

Chapter 26

Time Constraints for Sellers in Electronic Markets

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ABSTRACT

Electronic markets provide virtual places for negotiation over the exchange of products. In such places entities representing buyers and sellers can interact and agree upon a product price. Both parties try to maximize their profit. The authors model such an interaction as a finite horizon bargaining game and try to quantify the maximum time of seller participation in the game. The estimated deadline indicates until when the interaction is profitable for the seller. The authors' model defines the appropriate value for a patience factor which finally results in the seller deadline fully adapted in each product characteristics.

INTRODUCTION

With the rapid development of the Web new business models have emerged. A huge number of commodities are available to users including pieces of information. Due to the vast number of resources, finding the appropriate product is a demanding procedure and sometimes is beyond of the human capabilities. Hence, users need an automatic mechanism to find products while providers need a mechanism to efficiently promote and negotiate their products.

The combination of Electronic Markets (EMs) (Bakos, 1998) with an enhanced scheme such as intelligent agents could be the solution to this problem. EMs are virtual places where entities, not known in advance, can negotiate and agree upon the exchange of products. In these markets, products could be electronics, books, clothes or even more information. In cases where information pieces (stock prices, videos, etc) are the exchanged products, we can define the concept of Information Markets (IM) (Ge et al., 2007; Lauffman, 1994). Autonomous entities offer many advantages w.r.t. the representation of users (buyers) searching for products and providers (sellers). One example is

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intelligent agents. Agents (Nwana, 1996) are software components acting on behalf of their owners. In EMs, agents try to find and buy the appropriate product according to user needs. While representing sellers, agents try to sell each product in the most profitable price.

One important issue in such negotiations is the deadline determination for both parties. Especially in the seller side the deadline is very crucial because sellers try to service a lot of clients. The determination of the appropriate deadline is very important and difficult task. In this article, we describe a model for the seller behaviour and through this model we present a methodology for the deadline calculation. This model is extended using Fuzzy Logic (FL) theory (Zadeh, 1965) in order to provide an efficient mechanism for the decision process, especially, under conditions of uncertainty. The deadline calculation affects the behaviour of the seller in the interaction procedure concerning the proposed prices.

MARKETPLACE BUSINESS MODEL

EMs are virtual places where entities present, negotiate and agree upon the purchase of specific products. When the negotiated products are pieces of information such markets are termed Information Markets (IMs). Information has a number of specific characteristics which differentiates it from the classical products such electronics, books, etc. First of all, the economics of information production indicate that the information production costs more when the first copy is produced and less for the additional pieces. Furthermore, information can be characterized as out-of-date more easily than classical products. For example, a stock price has greater value for limited time duration. Hence, sellers want to sell such products as soon as possible. Finally, information is always available to buyers. A seller negotiating DVD players has limited capabilities of delivery

which can have negative result when they run out of products.

In general, EMs involve two main groups of entities: the buyers and the sellers. Buyers try to buy products at the lowest possible price while sellers try to sell products at the highest possible price. It is obvious, that there is a conflict of interests between these two groups. Hence, we can focus on their direct interaction and model this interaction as a Bargaining Game (BG) with incomplete information (Fudenberg & Tirole, 1991). Game theory (Rubinstein & Osborne, 1994) has been extensively studied by the research community. BGs have been thoroughly reviewed in Rubinstein's study (1985a; 1985b). Rubinstein has studied a BG with alternating offers and has defined the equilibrium for such games. Fudenberg and Tirole (1983) studied a simple two person two-period BG and presented a solution using the perfect Bayesian equilibrium approach. However, there is a difficulty when studying BGs under incomplete knowledge.

In such cases, players do not know any of the characteristics of the opponent and consequently at every round of the game are not sure for the opponent reaction. An important characteristic is the players' deadline. For example, players can make offers, however, they are not sure when the opponent deadline expires increasing the probability of a conflict. Moreover, in the seller side a deadline is mandatory because the seller has to deal with a number of buyers and it cannot propose prices for ever. For example, the seller, due to an increased number of clients waiting to buy a specific product, may want to sell it in smaller price and, thus, aiming at higher profits through this large number of buyers.

In this article, using the model of a BG, we try to define an automatic negotiation mechanism between players and combining it with FL we try to provide an additional level of intelligence describing a reasoning mechanism for them. The BG lasts for a finite period of time (horizon) and

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