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Minimizing time risk in on-line bidding: An adaptive information retrieval based approach

Anoop Verma [a,*], M.K. Tiwari [b], Nishikant Mishra [c]

[a] Department of Industrial Engineering, The University of Iowa, Iowa city, USA
[b] Department of Industrial Engineering and Management, Indian Institute of Technology, Kharagpur, India
[c] School of Management and Business, Aberystwyth University, SY23 3DD, UK

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ABSTRACT

Knowledge is of prime importance, particularly for the individuals who are involved in e-business. A lot of energy and time is wasted by the individuals in seeking required knowledge and information. In order to facilitate the individuals with required information, an efficient technique for the proper retrieval of knowledge is must. Almost all online business activities, particularly e-auction based firms are surrounded by various risk factors pertaining to time, security, brand etc. The main focus of the present paper is to analyze all such risk factors and further to categorize the same as per their degree of influence. A nominal group technique (NGT) based approach has been utilized to do the same that ranks the risk factors using agreed criteria based approach. Further, the paper proposed an adaptive information retrieval to resolve the problems related to time risk in online bidding process, while other risk factors has been tried to resolved by using corporate memory based data warehousing. Efficient knowledge retrieval along with the knowledge development and knowledge management became a backbreaking task for any organization. A corporate memory based approach has been utilized to represent the required knowledge stored in memory warehouse for its current and future usage. In underlying retrieval model, adaptiveness is achieved using genetic algorithm based matching function adaptation, where, a total of five matching functions viz. Jaccard's coefficient, Overlap's coefficient, Dice coefficient, Inclusion measure, and Cosine measures have been considered to determine the retrieval effectiveness. Later, effectiveness of information retrieval system is calculated in terms of well known parameters namely precision, recall, fallout and miss. Results of adaptive information retrieval using a weighted combination of matching functions are compared with individual matching functions.

1. Introduction

Over the past few years, knowledge has been considered as one of the important entity, particularly for those, who are involved in e-business related activities. Almost all online business communities store and disseminate a large amount of information during their daily conversation. Millions of dollars change hands daily through online auction markets. Online auctions attract thousands, sometimes millions of bidders who compete with each other for the items ranging from modern computer peripherals to antiques (Massad & Tucker, 2000). Internet being the sole and most important carriers for trading in online transactions such as online bidding process, transaction in e-enabled supply chain etc. Thus, trading partners can be feared of insecure transactions, as identity can be forged, nature of transactions can be altered, or website can be counterfeited. In addition, geographical diversity among the trading partners creates the unprecedented causes of fraud and consumers abuse. Companies such as e-bay, amazon.com have attracted the customers in a big way leading to better customer satisfaction, good reputation etc. However, various risk factors related to time, money, and personal information restrained the customers from the participation in the bidding process, thus, influences the turnover of such companies. To prevent such critical situations, these companies bear a lot of money to enforce sound security policies.

The type of such risk factors in such firms arise when a customer registered for the a certain bid, as he may now feared of personal information that can be open for others, further, he may also be concerned about the product he intended to buy etc. Thus, it becomes crucial for such companies to analyze and provide some effective means to minimize the effects of such risks that a customer may face while registering to them. In the present paper a

* Corresponding author.
E-mail addresses: anoop-verma@uiowa.edu, vermaap@email.uc.edu (A. Verma), mkt09@hotmail.com (M.K. Tiwari), nxm@cs.nott.ac.uk (N. Mishra).
URLs: http://anoop.nifftian.googlepages.com (A. Verma), http://www.geocities.com/gurukul007 (M.K. Tiwari).

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Nominal group technique (NGT) based approach has been utilized to rank the concerned risk factors in online bidding process. In real world scenario, companies facilitate the users to access huge lump of information about the products that a certain user is indented to buy. With the presence of such a vast array of data, it becomes difficult for the users to sort out the information that he actually needs. In such situations it is imperative for companies to improvise some effective means so that users' can effectively search their required information without wasting much of their time. In general users put their information need in the form of query and further information retrieval system sort out most similar documents after matching the whole document set with the query. The process of information retrieval in the form of documents continues till user is unsatisfied with the retrieved documents. Effective retrieval lies in the ease with which the documents are stored in the company's database. As, in the system and surrounding data flows in unformatted and variegated form, thus, it is imperative for such companies to properly filter and format the data, information, records etc. to make it available for efficient retrieval. In the literature, the term "Corporate memory" has been extensively used by the researchers and analysts to represent the stored knowledge in the formatted form (Ballay & Poitou, 1996; Heijst, Spek, & Kruizinga, 1996; Huang, Tseng, & Kusiak, 2005; Kuhn & Abecker, 1997; Simon & Grandbastein, 1995). The document formatting in corporate memory is performed offline, while the retrieval process (includes query formatting and matching process) is performed online (Pathak, Gordon, & Fan, 2000). In information retrieval matching among the documents and queries has been performed by using benchmark matching functions that explores the similarity between the documents and queries on the basis of criteria such as document length, position of keyterms in the document, frequency of keyterms etc. (Pathak et al., 2000; Saltan & Buckley, 1990). The purpose of the present paper is to study the risk factors related to online bidding process and further to provide some effective means to minimize the effect of same. Our main consideration includes the following.

1. Our analysis is based on a generic study of risk factors, which assumes that
   - Before implementing some means to minimize the effects of underlying risk factors, it is worth considering determining the critical risk factor among the available alternatives.
   - Degree of influence of risk factors in online business communities depend upon the type of user, type of product that an user is intended to buy, type of bidding process etc.
2. For effective information retrieval, genetic algorithm is employed in two phase viz. (1) To determine a set of relevant documents that meet the user's need, and (2) To determine a set of possible combination of weights for the benchmark matching functions, here, adaption is achieved in second phase.
3. All possible information retrieval effectiveness parameters viz. precision, fallout, recall, and miss have been considered in order to realize the performance of information retrieval.

We organize the paper as follows: In Section 2, description of online bidding process with the analysis of risk factors is considered, further, a group decision making approach is also performed here. It is followed by the detailed insight of Corporate memory that also includes the different memory management schemes, given in Section 3. In Section 4, description of basic information retrieval and implementation steps are given. Next section (i.e. Section 5) is devoted to the detail the solution methodology vis-a-vis the underlying problem. In Section 6, problem generation scheme and further the experimental details of underlying research is elaborated. Lastly, Section 7 concludes the present research with some lines of its future applications.

2. Online bidding process

Auction is an economic incentive mechanism that determines the price of an item to buy or sell (Huang, Tseng, & Kusiak, 2002). This process requires the involvement of one or more bidders who want the item, and an item for sale to the highest bidder. Online auction is done through internet, where, a web page used to display information regarding goods or services along with the information to sell them.

Traditional auctions have some information deficiencies, as they last only for a few minutes for each item sold. In this auction type, both sellers and bidders may not get what they actually want. With the advancement in the information technology, auction can be performed via internet, thus, overcoming the difficulties related to available information. Trading on the internet has several advantages, given as:

- It is independent of the geographic location.
- Business settlement will be in shorter time with lower overhead cost.
- It can support a great range of potential bidders.
- It provides an infrastructure for executing auctions and bids more cheaply.

2.1. Analysis of risk factors in online bidding

As stated earlier, trading in online business firms is more speculative rather comfortable, due to chance of loss of personal information, poor quality product etc. Apart from free price information, online auction is full of several risks associated with buyers, sellers, auctioneers etc. In the literature, researchers have identified several risk factors prevailed in online bidding process, description of which is given as (Massad & Tucker, 2000).

1. *Time risk*: This risk factor is mainly confined with the bidders or buyers, since, they requires a lot of information pertaining to product which they are intended to buy. This risk type is very common in day-to-day activities as buyers are generally unaware of products and their associated search mechanisms.
2. *Security risk*: This aspect of bidding risk has influenced much of this trade as due to loss of information such as credit card numbers etc.
3. *Vendor's risk*: Another type of risk that reside inside every buyers is regarding the authority of auction and the product they intended to buy.
4. *Brand risk*: This risk factor is mainly concerned with the authenticity of the product obtained by the buyers or bidders. Buyers may feel cheated by the type of product, which they received after winning the bid.
5. *Privacy risk*: The risk of loss of personal information such as address, email id, personal contacts etc. comes under the purview of privacy risk.
6. *Price collusion*: Contrary to all previously explained risk factors, price collusion affects the sellers. This risk factor is prevalent in open-bid type of auctions, where, every registered bidder can contact with the other registered bidders with the help of available information and conspire to deflate the price of the concerned product.

As compared with traditional in person bidding, the frequency and impact of these risk factors are more severe in online bidding process. It can be justified from the fact that the number of fraudulent cases in online bidding are increasing almost exponentially as each year passes. In order to represent the severity of risk factors in online bidding process, a comparative analysis of risk factors has been shown in Fig. 1.