Online Buying in Virtual Cosmetic Marketplace Using Recommender System

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Abstract

Electronic Commerce (E-commerce) has become one of the essential characteristics in the Internet era. Nowadays, E-commerce is growing rapidly in the Internet, and has become a complement to the usual business activities of corporations and individuals. Recommender systems have evolved in the last years as specialized tools to assist users in a plethora of computer-mediated tasks by providing guidelines or hints. Most recommender systems are aimed at helping users to deal with the problem of information overload by facilitating access to relevant items.

In this system, shopping agents like buying agents, selling agents, and mall agents, and then knowledge-based recommender system are used because the World Wide Web information grows explosively in the Internet and people encounter problem to pick some correct things from the set of choice in E-Commerce. All the activities are done in Virtual Marketplace. Virtual Marketplace is a type of E-Marketplace system. In this system, recommender systems help users choose something they actually want or need and limit their search by supplying a list of items. Therefore, the recommender systems get vital role in the Internet. The objective of the system is to give effective products for user when they want to search cosmetic as to which type of cosmetic is suitable for them. Knowledge-based recommender system and implementation with a multi-agent system framework for marketplace system are used in this system, in which buying agent, selling agent and mall agent are presented.

1. Introduction

Nowadays, Internet stores are providing services customized by the needs and interests of individual customers. Such services can be viewed as seller's agents with the purpose to push merchandise and/or services to the users. Therefore, there is a growing need for deploying shopping agents or buyer's agents whose goal is to best serve the user's need and to make more informed purchasing decisions. Software agents are probably the fastest growing area of Information Technology (IT). They are being used for applications like Internet shopping assistants, inside of the medical domains, computer games, and management of complex commercial and industrial processes. Software agents could help buyers and sellers to combat information overload and expedite specific stages of the online buying process. The term information overload is almost synonymous with the Internet, referring to the sheer volume of information that exists in electronic format on the Internet and the inability of humans to consume it [7]. And, Recommender systems represent an attractive application of information technology to help guide the customers in deciding what to buy. So, the proposed system is intended to learn and buy products from Virtual Marketplace, to understand application and construction of agent in marketplace system, to deal with information overload problem in the Internet by using recommender system.

2. Related Work

Amazon.com uses recommendations as a targeted marketing tool and it can recommendations on movie, music, book and many other products for each user. It uses Item-to-item collaborative filtering method to recommend items. It matches each of the user's purchased and rated items to similar items, then combines those similar items into a recommendation list [2].

Recommender.com includes a knowledge-based movie recommender system [3]. Knowledge-based recommender systems use knowledge about users and items to generate recommendations by reasoning about which items meet the user requirements. But they do not attempt to build long

term user model. In that system, user has to enter a movie name to get recommendation. Then, the system will recommend the movies which are similar to the movie the user just entered.

3. Background Theory

3.1 Software Agent

An agent is defined as a piece of software used to automate specific tasks. The software agent technologies can be used to automate several of the most time consuming stages of the buying process. A software agent is personalized, continuously running and autonomous. The task of searching multiple Web sites is a good example the complexity in developing a software agent.

In a distributed environment, agents manage the applications by coordinating with each other in order to achieve the user's common goal. An agent possesses a list of properties:

- Reactive: Agent responds in a timely fashion to changes in the environment.
- Autonomous: Agent exercises control over its own actions.
- Goal-oriented: Agent does not simply act in response to the environment.
- Temporally continuous: Agent is a continuously running process.
- Communication: Agent communicates with other agents, perhaps including people.
- Collaboration: Does not blindly obey commands but can modify requests, ask clarification questions, or even refuse to satisfy certain requests.
- Learning: Agent changes its behavior based on it previous experiences.
- Mobility: Agent able to transport itself from one machine to another.
- Flexible: Agent actions do not complex.
- Character: Agent believable "personality" and emotional state.

3.2. Virtual Market Place

Electronic marketplaces are virtual marketplaces, which mean that the objects of transactions and market participants do not have to be physically present. Virtual marketplaces are Internet based systems that allow software agents on behalf of their respective users, to buy, sell, or find specific goods. These systems must have customer to customer: all users can be potential buyers, sellers or both, depending on their interests, which means it is a market for customers to customers and centralized: it is a centralized system, which means that although the system can be internally distributed, to the outside users, and it is a unique centralized marketplace [6].

3.3. Recommender Systems

Recommender systems are personalized information agents that provide recommendations, suggestions for items likely to be of use to a user. Recommender systems provide advice to users about items they might wish to purchase or examine. Recommender systems are an increasingly important tool in the Internet. To date, most recommendation systems are designed based on knowledge-based, content–based filtering or collaborative filtering.

3.3.1 Knowledge-based recommender system

In Knowledge-based recommendation, knowledge-based about customers and the application domain are used to reason about what products fit the customer's preference. This system uses the query to make recommendations based on inferences about a user's needs and preference. Knowledge-based recommender systems perform a needed function in a world of ever-expanding information resources. Unlike other recommender systems, they do not depend on large bodies of statistical data about particular rated items or particular users. The knowledge component of these systems need not be prohibitively large, since we need only enough knowledge to judge items as similar to each other.

The most important advantage is that this approach does not depend on customer's rates and so, it avoids a cold start problem and latency problem [7].

4. Proposed System

The main idea of the proposed system is to deliver relevant cosmetic items data to the user according to their preference. This system can help buyer in buying products in multiple stores. Seller provides selling products to mall agent through selling agent. Mall agent is the main component of the online shopping system. Seller posts products to sell and buyer posts his/her preferences at the mall. And, knowledge-based recommender recommends products in common database of the knowledge-based.

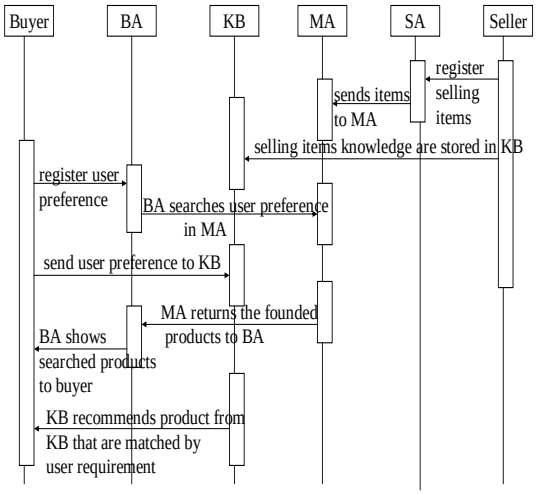

Figure 1: Sequence diagram for buying products in e-commerce

5. Overview of the system

There are four main components of my Virtual Marketplace, Mall Agent (MA), Buyer Agent (BA), Seller Agent (SA) and knowledge-based recommender system. The Seller Agent is a peer who has information that needs to be offered or advertised to the Mall Agents. A Buyer Agent is a peer that needs information about its customer's preference. Finally, the Mall Agent provides a list of Selling items that best match the customer's preference by comparing the request with the product features contained in the common database of the Mall Agent. Sellers register their selling items or products into the mall system and buyers register their preferences into the buying agent. Buyers provide their preferences in buying agent and buying agent searches the products in the mall system, also referred to as mall agent. Mall agent finds the matches in the products registered by sellers. When matches are found, buying agent is returned with a set of products. Then, buyer selects the one he/she wants.

When the buyer searches for a product, these situations can occur:

1. The user knows exactly what he/she wants.
2. The user has a desire but does not know the name of the products.
3. The user does not know precisely what he/she is looking for.

For example, when the user wants to buy a Facial Foam, firstly, register user preference, buying agent searches these preference in mall agent. When the user registers their preference, and then the buying agent searches products based on information explicitly from monitoring of each user behavior. The most interesting recommendation delivered by the system automatically recommends the cosmetic that are relevant with the user's preference after registration.

6. System Implementation

The main idea of this system is to deliver relevant cosmetic items data to the user according to their preference. System implementations are implemented with SQL Database, C#, .NET framework 2.0 in Visual Studio 2008.

In the figure, if the start user is admin, admin can choose 'I am administrator' as in figure 2. In the admin page, admin can choose his/her store and type name and password. And then, in the figure 3, admin can see their store's profile and he/she can insert new products, edit and update the existing products if the prices are changed. All products are stored in knowledge-based.

If the start user is a user, the user can enter their preference for searching cosmetic in marketplace. Category Combo box shows all the cosmetics available in marketplace that are registered by selling agent. And, the user can type the price range which he/she can pay. The user don't need to choose the brand, the buying agent will search all brand of category with the range of their price between minimum and maximum price. These products are searched by buyer agent. User can know the product they want is from what store and their price and other remarks paid by the products. The knowledge-based recommender system shows the products recommendations that are not irrelevant with the user price, but the system shows all price ranges.

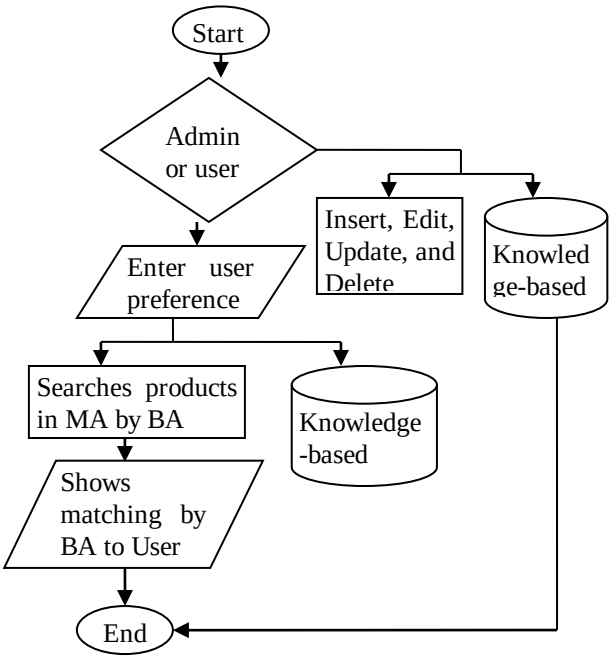

Figure 2: System Flow Diagram

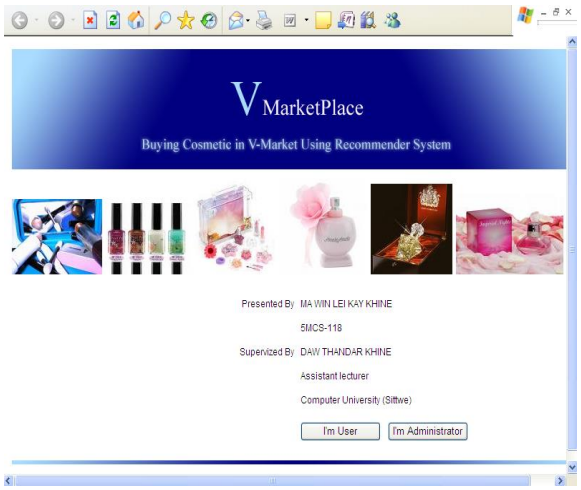

Figure 3: Home Page of the proposed System

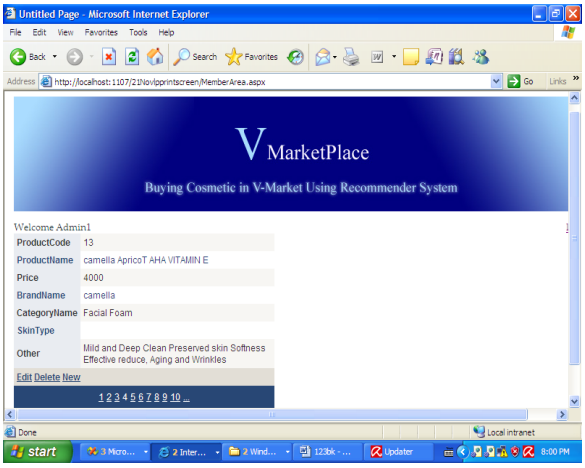

Figure 4: Admin registration Page

In this page, admin can see their store's profile and they can add new products, edit and update if the products are changed and delete the products.

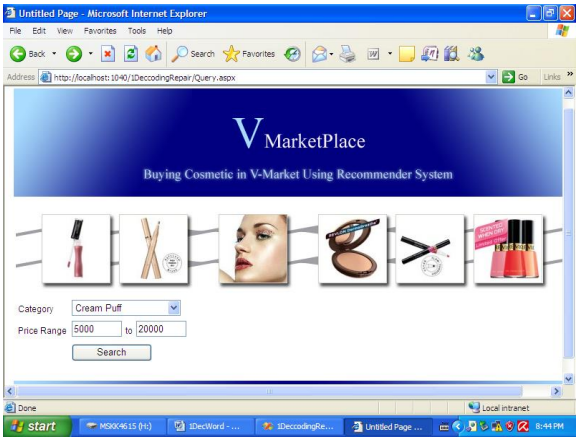

Figure 5: Cosmetic Search Page

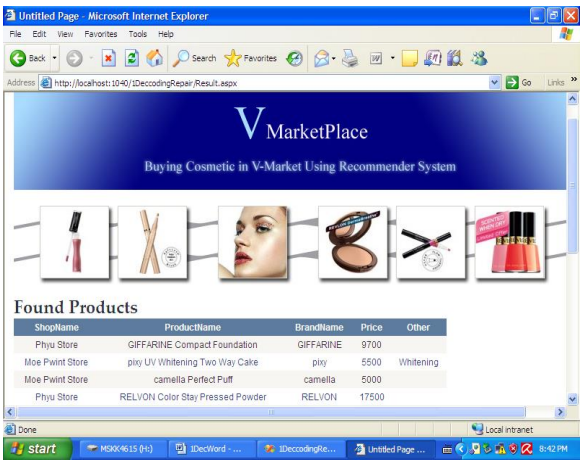

Figure 6: Founded Products Page that is searched by buying agent.

Figure 7: Recommendation Page

7. Conclusion

This paper presented online shopping assistant for the online shopping process by assisting buyers in searching items to buy from the different brands in the virtual cosmetic marketplace. It greatly reduces time in finding the right items by using software agents like Buying Agent, Selling Agent and Mall Agent. V-Market is a powerful research tool, which allows the fast development of new marketplace applications in a fairly simple way.

With the rapid explosion of the electronic commerce stores, the consumer may be overwhelmed by the volume and diversity of information available on the Internet and may not have time to search the available information to make a judicious choice. Therefore, the solution offered by software agents could be adopted. And, the number of agent based applications being developed and deployed in real world settings is rapidly increasing. Agents provide support to users in handling the information overload problem and can simplify our use of computer.

Knowledge-based recommender systems actually help users explore and thereby understand an information space. So, knowledge-based recommender systems are strongly complementary to other types of recommender systems because it does not have latency or cold-start problem like other recommender systems and does not rely on having historical data about a user's preferences. So, knowledge-based recommender system is a solution to those problems. They need only

7. References

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