6. A Virtual-Sales-Assistant Architecture for E-Business Environments

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Abstract

Customer support through virtual-sales-assistants is becoming more important with the growing complexity of the products offered over the Internet. This chapter presents an open system architecture for virtual-sales-assistants, discusses in detail the technical challenges and solutions, and addressed the integration into existing e-business systems.

6.1 Introduction

Particularly in the industrial products sector, automated, intelligent natural-language customer consulting is becoming more and more essential for companies that manufacture complex or high quality products and distribute these products over the Internet.

Most consulting systems are based either on multiagent technologies, but can not be easily integrated into e-business environments or on simpler pattern recognition methods which do not provide acceptable dialogue capabilities. A prominent factor for the success of an innovative Web-based virtual consulting system is the ability to embed advanced scientific approaches into standard e-business infrastructures. Multiagent system architectures are not designed to be integrated into corporate computing environments, which usually follow multitier concepts. The ADVICE project [1] is addressing this problem by developing a flexible, open system architecture which can be easily adapted to a broad variety of e-business scenarios as business portals or shop systems [2].

6.2 ADVICE Overview

ADVICE consists of a multiagent system that generates answers on a semantic level on the basis of the user’s input. Graphically appealing integration of the client frontend into e-business environments is a crucial prerequisite for the
acceptance of a virtual consulting system [3]. To enhance the attractiveness, the character is able to communicate in natural language and to make appropriate gestures and mimics. The data used for controlling the character’s gestures and facial expressions is generated in the ADVICE server system and the corresponding visualization is then displayed on the client system. The gestures and facial expressions are based on the semantics of the answers the system is giving to the user. So-called predefined answers enable the user to choose from a set of given options for response. The system can be activated or deactivated by the user. Both in an activated and in a deactivated state of the virtual character, ADVICE is able to track the actions and behavior of the user in the shop system, so that the ADVICE system is informed at all times about the user’s state of knowledge and is able to start a dialogue on the basis of this information. This information is used in order to avoid sending the user to the root of a dialogue structure within a session again and again after the user has deactivated the advisor and wants to reactivate it again later.

6.2.1 System Architecture

The ADVICE system architecture has been designed to be adaptable to various e-business infrastructures and scenarios. It is based on a multiagent system embedded into a flexible, open four-tier architecture. Therefore it was necessary to find the most suitable technologies for the interaction between the agents residing in the various tiers and the nonagent modules. Because there are different needs and problems in the connections between the different layers, several technologies, such as direct function calls, remote method invocation (RMI) and XML, are used. The system consists of four main software components: (1) the client applet, which includes the 3D virtual sales assistant; (2) a standard Web server running an ADVICE servlet; (3) the ADVICE server with the interface agent, which handles sessions and the linguistic analysis of the user utterances, as well as the generation of the output for the user and the integration into the shop system; and (4) the dialogue processing component (DPC) and the intelligent agent (IA). The agents within the server components (the interface agents, intelligent agent and DPC) form an agent society, communicating by speech acts. Since the types of agents (but not necessarily the number) are limited and the agents are highly specialized, it was not likely to use agent development systems such as the ROPE environment [4]. Figure 6.1 shows an overview of the ADVICE system architecture. The components and their functionality are:

Frontend: The ADVICE system is designed to communicate with different clients. Two client types are implemented for the prototype environment: the first one is a Java applet for execution in a Web browser, and the second one is a mobile phone client.

Webserver and Servlet: The servlet is executed by a Web server in its Java extension. It has the functionality of a gateway between HTTP and Java-RMI. This avoids firewall problems and enables scalability of the system.