

Creating Virtual Agents with an Agent Customizing Editor

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ABSTRACT

In this paper, we present an agent-customizing editor that facilitates the rapid creation and invocation of personalized, virtual information agents. The agent editor locates a *generic agent* that queries and retrieves information from different information sources. Users customize this agent by specifying the properties of a query, and selecting the required data elements returned in the response. The editor dynamically generates an interface by determining the types of queries the generic agent can generate, and the corresponding data that it obtains. The editor allows the user to specify a set of constraints for the generic agent's parameters, and from these constraints, a *virtual agent* is created. The editor also provides a framework for invoking the virtual agents, and deploying them within a multi-agent community.

Keywords

Agent Editors, Information Agents, Interface Agents, Personalization, Customization

INTRODUCTION

In recent years, software agents have attracted significant interest within the field of Human-Computer Interaction [2,4,5,6,7], as they empower users to work more effectively, by assisting, filtering, and navigating the plethora of information sources that are available. These agents may provide specialized or periodic information from certain information sources, or may perform some task or service based on the information they are given [1]. There are several different types of agents [8], including interface agents and information agents. Interface agents interact with the user, providing a mechanism whereby humans can specify tasks and inspect the results. They may acquire, model, and utilize user preferences to guide system coordination in support of the user's tasks [4,7]. Information agents provide intelligent access to different data sources, and as such may query a database directly, or

may locate information on the World-Wide Web [2].

Agents that exist within an open environment require some mechanism to locate other agents in order to achieve their goals. Another class of agents, known as middle agents, is responsible for providing services that assist agents with locating other agents. One sub-class of middle agents are generally known as *matchmakers*, *yellow pages* or *directory agent* systems [3,9]. Information agents can advertise their capabilities with these middle agents. Thus, if an interface (or other) agent needs to locate an agent that possesses certain capabilities (such as being able to return weather forecasts, or current stock prices), it can query the middle agent, which then returns a list of agents whose capabilities match the requirements of the interface agent.

Several different agents modify their behavior to provide personalized assistance. Some agents learn a user model based on observations and dialog with the user [4,6]. However, the integration of a learning mechanism generally makes the agent more complex, and it may take a number of interactions with the user before the agent has determined a user's requirements. We present an alternative approach for personalization, whereby the user can create small, lightweight agents that perform simple tasks, through a dynamic intuitive interface.

CUSTOMIZING INFORMATION AGENTS

Information agents are responsible for locating and retrieving information based on the query generated by a user or another software agent. However, it is the user's responsibility to generate the appropriate query, and extract the pertinent information from data returned by the information agent. If the information agent has knowledge about the user's preferences, then it can obtain personalized data, thus reducing the workload for the user. For example, the user could customize an agent to determine the current weather conditions for his home city, so that weather report requests could be simplified. In addition, the user might instruct the agent to tailor the weather reports to include only the information she is interested in, such as the 5-day forecast. This customized weather agent could then be reused, each time only providing the user with the desired information.

The agent-customizing editor provides a facility for users to locate and customize generic information agents. These agents can then be advertised with one or more middle agents. However, the customized agents are *virtual agents*, in that they have no physical presence until they are invoked. Thus, many virtual agents can be created through the agent editor and added to an agent community, without the overhead of hosting multiple copies of heavyweight information agents.

The Agent-Customizing Editor (ACE)

The *Agent-Customizing Editor* (ACE) supports both novice and expert users in customizing agents. It guides novice users through a step-by-step interface, and provides an expert-user mode with advanced functionality. The user expresses interest in a category of agents by selecting from a predefined ontology list, or by specifying a search term in plain English. The ACE queries the Matchmaker (middle agent) and retrieves a list of available generic agents. For example, if the user selects “*weather*”, the ACE might find several generic agents that are capable of reporting weather. However, as each agent queries a different data source (such as the CNN or Yahoo! web sites), the information returned by each agent may differ. The user can inspect each agent’s parameters to see which one best matches his needs. For example, the user might choose Yahoo! over CNN as it provides a 5-day forecast as opposed to a 4-day forecast. Once the user chooses a satisfactory generic agent, the interface adapts itself to accommodate the query and return parameters of the chosen agent. The user customizes the agent by specifying constraints to the agent’s parameters, such as instructing the agent to always report the 5-day forecast for her home city “*Pittsburgh, PA*” (see Figure 1 below).

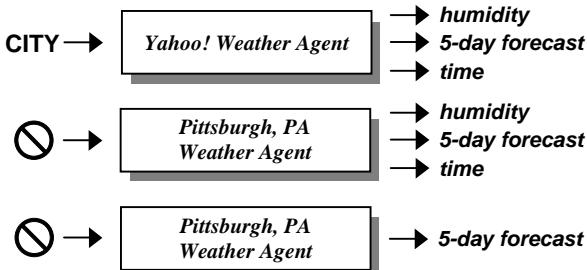


Figure 1: The Yahoo! Weather Agent is customized into a virtual agent that supplies the user only with the desired information: *5-day forecast for his/her hometown of Pittsburgh*.

Based on the user’s preferences, the ACE creates a customized virtual agent that can be launched from within the ACE or as a separate interface. This auto-generated interface gives a physical presence to the virtual agent and provides a means for the user by which to execute queries. The virtual agent’s interface is also responsible for presenting the personalized results information to the user. In this way, an average user with little knowledge about

agents is able to create a custom agent according to his personal preferences.

CONCLUSIONS

The agent-customizing editor is an interface that allows a user to find an appropriate information agent and customize it to perform tasks based on the user’s own preferences. The personalization of a generic agent is achieved by creating a custom virtual agent that is capable of agent-to-agent as well as human-to-agent interaction. To date, customized agents have been successfully created from information agents to simply retrieve user-desired data. We are currently investigating other agent behavior, such as information monitoring, and the possibility of customizing other classes of agents.

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