사이버쇼핑몰에서 개별화된 서비스를 위한 원투원 에이전트의 구조

Architecture of One-to-One Agent for Personalized Services in the Cyber Shopping Mall

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요약문

이 논문은 특별히 사이버쇼핑몰들이나 상업적인 웹사이트에서 효과적인 고객 지향적인 개별화 서비스를 지원하는 원투원에이전트의 구조를 제안한다. 데이터베이스를 연동하여 동적인 웹페이지를 지원하는 기존의 많은 쇼핑몰이나 상업성을 지닌 웹사이트들은 고객의 기호, 관심, 프로파일, 행동양식, 고객 히스토리등을 고려하지 않기 때문에 여전히 모든 고객에게 획일적으로 같은 내용을 제시하여 개별화된 원투원 서비스를 지원하지 못하고 있다. 이런 문제를 극복하기 위해서는 웹사이트를 구축하는 회사들은 제품정보, 서비스 정보등을 고객이나 비즈니스 파트너에게 좀더 개별화되고 고객 지향적인 정보를 제공하고 고객과의 원투원 관계를 지속시키기 위하여 웹사이트 구축전략을 신중히 수립하여야 한다. 지금까지 원투원 웹사이트 개발을 위해 타겟 푸쉬, 타겟 메일, 타겟 광고등 다양한 개별화 기술이 사용되어 왔다. 이 논문에서는 성능과 안정성을 고려한 멀티쓰레드기반 개별화 에이전트 구조와 개별 고객의 고객 지향적인 서비스를 위해 규칙기반의 매칭기술을 사용하며 적응적인 프로파일을 위해 피드백 프로파일 기법을 소개한다. 규칙 기반 매칭 기술은 매칭엔진에 의하여 다양한 개별화된 컨텐츠와 메일을 생성할 수 있으며 규칙문장은 다양한 서비스를 표현하고 평가할 수 있게 설계 되었다.

Keywords : 전자상거래, 개별화, 원투원마케팅, 규칙기반매칭기술, 에이전트

1. Introduction

Intelligent software agents are a popular research object these days in such fields as psychology, sociology and computer science. Agents are most intensely studied in the discipline of Artificial Intelligence. Strangely enough, it seems like the question what exactly an agent is, has only very recently been addressed seriously. Because of the fact that currently many parties use the term "agent" in many different ways, it has become difficult for users to make a good estimation of what the possibilities of the agent technology are. At this moment, there is every appearance that there are more definitions than there are working examples of systems that could be called agent-based.[7]

The rapid growth of the World Wide Web has made it possible for a large amount of information resources on the Internet to be accessed easily, but most web sites don't communicate with users because they don't deliver the information user actually want. Most of time it is because web sites present the same information that companies use in their services. In light of these trends, companies creating web sites to supply their customers, employees, and business partners with products, services, and information must evaluate their web strategies to provide personally relevant content and create one-to-one relationships with their customers. We are approaching this goal from two directions that are closely related to each other: personalized web service, and intelligent interface agents. Personalization technology helps the customer get useful information easily. On most personalized WWW pages, the selection of information is customized according to each user's preference or interest. The web site creates personalized contents or e-mail for each customer on the fly using customer profile and purchase history, and customer action to evaluate the customer's expected interest in each web page. That is, the information would be filtered using personalization technology and would then be delivered automatically using the push mechanism and template process. This paper gives a high-level explanation of what one-to-one relationships are and how they are achieved with personalization techniques. Personalization is the third stage of web evolution.

2. One-to-One service for long relation with users

Today many businesses approach the new technique of electronic commerce by usually placing their product catalogs on the cyber shopping mall and combining them with an interactive order processing function to capture payment and process the order. To these businesses, selling their products via the cyber shopping mall is simply another business channel. This approach is not suitable, as it does not differentiate them from their competitors and fails to attract and sustain the attention of their target customers. Businesses that strive to be successful in selling their merchandise through the Internet will have to take advantage of its inherent strengths. The sequential solution to solve the problem is that attract and sustain consumers by pushing personalized and customized services related with a sense of

community relevant to them, and that engage consumers in personalized dialogue, learning more about their needs to better anticipate their future needs and requirements. The next procedure is that motivate consumers by providing personalized incentives (coupons, advertisements) for them to move from dialogue to action such as ordering a product or completing a survey. The next procedure is that fulfill transactions by reliably and securely supporting the full process of electronic commerce from promotional pricing to secure payment handling and that manage the process by monitoring results and allowing dynamic changes to business rules and content to ensure the system is achieving business goals.[1]

There is various one-to-one web personalization techniques Push techniques are more valuable because they take the burden off of the user. From a site perspective, push techniques are invaluable for cross-selling products and services and maintaining one-to-one relationships with users. We have implemented these techniques using rule-based matching technique and one-to-one analysis engine. One-to-One web marketers will receive several benefits from providing personalization on their shopping malls, including customer loyalty, competitive advantage, lower marketing costs, ability to identify the most profitable customer relationships, additional revenue from premium services, and the ability to adapt and improve their shopping malls, products, and services.

3. Personalization Agent architecture

The personalization agent classifies its customers in categories based on their purchase history, customer relation with web site. It recommends new products and services based on your customer category. The server also shows the customer targeted incentives and advertisement based on the customer profile. This is called rule-based matching because business managers can define business rules to match content with customer. [8, 9, 10] We propose the architecture of personalization agent to support rule-based matching technique. The architecture of the proposed web personalization agent is shown in Figure1. It consists of general 3-tier architecture: legacy web application system, web personalization agent, Web server. Web personalization agent was composed of various components like that Figure 1. We designed this agent in order to execute independently from legacy system. But, for message passing of service request between legacy system and agent, an existed legacy system was required some customization of interface to agent. This architecture enables to locate and distribute personalization agents. In nearest future, this agent can be extended to support CORBA for distributed environment, scalable expansion, and traffic enhancement.

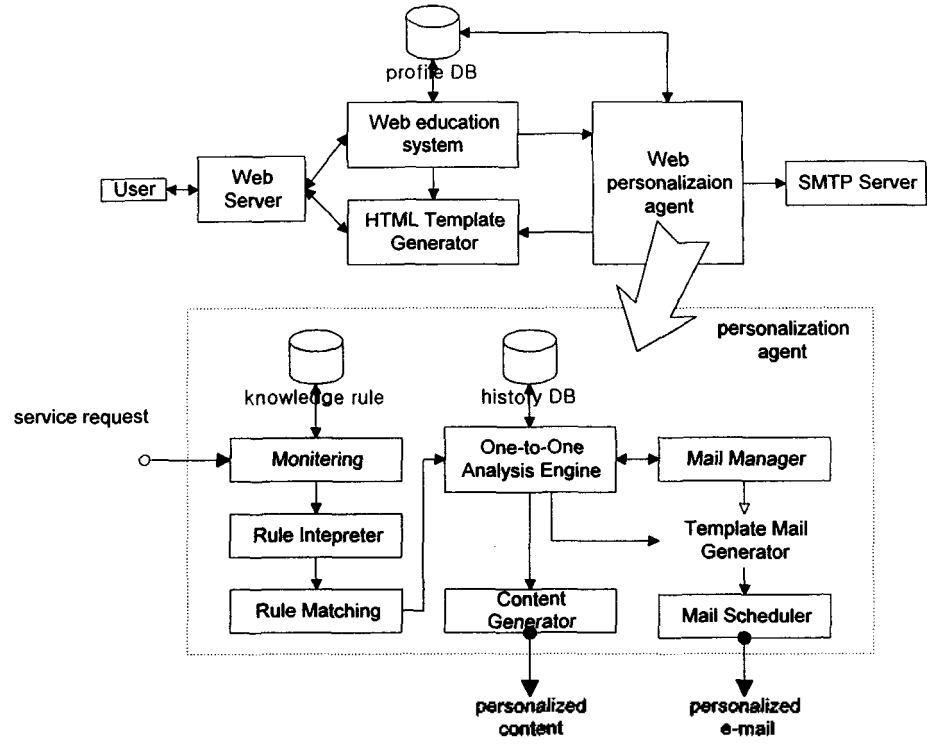

Figure 1. Architecture of personalization agent

services	Recommendation, advert, product, coupon	Personalized HTML E-mail
content layer	Content generation	E-mail generation
engine layer	One-to-One analysis engine	
	Rule matching engine	
	Rule interpreter	
db layer	DBI(database interface)	

Figure 2. Layered structure of personalization agent

The proposed personalization agent has four-layer in Figure 2. First, The DB layer supplies connection of relational DBMS and includes data and information such as history log and knowledge rules. The engine layer has two components. The rule interpreter retrieves the knowledge rule from knowledge database inside agent and interprets rule statement. Rule-based matching technology needs rule statement for evaluate customer's condition that enable to receive personalized services. Thus, we have designed syntax of rule statement like that "If <condition>(string) Then<action>(string) Active from<datetime>to<datetime> Rank(integer) Exclusive class(integer) Description(string) Notice(string) Type[push|advert|profile|mail|<user action>]".[10,14]

This syntax statement was not detailed version and just simple representation for explanation. These rule syntax almost cover or describe the personalization technique (that is cross-selling, up-selling, target marketing, e-mail, profile updating, coupon and advertisement) for one-to-one services on cyber shopping mall or education service. It is easy for web developers to provide personalized services because rule maker at client side helps us to make the rule easily and conveniently. Rule statement is composed of "IF~THEN" mood syntax. The "IF" clause is composed of condition function for evaluation of the customer profile, purchase history, etc., operator for comparing with relevant value, actual comparative value, and conjunction for combination of various customer's condition. The "Then" clause is composed of action function for activating push process, target, target kind for object to push, apply filter for filtering candidate of rule, apply count for push count. Defining the multiple conditions and one action does creating one rule for pushing personalized content with the rule maker. Based of each token generated by rule interpreter the rule-matching engine generates relevant SQL statement, and query is sent to database. Result of query is compared with token value, and output of matching process is true or false. Needed information of matching is customer profile, customer's purchase history, and order information, catalog and product information of web site.

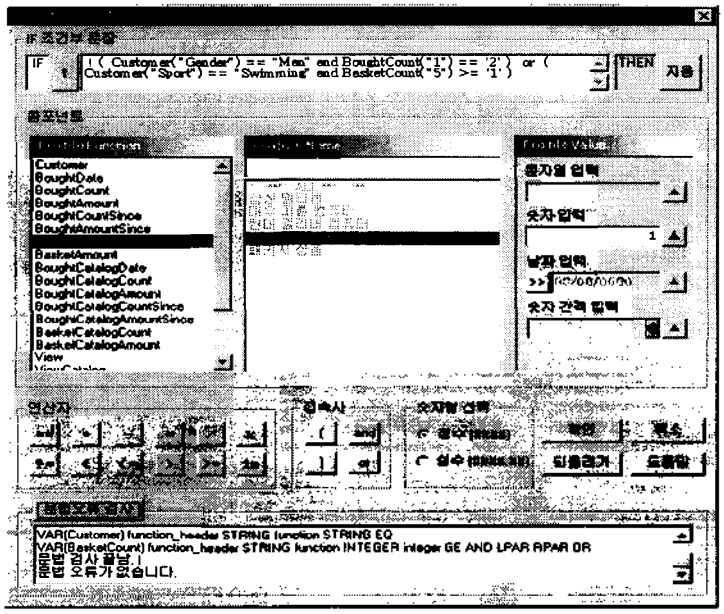

Figure 3. Rule editor for composition.

The rule in advance was generated by rulemaker at client side (Figure 3.), and rulemaker store the rule to knowledge database at agents database. One-to-one analysis engine has ability that market basket analysis and user profile analysis, and potential customer extraction etc. Then, content generator generates personalized content from the matched result. Actually contents represent all personalized services: push(target-marketing, cross-selling, up-selling, target-advertisement), profile updating, and target-e-mail,

etc.[1] Mail manager send event to analysis engine in order to get the relevant personalized information and transfer information of composition to template e-mail generator. E-mail template or HTML template already was stored in database. Personalized e-mail was composed of general comment, personalized content and various multimedia. Mail scheduler sends e-mail to SMTP server (sendmail) by schedule. Finally, HTML template generator converts the template to complete html file. The merchant selects appropriate content that will appeal to customer based on rules stored in HTML template files. The template files also determine how content will be formatted, which means that the design of web site can be separated from the content creation - making it easier to develop and maintain a personalized web site.

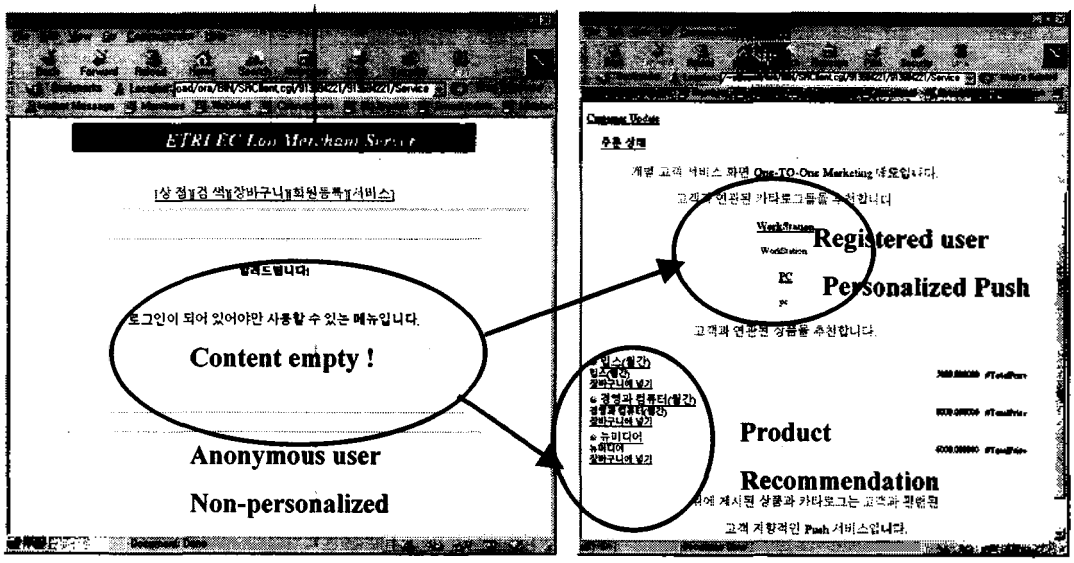

Figure 4. Left : anonymous user, Right : Registered user

Figure 4. shows result of experiment in shopping mall. The merchant server first sends a general content when customer entered into shopping mall as anonymous in left window figure. If customer log in shopping mall as registered customer, it sends personalized content to be matched for customer in right window figure. Without feedback process, profile operation was not occurred, and the enhanced one-to-one service will not be provided to the customer.

4. Conclusion

We developed the personalization agent for one-to-one service. The agent has three layer architecture and separated from the legacy web application system and supports rule-based matching technique and personalized e-mail generation. by using information of the customer's profile, purchase history, the immediate customer action. We have applied the technique to personalized merchant server systems. There are various types of information on the cyber shopping mall. Some pages are updated very often,

and some pages are updated only a few times a month or less. Conventional personalized services consider only the personal interest when filtering or sorting information, but our experience in a personalized web page service showed that the feedback system needed to be considered in order to help customers to get relevant information. The integration of the service supply needed to also be considered, especially in push-type services. Using the rule statement to represent the various one-to-one services enables separated services to be handled as one method of rule-based matching technique efficiently. By deploying the rule-based matching technique, web marketer will be capable of targeting single individuals and their unique needs. This will enable web marketers to extend the highest levels of personalized attention and service to all of their customers and to realize new opportunities to serve customers and generate profits.

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