A Review of Modeling and Design of Intelligent Agent System

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Abstract
In this paper, we review the modeling and design of an Intelligent Agent System (IAS), in order to achieve this goal; we reviewed several kinds of agents that exhibit intelligent features. They are the main agent, management agent, watcher agent, report agent and application agent. We identify their features, areas of application and limitations.

Keywords: Intelligent, agent, management agent, pattern classification, bank asset management system;

1. **Introduction**

Recently, a more intelligent and user-friendly interface system has been introduced, in the form of an agent that can act in the place of a human being. An agent is an information processing I assumed that this was meant to be a general introductory statement program that can be applied to numerous fields.

Intelligent agents can be classified into several different categories [13]. Firstly, they can be divided into non-cooperative and cooperative intelligent agents, depending on their ability to cooperate with each other for the execution of their tasks. The second category is referred to as rational intelligent agents and comprises agents that are utilitarian in an economic sense. They act and collaborate to maximize their profit and can be applied to automated trading and electronic commerce. The third class of intelligent agents comprises adaptive intelligent agents that are able to adapt themselves and can be applied to learning personal assistants on the Web. Fourthly, mobile intelligent agents are a particular category of agents, which can travel autonomously through the Internet, and can be applied to such tasks as dynamic load balancing among information servers and reducing the volume of data transfers. The field of intelligent agents has seen rapid growth over the last decade and such agents now constitute powerful tools that are utilized in most industrial applications. Recently, the use of intelligent agents has been applied to such applications as intelligent user interfaces [12, 13], autonomous agents [10, 11], vision systems [1], knowledge discovery and data mining [4], information retrieval [3, 8], electronic commerce [2], personal assistants used on the web [10], fuzzy decisions, and decision making in complex environments [14].

An intelligent agent is generally considered to be an autonomous system that can obtain synergy effects by combining a practical user interface, on the one hand, and an intelligent system based on Artificial Intelligence, Neural Networks and fuzzy theory, on the other hand.

At present, however, intelligent agents are still in their infancy, merely providing a user interface, while the implementation of intelligent agent theory and the practical application of intelligent fusion technology are still on the starting blocks.

Moreover, the problems related to the establishment of efficient connections between agents, job distribution between agents, and the handling of conflicts and errors between agents have not yet been solved. However, this kind of problem can arise in any kind of application that is based on intelligent agents.

In this paper, we review a model and design for an intelligent agent system, which helps the user in a user-friendly fashion.

2. INTELLIGENT AGENT SYSTEM (IAS)

2.1. Modeling of the IAS

The intelligent agent system described in this paper, hereafter referred to as IAS, consists of 5 agents, the

main agent, management agent, application agent, watcher agent and report agent [6]. The basic architecture of IAS is illustrated in Fig. 1.

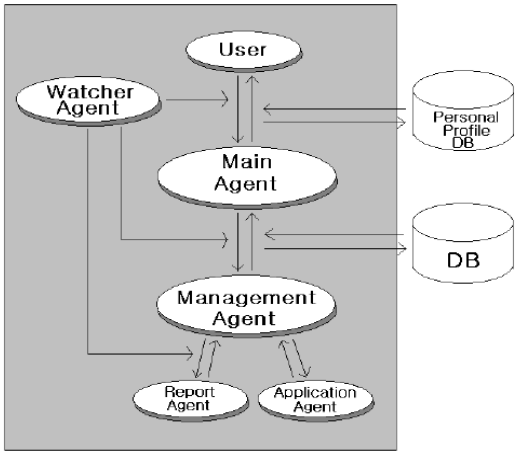

Figure. 1. Basic architecture of IAS.

2.2. Major role of each agent

Main agent: The main agent operates in a manner designed to be very friendly to the user, by adapting itself to the situation with which it is confronted. It maintains the agent list, remembers the role of each agent and controls all of the agents. When the user first addresses the system, it explains the necessary operating procedures. It allows the user's personal profile to be input and stores it in the personal profile database. The interactions between the User and the
Main Agent is illustrated in Fig. 2.

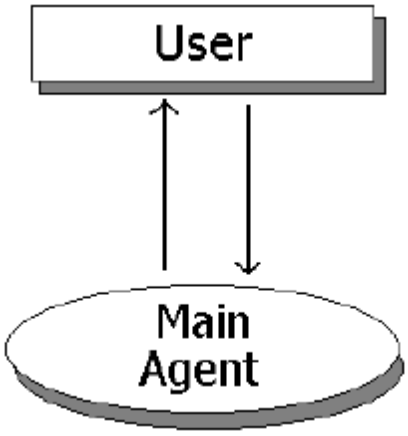

Fig. 2. Interactions between user and main agent.

1) User interacts with main agent
2) Main agent responds in a user friendly fashion and searches for the job that the user wants to execute.

Management agent: This agent has overall control over the other agents. If it receives a message from another agent, it selects a suitable agent for the message and activates this agent. In this particular system, it acts as a fuzzy converting system, when ambiguous requests are given, and returns a tuple of fuzzy values to the next step, the banking agent.

Application agent: The application agent receives information from the management agent and performs the requested task. It also recovers information from the Goods DB.

Watcher agent: This agent watches for messages between agents and keeps track of which agent is currently activated. If there is a conflict between agents or if events do not occur in the right order, it sends a warning message to the user by means of a pop up window. If a fatal error occurs, it terminates the operation of the currently activated agent and returns to the previous step. It operates using a stack structure, that is, LIFO (Last In First Out).

Report agent: This agent shows the final results to the user in a very friendly way, by means of a list, graph or diagram.

Management agent: This agent inferences the pattern class method that the user wants to use, and decides which agent to execute in which order. It handles any errors which arise between the different agents.

1) The management agent calls the pattern classification agent and orders it to perform what the user requested.
2) The pattern classification agent calls the management agent once it has completed its task, in order to inform it that the requested job is finished.
3) The management agent calls the graphic agent and displays the results.

Pattern Classification Agent: This agent receives data from the main agent and applies the pattern classification algorithm to it, in order to classify the data and the cluster center values. It sends the cluster center information to the management agent, which in turn sends the original data and the cluster center information to the graphic agent.

Graphic Agent: This agent displays the data in an appropriate graphic fashion. If the data is 2-dimensional, it displays a 2-dimensional graphic and cluster center. However, if the data it receives is 3- dimensional, it should recognize this fact, and display a 3-dimensional graphic which the user can clearly understand. If the user tried several Pattern classification methods for a given set of data, it should display several graphic results corresponding to each method which was used.

CONCLUSION

In this paper, we described the modeling and design of an intelligent agent system. We employed several different kinds of agents, each of which exhibits intelligent features.

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