Recommending a Trip Plan by Negotiation with a Software Travel Agent

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Abstract. A trip plan is a compromise between the personal preferences and constraints of a traveler and the spatial, temporal, physical, cost constraints of the visiting destinations and environmental support. To recommend a trip plan to a traveler, the travel agent must find a reconciled solution among these constraints. In this paper, we demonstrate a design of a software travel agent who could recommend a trip plan by conducting the negotiation with human travelers. The recommendation and negotiation dialogue for the travel agent is driven by the mechanisms of resolution of constraint violation. In order to ensure the coherence and continuity of the plan negotiation process, we adopt a minimal alternation principle in the mechanism of the resolution of constraint violation. Finally, we illustrate with scenarios with trip plan recommendation for a tourist to Taipei city by negotiation with the software travel agent.

1 Introduction

Recommending a good trip plan for a particular traveler is often not a trivial task for a travel agent. A travel agent has to satisfy not only the customer's personal preferences and constraints, but also the complex spatial, temporal, physical and cost constraints imposed by the transportation methods among visiting spots and various environmental supports such as the availability of hotels. However, a traveler may not often express clearly his or her preferences over a trip plan at the outset unless they get more information about the visiting destinations and itinerary about the trip. Therefore, a travel agent alone cannot always decide a satisfactory trip plan for a traveler without the involvement of the travelers. Communication and negotiation with the traveler is necessary to recommend a satisfactory trip plan for the traveler.

By a trip plan we mean the details about the itinerary as well as the methods of transportation and cost estimation for the whole trip. We are particularly interested in understanding how a travel agent could conduct such kinds of recommendation and negotiation dialogues with the user and come out with a satisfactory trip plan for the user. In this paper, we focus on the techniques of recommendation by negotiation with the user and by satisfying user's personal preferences and domain constraints of various kinds. The recommendation and negotiation dialogue of a travel agent is primarily driven by the mechanisms of resolution of constraint violation.

M. Klusch and F. Zambonelli (Eds): CIA 2001, LNAI 2182, pp. 32–37, 2001.

Ndumu et al. [4] identifies a number of important issues and challenges for the creators of personal travel assistant (PTA) systems that are based on a multi-agent architecture. Another work is the trading agent competition [6] for a travel agent to bid and purchase travel components at different market places in building travel packages for its clients.

2 The System Overview

Our test bed is built upon JADE [7]. The system is a simple travel application composed of a travel agent and a user interface agent

The user interface agent simply provides a user with many friendly interfaces. One is an interaction form (Figure 1), by which a user can specify his preferences for the trip and request the travel agent to arrange such a plan. When the travel agent completes the request, a resulting trip plan is returned and displayed in the plan displaying area. If a user is not satisfied with the plan, he may press the "modify" button to the right of the plan displaying area and a modification dialog box (Figure 2) will pops up to help the user to modify the plan.

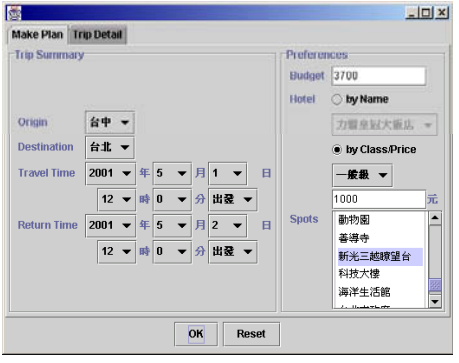

Fig. 1. The interaction form

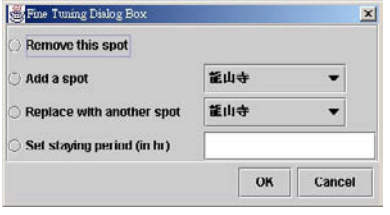

Fig. 2. The modification dialog box

The travel agent is the service center of the system, which provides several services including building a trip plan and modifications of an existing plan. A travel agent consists of a trip planner, a context user model, an inconsistency manager and a travel database about the locations and attributes of possible visiting spots, hotels and other traveling options. The context user model keeps the likes and dislikes of a user. Unlike user models of the long-term preferences, it is only concerned about the favors and disfavors in the current dialogue context. Whenever a service request is received, the travel agent first updates the context user model according to the request. Then it employs the trip planner to accomplish the user's request. The behaviors of the trip planner are constrained by both context user model and the domain constraints. If the trip planner fails to accomplish its tasks for the user by over-constraining the trip plan