A Multiagent System for Network Information Services

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Mighty advances have been made in the network area and the number and kind of information services offered to the users of the internet increase very rapidly in the past few years. On the other hand, users are eager for the services offered in higher levels. For example, a task can be delegated to an agent and the services can provide knowledge information through cooperative distributed problem solving among multiple agents. In this paper, we present a multiagent system, called MANIS (Multi-Agent Network Information Service), which has integrated several methods for text understanding and offers the text understanding services over network.

MANIS is organized as a market-like system. It has four components: broker agents, service organizations, the service market management subsystem and the computational resource market management subsystem.

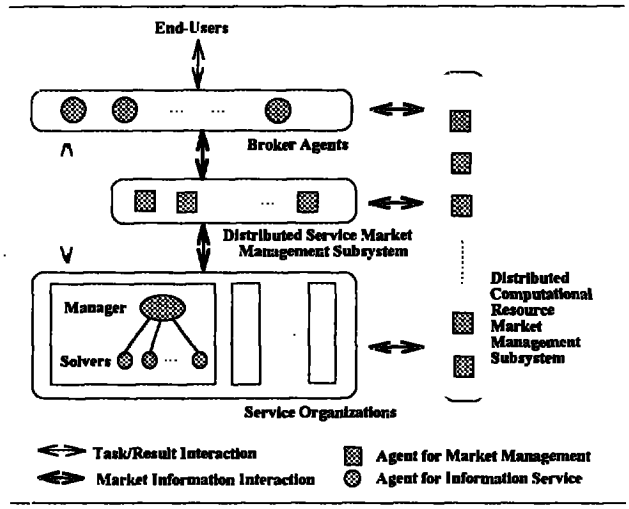

Figure 1: The Market-like Organization Model of MANIS

Broker agents are responsible for interacting with the end-users and choosing among services offered by service organizations. The manager is the representative of a service organization. It contracts tasks with the brokers, then allocates them to the agents, called solvers, which are responsible for problem solving. From the perspective of broker agents, the service organization is just a server agent identified by the manager. Agents in the service market management subsystem gather the information of server agents. Every kind of services is corresponding to a sub-market which contains the current information of that service. Agents in the computational resource market management subsystem are responsible for gathering the information of computational resources, such as the computing speed, and provide a place for sharing the expectant information of computational resources according to which agents could make the decisions on self-reorganization.

Two kinds of system agents are also provided in MANIS. They are agents for communication (referred simply to CAs) and agents for computational resource management (referred to RAs). Every host has a CA and a RA at least, and application agents, as mentioned above, links to them in a federation architecture which is similar to the architecture in the ABSE project except that there are RAs which are responsible for managing the limited computational resources of the hosts of MANIS.

Three strategies for the choice of alternative server agents are integrated in MANIS which emphasize learning from the history of interaction and evolve from the strategies that have been formally defined and experimentally analyzed in the TUMIT testbed (Wang & Shi 95). In order to facilitate the self-organization of server agents via decomposition/composition adapting to the task load, we also present a social agent framework in which an agent is viewed as the locus of knowledge and action and represented as an organization of the intelligence entities competing for the sharing and limited computational resources of the agent based on the DAI social organization theory and the OBCP theory. Thus, an agent engages in organizational computing and the problem of limited resources must be considered carefully.

MANIS is an ongoing project which is implemented in C++ language on the platform of Solaris2.4. Future work in the following areas is in progress: (1) the social agent framework; (2) the services not limited to text understanding; (3) the implementation on the Java platform.

References

Wang,X.; and Shi,C. 1995. A Text Understanding Oriented Multiagent Dynamic Interaction Testbed: Theoretic Framework, System Architecture and Experimentation. In Proceedings of 1995 IEEE International Conference on System, Man, and Cybernetics, 800-805.