Intelligent Agent Based Model for Auction Service Discovery in Mobile E-Commerce

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ABSTRACT

Internet enabled auctions are one of the popular application which basically require a web service discovery mechanism that is efficient in all perspectives. This paper focuses on auction service discovery and building repository of services for the use of E-customers. The auction service directory (repository) is developed based on the customer's desires. Agent based Belief Desire Intention (BDI) architecture is used in this model, not only to support the service discovery process in spotty or no connectivity network environment but also to automate the process so that it enables the mobile users to complete the discovery process successfully without continuous on-line presence. The simulation results depict that the performance parameters like customer satisfaction, availability of requested services and stability in fetching the services are better in the proposed service discovery model as compared to auction based advertisement facilitated service discovery mechanism.

Keywords: Agent Technology, Auction Directory, Auction Service Discovery, Belief Desire Intention, Mobile Commerce, Semantic Web

INTRODUCTION

Mobile E-commerce is defined as buying and selling of services, information or goods irrespective of locations on hand held mobile devices in wireless network environment and establishes communication between all necessary parties to complete the transactions. Some of the applications are road navigation, location based services, context aware computational services, mobile and virtual health care services, mobile payment, E-auctions with ubiquitous participa-tion etc. These applications are supported by web enabled services. E-auction is a popular mobile E-commerce web application that enables trading of goods and services through a dynamic pricing strategy using hand held devices. Due to the availability of computational resources at a cheaper price and the popularity gained by E-auctions, the auction services on WWW have increased exponentially in number. This has caused a problem for a user in locating the required auction services efficiently from a very large pool of available services. Thus to participate in auctions it becomes essential to discover the active auctions and its details efficiently. The objective of this work is, to

autonomously discover active auction services and build a repository of auction services by employing software agents and BDI (Belief Desire Intention) cognitive architecture. This section presents challenges in auction services discovery, some of the related works and our contributions.

CHALLENGES IN AUCTION SERVICE DISCOVERY

The auction service discovery mechanism for mobile customers in the wireless network poses a number of challenges. The first challenge is that the auction services are dynamic in nature since they join when the auction is about to start or leave the system once the auction closes. Hence the number of auction services in the directory is directly proportional to the number of active auctions at that point of time. This dynamism in the E-market has to be reflected in the service directory (Michel & Kranakis, 2003). Flexibility for entering the discovered services and deleting of the services in a dynamic environment may serve as a solution to this challenge by using a tree data structure that has the ability to adapt to changes imposed by creating, updating or deleting services.

Second challenge is achieving better time efficiency and accuracy in locating the required auction services. Conventionally, (Goland, Cai, Leach, & Gu, 1999) the services are categorized and stored sequentially in a server. This causes inefficiency in locating, deleting and adding the new services dynamically. Hence tree data structure may be adopted to organize the web services that provide an efficient and accurate method to locate the web services. The intelligent agent can map the product requested to the appropriate server to search and hence reduces the search space. Further to increase the time efficiency of the searching process, cognitive science based BDI agent architectures may be employed. The belief set in the BDI agent architecture acts as a cache memory that stores the details of frequently requested services. This

helps to improve the turnaround/service access time for most of the user request.

Third challenge is the requirement of autonomy in service discovery. Generally the active auction services are being searched manually (Dipanjan, Filip, Sasikanth, & Anupam, 2001) which is time consuming and also needs continuous human interaction with the servers on the Internet till it is completed. Hence automation of service discovery is required which will ease the role of the user. Automation of the discovery process may be supported by software agents due to their ability to perform autonomous task execution adjusted by their owner profile and the current state of the surrounding environment.

Fourth challenge is that synchronous communication is required between the mobile service requester and provider till the completion of the transaction (Mecar, Devlic, & Trzec, 2005). This implies that the Internet connectivity is required till the completion of the transaction which is practically difficult as the users/requesters/clients are mobile. As an attempt to overcome the connectivity problem, the software agents may be used. This enables wireless users to access and invoke web services without the need for continuous on-line presence of the service requesters. These will complete the given task say for example the auction site searching even when connectivity is spotty or no connectivity is available at the client end.

The greatest challenge is providing non-functional Quality of Service (QoS) to assist in selecting appropriate web services and also to prioritize different applications to guarantee required level to performance in terms of response time, availability of services, stability and customer satisfaction. In addition to this, contextual information as described in Nandini and Sunilkumar (2006) like user, computing, time and history may be used to filter the services during the discovery process. Thus it is necessary to develop a model or a framework which overcomes the mentioned challenges that may emerge as one of the efficient service discovery mechanism.

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