Online Air Ticket Reservation System by Using Software Agents

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Abstract

As Agents become more active and sophisticated, their implicit actions become more serious. This paper describes the use of software agents for extracting data and reserving ticket to improve the services. These agents can extract the essential information in a matter of minutes and can reserve this data to support ticket booking (single or round trip) and generate e-ticket on the Web. The system eliminates processing with lots of paperwork and supports making decisions in time. In this system, passenger can make online reservation for every airline and can see all in one site and can get air ticket at remote location without time-consuming and complicated. Here, the system attempts at building a semantic bridge between actual airline data and agent-based travel support system.

Keywords

Agents, software agents, air ticket booking, e-ticket

1. Introduction

An agent-based system can interact much more personally with the users. Agents are sophisticated computer programs that act autonomously on behalf of users because of the flexible and dynamic characters of agents. They are being used widely as an interface system between the user and the World Wide Web for different applications. [1]

In air ticket reservation system, Software agents aim to save time and provide better accuracy and services for passengers. It also supports to get suggestion from passengers and to respond the passenger's inquires rapidly. This system attempts to calculate airway bill easily in so short time and to generate space availability without delay. The traveler can compare and choose different air fares of airlines at the same time. The traveler can make register booking at anywhere and can get the ticket by printing e-ticket. E-ticking (ET) reduces ticket processing charges, eliminates the need for paper and allows flexibility to the passenger.

This system applies serial schedule to avoid deadlock problem. A schedule where the operations of each transaction are executed consecutively without any interleaved operations from other transactions.

2. Related Works

J. Morris and P. Maes discuss the limitations of current on-line auction systems and present their guidelines for more dynamic attribute-based bidding. Their prototype application for airline flight bidding demonstrates their vision for interfaces that facilitate negotiation between buyers and sellers [3]. B. Anckar, S. Olofsson and P.Walden present online self-booking travel sites on the Web, consumers are offered great opportunities for convenient and inexpensive travel bookings. Nevertheless, they face certain problems and limitations in that respect: The booking process tends to be time-consuming and complicated, and the retrieved fares are often expensive. That research suggests that the most significant barriers to online bookings can be eliminated or reduced with a software agent approach. That paper presents the operating environment of a multi-channel software agent application, fare tracer, which has been designed to assist consumers in making their own travel reservations on the Web [4]. C. Gheorghe and I. Zaheu present e-ticketing (ET) is one of the most significant opportunities to reduce costs and improve passenger convenience. It reduces ticket processing charges, eliminated the need for paper and allows greater flexibility to the passenger and travel agent to make changes to the itinerary. "Paperless travel" from the point of view of saving costs and it also shows how the same airline route can have different fares vary with the type of issuing ticket. If passenger loses the e-ticket print-out, he can head for the nearest internet cafe and find the email confirmation to go through the steps and print the e-ticket again [2].

3. Background Theory

3.1 Agent

Agent is a computer system that is situated in some environment and is capable of autonomous action in this environment to meet its design objective. An agent represents the user, helps the user, guides the user, and in some cases, takes unilateral action on the user's behalf. An agent is anything that can be view as perceiving its "environment" through "sensors" and action upon that environment through "actuators". Agents are active, persistent, (software) component that perceives reason, act and communicate. Some people add further characteristics such as autonomy, goal oriented, reactive, declaratively programmed. [1]

3.2 Multi-Agent

Multi-agent System (MAS) is a recent system but widely recognized subdiscipline of Artificial Intelligence (AI). An MAS is a collection of intelligent software agents that coordinate to achieve certain goals. One of the most interesting aspects of MAS is emergent behavior. Emergent behavior is that which is not attributed to any individual agent, but is a global outcome of agent coordination. The MAS approach allows users to be assisted by software agents usually distributed over the network. These agents have different skills and roles trying to support or automate some tasks: they may be dedicated in interfacing the user with the system, managing communities and processing or archiving data, etc.

3.3 Software Agents

Software Agents have evolved from multi-agent system (MAS), which in turn form one of the three broad areas which fall under DAI, the other two being Distributed Problem Solving and parallel AI. Three categories of agents can be distinguished: human agents, hardware agents and software agents are defined as being a software program that can perform specific tasks for a user and possesses a degree of intelligence that permit to perform parts of its tasks autonomously and to interact with its environment in a useful manner.[6]

Software agent technology is a sub-field of the AI (Artificial Intelligence), and currently is a rapidly growing research field. An agent is a software entity capable of acting intelligently on behalf of a user, in order to accomplish a given task. A group of specialized agents cooperate and work together to solve problems that are beyond their individual capabilities. In an open and distributed, multi-agent environment, the need for standard mechanisms and specifications are vital for ensuring interoperability of the autonomous agents. [8]

3.4 Software Agent Properties

Autonomy: agent operates without the direct intervention of humans or others
Social ability: agent interacts or communicates with other agents
Reactivity: agent perceives the environment and responds a timely fashion to changes that occur in it
Pro-activity: agent is able to exhibit goal-directed behavior by taking the initiative
Temporal continuity: agent is continuously running processes map a single input to a single output and then terminate
Goal orientedness: decision how such a task is best split up in smaller sub-tasks, and in which order and in which way these sub-tasks should be best performed, should be made by the agent itself

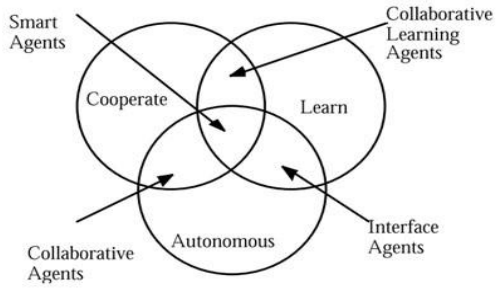

Figure 1. Source: [Software Agents: An overview]

A well known agent classification is presented in Figure 1.

3.5 Coordination

Coordination is defined as the management of interdependencies of activities. Coordination is a process in which agents engaged in order to ensure a community of individual agents act in a coherent manner to improve overall system performance. Coordination agents are designed to accomplish the coordination tasks in order commitment, event /exception handling, conflict resolving, quick response to customer, reducing total logistics cost, and finally adding more value to end customers. [5]

3.6 Agent Communication

Agents in a multi-agent system (MAS) must be able to interact and communicate with each other. This usually requires a common language, an Agent

Communication Language (ACL). Much work has been done in developing ACL that to provide standard communication protocols between agents are declarative, syntactically simple, and readable by people. KQML is the most widely used ACL in multi-agent systems. The language is based on speech act theory performatives, wherein the speaker's intent of the effects of a message on the hearer is communicated by specifying the type of the message, e.g. ask, tell. ACL defines a set of performatives and their meaning (e.g. ask-one). The content of the performative is not standardized, but varies from system to system. To make agents understand each other they have to not speak the same language, but also have a common ontology. [7]

4. Design and Implementation of the Proposed System

4.1. System Flow Diagram of the proposed system

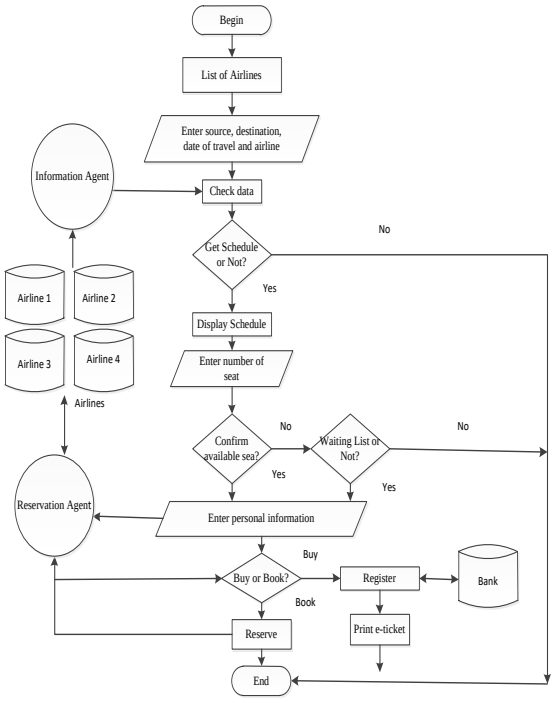

Figure2. System Flow Diagram

The system flow diagram of the proposed system is depicted in Figure2. In this model, firstly, the user enters source, destination, date of travel and airline. And user can also choose single trip or round trip. The system will display the schedule which contains flight number, price per seat, available seat, booking seat, estimation of departure time and arrival time. Secondly, the user requests the number of seats that he needed. The system calculates air fares for user according to the number of seats and confirms whether the seats are available or not. If the seats are unavailable for this booking, the user can be in waiting list. The system will announce the available people in waiting list after cancellation the booking by other users. Otherwise, the user can make reservation until four days before departure date or registration by filling the personal information. The user can register ticket by using bank account number. And then the system checks the account number, which received from user, is valid or not and also checks the balance in that account is enough or not. After checking, the user can print or save e-ticket. The system avoid deadlock problem by using serial schedule.

4.2 Database Design of the Proposed System

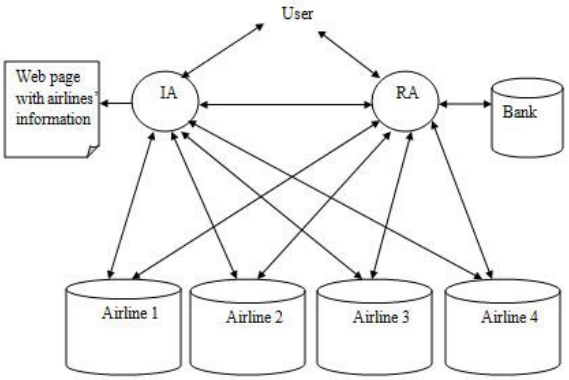

Figure3. Database Design of the System

The database design of the proposed system is presented in Figure 3. There are three kinds of database: airline database, reservation agent database and bank database.

Airline databases have same design and maintain information about airlines in Myanmar. Each airline database contains schedule, plane information, and price information. Schedule of the airline stores schedule code, flight number, source, destination, departure date, expire date for reservation, estimate departure time, estimate arrival time, remark, available seat, booking seat and air line name. Plane info contains flight number, number of seat and plane type. And then, price info keeps source, destination and price per seat.

Reservation Agent Database keeps personal information, waiting list, reservation and registration. Personal information consists of person code, NRC, Email address and age. Waiting list contains waiting list code, schedule code, code of person who waits for getting seat, start waiting date, airline name and number of seat. Reservation keeps reservation code, schedule code, code of person who

reserves for air ticket, reservation date, air line name, total amount, expire date, number of seat and returns schedule code for round trip. And then registration stores registration code, reservation code, schedule code, registration date, total amount, account number of person, airline name for register, returns schedule code for round trip and code of person who registers for trip.

Bank Database stores name of person, NRC, account number and balance in that account.

4.3 Work flow of the Agents

In this section we will provide an overview about the software agents has been developed. There are two fundamental agents in software agents' society, namely Information Agent (IA) and Reservation Agent (RA). The framework of this agent society more or less can be specified by the coordinating manner of the agents. The behavior of each agent is described below:

Information Agent (IA)

IA communicates with user and reservation agent. IA elicits input from the user. IA checks the airlines database and sends it back to the user. If the user already have his own reservation code, IA queries the Reservation Agent about the user's reservation information. And then IA indirectly registers this booking. IA also queries waiting list information and reservation information before cancel booking and waiting list. IA displays notice information for user who are in waiting list and accepts suggestion from user. Most of the data maintenance is automatically done by the information agent.

Reservation Agent (RA)

RA receives from Information Agent. RA sends the information which is required by Information Agent. RA calculates air fares and confirms for seat. RA make waiting list, reservation, registration and print e-ticket.

5. Conclusion

Web technology provides the key to fulfill the business requirements such as to gain maximum productivity, to improve quality, and to set up right decisions in time. As a result, so many advantages are gained from information technology, we attempt to develop and upgrade as e-commerce website for ticket booking system. Ticket booking system provides passenger's requirements and management requirements in performing their tasks such as booking, up-to-date information of Seat Available, printing e-ticket effectively.

The system responds the passenger's inquires rapidly and provides just in time ticket booking. It is convenient for the passengers to get online booking information from all airlines in Myanmar. It saves time, effort and provides better services for Passenger and there is no busy for airline operator. The system provides remote enquiry and remote booking, register booking and printing e-ticket. It also supports to get suggestion from passengers.

6. Limitation and Further Extension

When the user registers for ticket booking, the user requires bank account number. Second limitation is that the user can pay charges only by Myanmar kyat. And third limitation is the user can not cancel for the registered e-ticket as a third limitation.

In the future, this intended to add international airlines. Another great expected extension is to make Hotel Reservation, Car Hiring and so on.

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