

Review

Designing buyer and seller intelligent agents in an electronic market based on emergency decision making

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In the recent decade, big suppliers use internet sites for introducing and selling their products. These companies decided to carry out their ordering and reservation operations through these internet sites because they were successful and were welcomed by many internet users. In this article, a model of electronic market for buyer and seller intelligent agents is recommended which introduces an emotional model benefiting from the emotional state of stress and attitude for decision-making. The system uses its previous experiences to make decisions in emergency conditions and corrects and generalizes them to the present conditions to find a solution to a new problem. In ordinary conditions, a new decision maker considers different choices and studies the weak and strong points of each choice and then makes a decision. But in emergency conditions, an experienced person chooses a satisfying solution in the first step because of time shortage and other factors. The application of this idea can increase the effectiveness of computer decision making systems.

Key words: Agent-based electronic market, emergency decision-making, buyer and seller agents, internet pricing.

INTRODUCTION

In the recent decade, big suppliers use internet sites for introducing and selling their products. These companies decided to carry out their ordering and reservation operations through these internet sites because they were successful and were welcomed by many internet users. As a result, customers can shop online by choosing the desired products and filling out the order form. As a result of the increase in the number of the product selling sites and the existence of different kinds of introduced products, buying products on the internet has become very time-consuming and the buyer has to consider the sale conditions of a product in different sites and then compare them together to choose the best selling sites for shopping (Fitzpartrick, 2001).

Due to information technology (IT) developments and increase in the application of electronic commerce, new concepts such as software agents have come into

existence to decrease the time which a user spend searching on the internet and comparing prices and checking products specifications (Beam and Segev, 1996).

Today, electronic transactions between producers and consumers are mainly carried out mainly based on egocentric software agents and these agents negotiate the price and quality of products on behalf of real users (Weiss, 1999).

On the other hand, with the advent of the new effects of artificial intelligence and ideas such as ants logarithm, genetic algorithm and market mechanisms, new perspectives were created to improve the performance of software agents including the application of market mechanism in the implementation of electronic commerce simulator. Ecommerce was used in the form of the exchange of electronic data during a few last decades especially in big companies and organizations (West et al., 1990).

Internet and web have changed the form of e-commerce during a few years ago. E-commerce has

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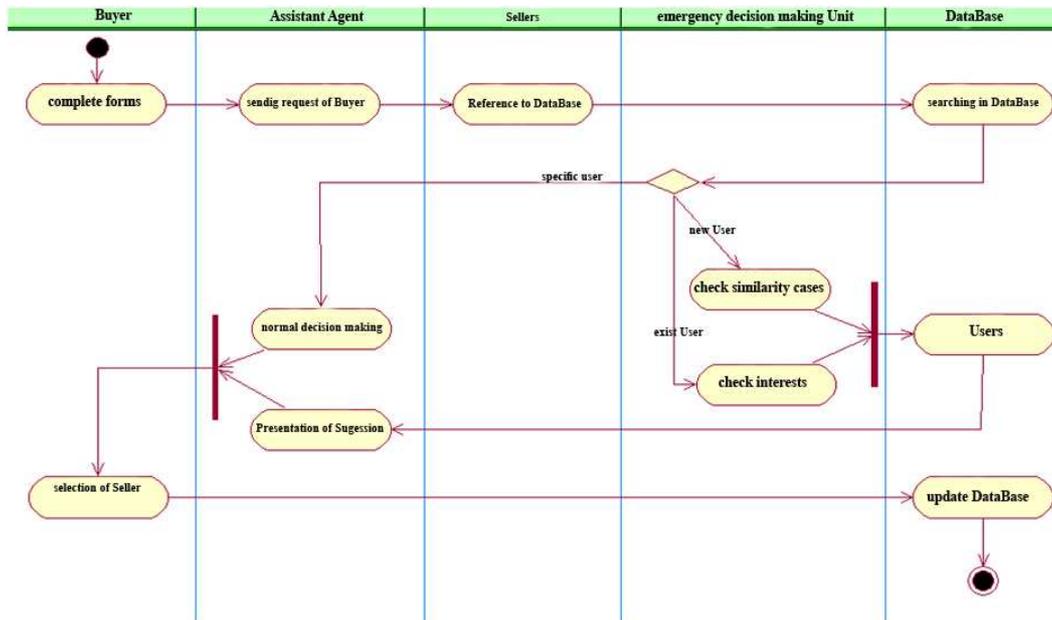


Figure 1. Competitive market model diagram.

evolved in the field of the product sale through different models and generations (Kalakota and Whinston, 1996). Agent-based electronic markets are one of the outcomes of the use of agent IT in e-commerce (Wang et al., 1990). The mechanism of the design of private agents as a buyer and seller has been the favorite topic of many researchers in university departments and industry because of the development of agent-based electronic markets (Chavez and Maes, 1996; Doorenbos et al., 1997). Because of the importance of the role of buyer and seller agents in increasing the satisfaction of its users and for the maximum use of market conditions, the relevant researchers focused their attention on making buyer and seller agents more intelligent.

MARKET MODEL

There are sites on the internet that conduct the operation of searching products. As a result, the buyer can log onto these sites and receive the list of products and services by defining the desired requirements. The kinds of market are: competitive, free market, common market, auction, etc. here we deal with the competitive one. The diagram of this model is shown in Figure 1. The main elements of the market including buyer and seller agents, market assistant agent and a collection of transactions and their order are shown in this figure. The explanation of transactions and their order in the market are as follows:

1. The seller enters the central site and chooses the kind of the market, then he fills out two forms giving

the specifications of the desired product and his personal specifications to the buyer agent and the buyer agent gives the received information to the market assistant agent in order to enroll in the market.

2. The market assistant agent to retrieve the relevant sellers and sends them the buyer information.

Afterwards, the rest of the stages in the competitive market has been described in the next section.

COMPETITIVE MODEL

A competitive market is a market in which a great number of buyers and sellers are busy trading independently. As a result, none of the market members can influence the price greatly, because the announced prices are almost fixed and also low. In this market, because of the competition, sellers use decision making process under emergency conditions to sell products more. They use their past experiences to present suggestions close to the interests of their customers and attract them more quickly.

Emergency conditions studies have shown that decision-making process under emergency conditions is different from that under normal conditions. Under normal conditions, the decision maker considers different options and studies the strong and weak points of each option and then makes a decision. But under emergency conditions, he should choose a suitable solution immediately because of time constraint. He makes a decision based on his experience and according to the

current situation. In studies done in Wang et al. (1990) about the decision making of firefighters chief. They neither choose nor studies different options. They also do not assess possible likelihoods. It seems that a comprehensive technique for solving different questions is made of a collection of different techniques in different conditions.

A novice businessman, who has enough time, may start to consider different possible options in his mind to make a financial decision. In contrast a firefighter confronting a burning building knows that he does not have much time to make a decision and implement it if he makes a better decision over time he will have no chance to implement it and if he takes actions late he will not have any chance of rescue and assistance.

So he does not study and score different options under emergency conditions but he makes a satisfying decision quickly based on his past experience and training in the confrontation with different fires and implement it. The decision may not be the best one, but it is a suitable one according to the current situation and the resource limitation of his memory, such as the power of information processing and decision-making, and it is also a good strategy for putting the fire out to save people. Now after implementing this strategy and diminution of decision space the same firefighter may change his decision process into studying different options or make the best decision by evaluating each option and implement it.

It must be first said that the effect of stress is not always negative. Its negative effect has a relation with the novice people who are not familiar with the work, but not with the experienced people. The manifestation of the emotional state of stress may signify that the conditions are urgent. Stress has different and sometimes contradicting definitions. But these definitions are common in the following characteristic. The occurrence of the emotional state of stress signifies sending the request for the emergence of contrastive abilities and adaptability of mind and body. With this work, one tries to get along with the current situation.

The above definition can be interpreted in different ways. For example any delay in the announcement of a decision may indicate that the conditions are beyond the ability of the system if it passes the deadline and repeats more than once, as a result, the system needs to adapt itself with the current conditions. Among the reasons, we can mention the following: failure of processing and saving resources, the high processing volume required for decision-making, increase in the processing requirement of other parts of the system and decrease in the processor time for decision making. Bad performance of the system is considered to cause the emotional state of stress.

This bad performance defined below indicates the emergency conditions. Therefore, we request the system to adapt itself with conditions beyond its power. We considered an efficiency function or an error function which shows the efficiency or error of the system at every

moment. Now we can say that if the rest of the system efficiency has a decreasing trend or the rest of the system errors have an increasing trend, both conditions are stressful, on the condition that the rest follows a certain pattern. An increasing rest doesn't mean the conditions are stressful. Because the situations may be under control and the damage may be developing in a controlled way or at a slow pace. For example, we can mention the fire which has been controlled but cannot be extinguished. Under such conditions, the burning rate of buildings is increasing but under control and the fire has been extinguished. In other words, we can consider a crisis as stressful and design a part in the system to detect the occurrence or non-occurrence of crisis based on the current and previous situation.

RECOMMENDED MODEL

In the idea of our method, some units are added to the decision making system that enables it make a suitable decision in the emergency conditions which are found in a competitive market. Emergency decision making unit itself contains the subunits: a unit studying the existence of a similar experience, bank updating unit, users unit and special user unit. Users unit includes member user unit and old user unit. Member user unit includes users who have shopped at the store and their information is updated each time.

Special user unit includes the buyers who have different tastes from other users their interests may not be predicted despite the fact that they are a member of the existing users of the system. Also, the old user unit contains the tastes of the users for getting more experience and does not keep their private information. As a result, the unit of saving new cases can be used. The system looks for a similar case in the case base. If there is not a similar case, the system is directed toward a normal decision and it is hoped give a suitable answer during a little time it has, the possibility is low however. This happens when the system does not have enough experience. If there is a similar case in the special user unit, the system is directed again toward a normal decision.

If we cannot get a result about his interests because of the contradicting choices of the customer despite the existence of past experience, this case is transferred to special user unit. If the previous case is a successful solution the system uses this experience and suggests a solution for the existing problem.

Bank updating unit considers the existing conditions and previous experience and then changes the solution of the past experience based on the existing differences. This unit must be precise, because wrong labeling of the solutions can cause problems and make the science base of the system incompatible and damage the performance of the system greatly.

If the presented solution is useful and successful, the

member user unit is saved for future use; otherwise, it is saved in the special user unit for preventing a similar solution in the future. The storage of the experience gained at the time of the system run, has its own difficulties. This task is time-consuming, and we should keep in mind that the storage should not be done immediately after implementing the relevant decision. This can be done at a proper time when the processor is not so busy. But there are systems that are not suitable for this because the total run time is little and the volume of processing is high during this time. So in the light of the capacity of database, the information of old users is deleted and their tastes are saved in the old user unit. If the system is too busy and does not have the power to serve all users simultaneously, it gives priority to those users who have more credit. We can review the labeling done by the system in the run time by a foreign observer which helps the system improve a lot.

The rest of the steps of the competitive market are as follows:

1. After receiving the request of the buyer, seller agents plan their bid based on the decision making model under emergency conditions and credit of the customer.
2. The planned bid along with the comparison with other similar products is sent to the desired buyer. The buyer can also arrange products based on different cases in this stage.
3. The buyer agent chooses the best bid.
4. The buyer agent informs the selected seller.
5. The seller agent delivers the product.
6. Sellers, if they wish, can become a member in a unit, they can negotiate together after membership. After a buyer chooses a seller, the assistant agent lets all member sellers to know the accepted price. Therefore, the sellers plan their bids with a little contradiction.
7. The buyer pays after receiving products.
8. The buyer gives credit to the seller. This credit affects the selection of customers a lot.
9. The seller agent gives credit to the buyer.
10. The assistant agent receives the information and registers in the intended databank.

IMPLEMENTATION

This article aims to design and implement a model for the electronic selling and buying of products using the technology of mobile agents. A method of modeling stress and intelligent decision making in emergency conditions is introduced in this article. Decision making under emergency conditions is used in the competitive market to maximize profit. In this method, the emergency decision-making unit is added to the normal decision making system which enables the agent in stressful conditions to make decisions safely and in a more previously tested way. This method compared with normal decision making methods has two advantages.

The first advantage is summarized in safe and rapid decision making in critical conditions. We need to make decisions as quickly as possible in a critical condition to decrease the strength of the disaster. The decision is total and satisfying but not necessarily the best one. But we do not waste time instead; the disaster does not increase and can be controlled, also, the decision made is safe. In other words, we are sure about the result. This certainty plays a special role in emergency conditions. It is not wise to risk in such conditions, because a wrong decision may make the disaster uncontrollable. The second advantage is tolerating the error of the system which has been made by adding this unit. It is highly possible that many sources damage in critical conditions (Figure 1).

The system should be designed and implemented in a way that it does not stop in such conditions and tolerate the error. In the recommended system, it continues to operate emotionally and naturally as far as the system has sufficient resources. Obviously, emergency decision making needs little processing resources and memory than the normal condition. If some failures are not predicted in the system, the system keeps his efficiency while error. Because of the failure of some resources, the efficiency of the system decreases the performance of the system gets worse and stress happens. Stress causes the system to come to emergency decision making until the time of the relative control of the conditions.

After passing time and controlling conditions, the system returns to normal decision making. If the failure conditions continue this scenario repeats again. We see that the recommended system adapts environmental conditions. This adaptation is important because it is comprehensive and can be generalized to all cases of failure. Even if these are not predicted in advance, emotional decision making makes general decisions and the normal system implement the decisions locally. Therefore, the efficiency of the normal system in making decisions in a small space affects emotional decision making directly. Poor efficiency can neutralize the best decisions made by the emotional system.

To prepare this article, we have carried out comprehensive studies about selling and buying products, technology of the mobile agent, and the way of conversation between agents in environments with several kinds of activity and about the formulation of standards. Since this technology has not been introduced for a long time, no world comprehensive standards have yet been recorded. The separation of kinds of markets will be effective in completing the implementation of an electronic market.

CONCLUSION

In this article, a model of electronic market for buyer and seller intelligent agents is recommended which introduces an emotional model benefiting from the emotional state of stress and attitude for decision-making. The system uses its previous experiences to make decisions in emergency

conditions and corrects and generalizes them to the present conditions to find a solution to a new problem. In ordinary conditions, a new decision maker considers different choices and studies the weak and strong points of each choice and then makes a decision. But in emergency conditions, an experienced person chooses a satisfying solution in the first step because of time shortage and other factors. The application of this idea can increase the effectiveness of computer decision making systems.

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