Chapter 12

Personal Tour: A Multi-Agent Recommender System of Travel Packages

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ABSTRACT

This chapter describes the Personal Tour: a multi-agent recommender system designed to help users to find best travel packages according to their preferences. Personal Tour is based on the collaboration of multiple agents exchanging information stored in their local knowledge bases. Based on the paradigm of the Distributed Artificial Intelligence, a user recommendation request is divided into partial recommendations handled by different agents, each one maintaining incomplete information that may be useful to compose a recommendation.

INTRODUCTION

Users of e-Commerce Web sites still face the information overload problem. Recommender Systems (RSs) have been proposed and developed to cope with this problem (Resnick et al., 1994), and more in general to support the information selection and decision making processes on e-Commerce Web sites. These systems are being applied in different domains (Gunawardana & Meek, 2009).

Multi-agent recommender systems are being used for managing information from different sources in domains where the knowledge is distributed. Agents are able to retrieve, filter and use information that may be relevant to recommendation decision process.
This paper presents Personal Tour, a multi-agent recommender system that helps users to find travel packages according to their preferences. Agents can exploit knowledge about previous recommendations in order to determine solutions that suit the wishes and needs of a customer. They are able to aggregate information and match the recommendations with the information that the user is looking for.

Personal Tour has features that help to generate better recommendations, such as:

- Agents are able to perform parts of the recommendation (for example, locomotion ways) in order to cooperate for presenting the final recommendation to the user (the whole travel package);
- Agents are able to exchange information with other agents from the community when necessary;
- Agents become experts in specific part of the recommendation;
- Agents have specific knowledge (for example, alternative flights from different companies) and they are able to search for information needed for the recommendation in their own knowledge bases.

This paper is organized as follow: presented first is the related work in multi-agent recommender systems, followed by the Personal Tour and its components, then some experiments done in order to validate the system are discussed and finally, the last section presents some conclusions and future work.

**RELATED WORK**

Multi-agent models have been applied to retrieve, filter and use information relevant to the requested recommendations. MAPWEB (Camacho et al., 2006), for example, is a multi-agent approach that plans travels according to the preferences of the user. It has 4 different agents: UserAgent, that is responsible for the communication between the user and the system; the PlannerAgent, that is responsible for planning the travel; the Webbot, that is responsible for searching information in Internet; and the CoachAgent that acts like a coach for the group of agents, controlling them and assigning tasks to them. The agents are able to store the generated plans as cases and use these cases to build new plans.

The disadvantage of MAPWEB is the fact that the CoachAgent controls and manages the tasks and it controls the possible communications and indicates who must help who. Moreover, there is no process to validate the knowledge of the agents. Agents may work with outdated information during the planning process generating bad recommendations. In Personal Tour there is no central knowledge or task manager, so the division of tasks is made by common agree among the agents in the system and according to the specialty of each agent.

SmartClient (Torrens et al., 2002) is another multi-agent system applied in the tourism domain that helps the user to plan a flight route by representing the space of solutions (recommendations) as constraint satisfaction problems. Users define the departure city, the cities they want to visit and the travel dates. With these preferences in hand, the system builds a constraint satisfaction network able to exploit the possible routes. This approach has a couple of disadvantages. First, it collects route information from the server only once to avoid several costly accesses. That limits the search space because and it is not possible for the user to modify the preferences and to refine the query. Secondly, the domain variables involved in the constraint network are fixed by the system and it is not possible to explore solutions that are not originally in the search space. In Personal Tour users may criticize the recommendation received, refining the query through the modification of the informed preferences.
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