Intelligent Product Brokering and Preference Tracking Services

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BACKGROUND

It has been projected that electronic commerce conducted via mobile devices such as cellular phones and PDAs will become a whopping $25 billion market worldwide by 2006 (Frost & Sullivan, 2002). Some of the driving factors behind mobile commerce (m-commerce) have been attributed to the compactness and high-penetration rate of these mobile devices.

Despite all the hype and promises about m-commerce, however, several main issues will have to be resolved (Morris & Dickinson, 2001; Nwana & Ndumu, 1996, 1997). Clumsy user interfaces, cumbersome applications, low speeds, flaky connections, and expensive services have soured many who have tried m-commerce, and security and privacy concerns have also dampened enthusiasm for m-commerce.

Taking these concerns into account, the developers will have to offer something unique. One of the potential killer applications for m-commerce could be intelligent programs that are able to search and retrieve a personalized set of products from the Internet for their users. These programs are called software agents. Agent-based e-commerce has emerged and software agents have demonstrated tremendous potential in conducting transactional tasks via the Internet.

According to the model from the Maes’s group (Guttman & Maes, 1999), the consumer buying behavior (CBB) can be divided into six stages, namely, need identification, product brokering, merchant brokering, negotiation, payment and delivery, and product service and evaluation. Among these stages, product brokering plays an important role. It involves gathering product or service information, filtering information, recommending products, and so forth.

A user searching for a particular product on the Internet will normally have to use popular search engines and enter keywords that describe the product. These search engines will process these keywords and generate a large number of links for the user to visit. Neither the search engine nor the Web site knows the preference of the user and therefore might provide information that is irrelevant to the user. Hence, user preference tracking becomes one of the fundamental tasks of product-brokering agents.

Agents act on behalf of their users by carrying out delegated tasks automatically. A product-brokering agent will search for the products in the background with minimal user intervention, thereby allowing the user to concentrate on other aspects of the transaction, such as product purchase, bidding, negotiation, and so forth. The agent could be programmed with the user’s preferences in mind and filter out irrelevant products automatically. The agent could also detect shifts in the user’s interests and adjust accordingly to suit the user. Personalized product-brokering agents require a profile of the user in order to function effectively. The agent would also have to be responsive to changes in the user’s interests and be able to search and extract relevant information from outside sources.

At MIT Media Labs, Maes and Sheth (Maes, 1994; Sheth & Maes, 1993) came up with a system to filter and retrieve a personalized set of USENET articles for a particular user by creating and evolving a population of information filtering agents using genetic algorithms (Holland, 1973). Genetic algorithms have been widely used in various applications (Chen & Shahabi, 2002; Farhoodi & Fingar, 1997a). Their superior and flexible performance has motivated their use in software agents.

Some keywords will be provided by the user that represents the user’s interests. Weights are also assigned to each keyword, and the agents will use them to search and retrieve articles from the relevant newsgroups. After reading the articles, the user can either give a positive or negative feedback to the agents via a simple GUI. Positive feedback increases the fitness of the appropriate agents and also the weights of the relevant keywords (vice versa for negative feedback). In the background, the system periodically creates new generations of agents from the fitter species while eliminating the weaker ones. Initial results obtained from their experiments showed that the agents are capable of tracking its user’s interests and recommend mostly relevant articles.

Whereas the researchers at MIT required the user to input their preferences into the system before a profile could be created, Crabtree and Soltysiak (1998) believed...
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