Crime and Complaint Center (IC3) received over 200,000 complaints of auction related frauds in 2007, and more than 40,000 in 2011 (SecurePuter, 2008; IC3 2011). IC3 classifies auction frauds as: misrepresentation of products, non-delivery of products, triangulation, fee staking, selling of black-market products, multiple bidding, and shill bidding. Shill bidding refers to artificial price inflating and price deflating in order to create an interest for the auctioned product. According to study, in 2008 auction users have lost about 250 million dollars because of shilling activities in online auctions. Shill bidding is the hardest to detect among all online auction frauds. The bidders have to be present physically for traditional offline auctions, which may not be feasible for some bidders situated far from the place of bidding due to time constraints. Online auctions are designed to attract more number of bidders situated geographically far apart from the place of auction by providing everyone equal opportunity to participate in the auction, by clicking mouse buttons only. Also, it provides a user friendly platform to choose and select the item of interest. We present the ShillFree auction system, which can protect users from shill bidders in auctions. The ShillFree auction system is secure, trustworthy and easy to modify as new patterns of shilling are detected. ShillFree auction system generates and maintains user profiles based on their used period and behavior in previous auctions to manage the users. It also controls users' behaviour during auctions by user limits and authorization of different user requests. The ShillFree auction system monitors the bidding process during auctions, detects shilling attempts, and responses in real time while auction is still running. To ensure shill free auctioning, our auction system would be able to track and examines the behaviors and IPs of the bidders at run time.

II. LITERATURE REVIEW

Rinkesh Patel, Haiping Xu and Ankit Goel introduce a shill monitoring system for agent-based online auctions. They proposed using role-based access control mechanisms to control shill bidders. They designed a model with a security agent that monitors auction transactions for shill bidding. The proposed auction system considers forward auctions. The shill monitoring system monitors users instead of auctions. The authors consider a few shilling patterns, whereas there are other patterns which are also used. [4] Xu, H., & Cheng, Y. T. proposed an approach to detect shill bidding by verifying bidding behaviors in concurrent auctions. The authors gather bidding data from two concurrent auctions compare and develop a toolkit to detect shill suspects. The system is applicable only for two concurrent auctions with similar items. Moreover the approach is not applicable in real time. Xu et al. (2008) present a framework for Agent-based Trust Management (ATM) in online auctions. The ATM framework consists of agents for monitoring, analysis and security. A key idea is that, different agents are used to handle trust 'reputation scores' or 'feedbacks' of other users to determine shill bidding, which can be easily falsified. Moreover, some severe techniques like duplicate identity shilling and group shilling are not addressed in this paper. [3] Dong, F. S., Shatz, M., & Xu propose using knowledge-based Dempster-Shafer (DS) theory to secure online auctions from shilling. They introduce a two-step model, where in the first step they propose to use the previously introduced shill detection technique of concurrent auctions (Xu and Cheng, 2007). In the second step they propose to use DS theory to verify the detected results of shilling in the first step for more accuracy. Their proposed DS theory based model checker performs shill verification only when the auction ends, which is not in real time when the shilling is happening. Although the authors claim that the technique can detect shilling in real time, their proposed model checker performs a check on the bidding behaviors only when the auction ends (Dong et al., 2009). If this analysis is correct, the model is not able to perform shill verification in real time. [2] Dong, F., Shatz, S. M., Xu, H., & Majumdar In this the relationship between final prices of online auctions and shill activities and propose a system to identify shill bidding based on the difference between the final auction price and the expected auction price. Their approach is restricted to auctions where the

III. PROPOSED SYSTEM

Considering the limitations of the existing literature, we have proposed a Fake Bidding Detection system. Our main aim is to detect shill bidding in real-time and block fake user. The ShillFree auction system has been proposed meets the main goal of combating shill bidding in real time. We designed three-layer architecture of the ShillFree auction system to achieve the goal. First layer will present information of all auctions and users. For registration and sign in, every user has to be approved by the business layer. The data layer keeps the history of users and auctions. The business layer processes the users' actions performed in the GUI, monitors, detects and takes necessary actions against shill bidding at run time. The architecture is implemented as a multi-agent system, where each agent, based on a set of beliefs, desires and intentions solves a particular problem. All agents cooperate in order to achieve the ultimate goal of protecting the running auctions from shilling.

IV. RESULTS AND DISCUSSIONS

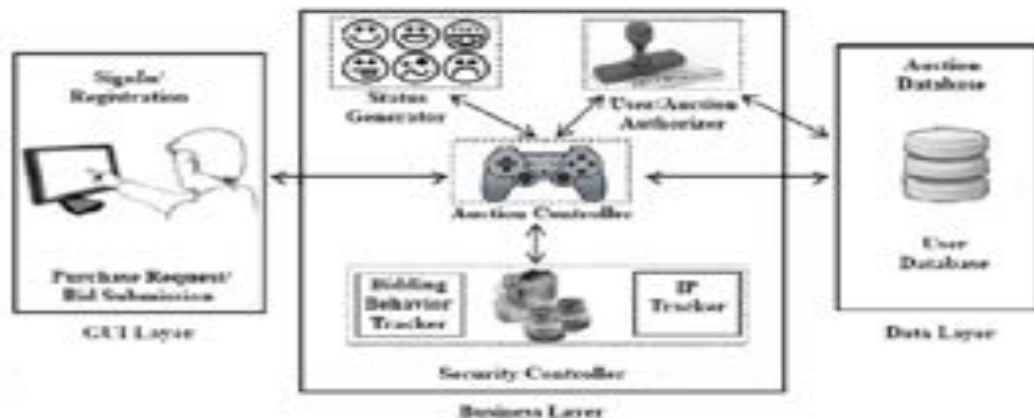


Figure 1. Architecture

1. Shill Bidding

Shill bidding takes place when a seller in a forward auction wants to sell his item for more, or a buyer in a reverse auction wants to buy the item for less than the usual price. Shill bidders use different approaches to achieve their goal of shilling. By examining real auction data, we can find some common patterns of their approaches of shilling which include:

- Pattern1: a shill bidder continually bids to outbid his own bid even when he is the top bidder in the auction, to increase or decrease the price.
- Pattern2: a shill bidder bids within a short interval of time to outbid his own bid or others' to give more time to the other potential bidders.
- Pattern3: a shill bidder makes an unnecessarily large price change to increase or decrease the price rapidly.
- Pattern4: a shill bidder bids more in the beginning of the auction to make sure that other bidders get more time to bid.
- Pattern5: a shill bidder bids more times on average than other bidders.
- Pattern6: a shill bidder asks another bidder to bid on the same item.
- Pattern7: a shill bidder establishes a bidding ring composed of multiple sellers or buyers bidding on the buyer's or seller's item, with or without the direct involvement of the buyer or the seller.
- Pattern8: a group of shill bidders may form a bidding ring composed of multiple sellers or buyers bidding on each other's items.
- Pattern9: two or more shill bidders work together in the same auction to inflate or deflate the price, which is also known as collusive shill bidding.
- Pattern10: a shill bidder bids exclusively only on one or few users' items.
- Pattern11: a shill bidder creates multiple identities and bids on his own item using a single computer with the same IP address.
- Pattern12: a shill bidder bids multiple times on the same item by changing both his identity and IP address of his computer.

Every user has to be approved by the business layer for registration and sign in. The history of users and auctions is maintained by the data layer. The business layer processes the users' actions performed in the GUI, monitors, detects and takes necessary actions against shill bidding at run time and block user.

V. CONCLUSION

Activities like shill bidding in online auctions are damaging the reputation of the online auctions and have become serious problem in terms of trust and security. In this paper, online auction system is presented to secure online auctions from shill bidding in real time and block fake users.

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