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1 Introduction

The system we are developing is an interactive agent capable of engaging users in a dialog about travel. The agent will serve as a travel "buddy", by expressing an interest in the travel experiences of the user, and by talking about the travel experiences of others. While the primary goal of the agent is to be engaging to each user, it attempts to achieve the primary goal by informing the users of experiences they might enjoy, based on the agent's beliefs about the users.

2 Motivation

Many existing interactive agents are essentially elaborate user interfaces for case-based reasoning backends or other data retrieval processes. Additionally, the notion of a basic companion agent has been extensively researched. Our motivation is to provide a hybrid agent which provides enjoyable interaction for users while also providing indirect access to a knowledge base of data on a specific topic. This also allows for a scalable system, which could easily be extended with more topic components, adding depth to dialogues with users.

Rather than viewing the solution as a specific piece of information, our process harnesses the combined knowledge of other users into one agent. This agent is able to use its a complex user model and extensive knowledge base to engage a user in discovering their own solution. We feel that this approach increases the willingness to interact with the agent, thus giving more opportunities to solve a problem.

3 Related Work

A joint project between researchers in the U.K. and Finland developed an Embodied Conversational Agent (ECA) to assist users in planning their day and reminding them to perform healthy activities. The system works by learning about the users daily activity by engaging them in everyday conversation. Rather than requesting specific knowledge from the user, the conversational approach is more natural for the user, although it relies on the agent making more inferences on its own. The beliefs of the system are then used to develop a healthy plan for each day and the plan is used to make suggestions to the user.

For example, the agent may learn that the user often has free time before work and suggest to the user that they go to the gym before work. At the end of the day, the agent will then follow up and inquire as to whether the user went to the gym or not. Through this approach, the agent attempts to be less intrusive in the users life, while still providing a relevant service in a friendly way.

In an earlier work conducted by a research group in Italy an Intelligent Travel Recommender (ITR) was developed which used case-based reasoning to provide the user with suitable suggestions concerning destination, accommodation and activities for an

upcoming trip. The system uses a very simple interface for gathering the user's preferences and attempts to match their input to its trip databases. In case of failure, i.e. no matched could be found, it suggests a set of relaxations to the user's selected preferences. Additional to this the system exploits case similarity with older sessions to rank the results of the user query by computing the similarities of the items of the current query to those obtained in similar previous sessions.

The ITR is not a travel agent and doesn't try to come up with a conclusive travel plan, it rather suggests suitable locations, activities, etc. and lets the user collect the various trip components in their "travel bag" for later review much like a shopping cart at an online shop.

4 Analysis

Our analysis will be broken into several steps. At the base level, our discovery process will include interviews with "experienced travellers". These people will be used to gather information for our knowledge base, as well as provide us with an idea of topics of discussion during a conversation about travel. Other travel information will be gathered, as needed, from travel blogs and forums.

Beyond interviews, the analysis process will include a variety of diagrams showing the interaction of ideas within our knowledge base. Process diagrams will be used to layout the order of events the agent moves through before presenting a response to the user. Influence diagrams will document information in the knowledge base that could potentially change beliefs in other areas. For instance, if the agent adds a belief that a user dislikes hot weather, this will influence beliefs about their enjoyment of locations with warm climates.

5 Design

The system architecture will be made up out of two main components. The first part is the knowledge base which contains all the information about the previous users of the program and all the trips our "friend" knows about. It also contains the user model that the program keeps of the current user, which contains all the beliefs about the user's travel preferences. And also things that are still unknown and need to be known for the "friend" to make a suitable recommendation. The other part is the interpretation and mapping of the user input and the generation of useful agent output, both in the form of text.

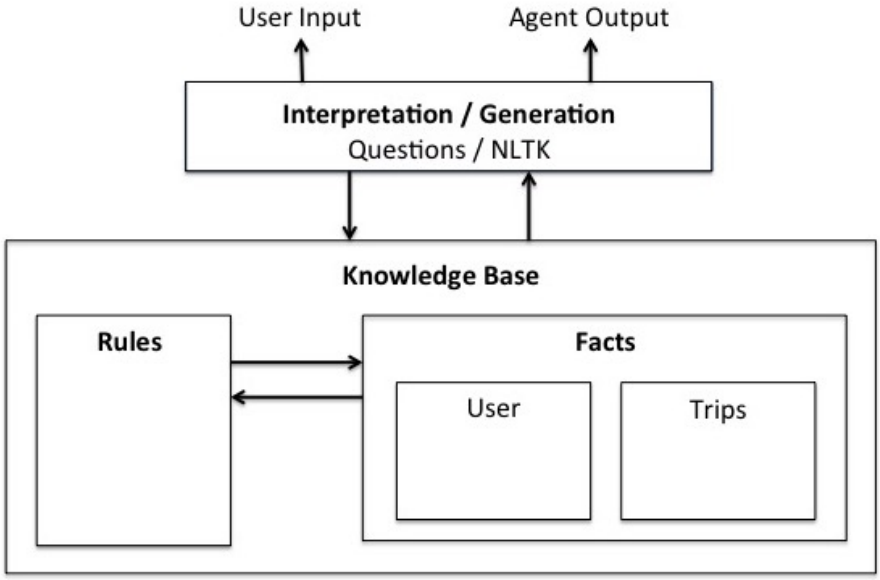

Figure 1: Proposed design for the overall architecture.

The agent itself will be written and designed using the knowledge engine, PyKE, which is a Python module for logic programming based on the popular PROLOG language. PyKE provides us with three kinds of knowledge bases, the Knowledge Fact Base, the Knowledge Rule Base and the Knowledge Question Base.

The Knowledge Fact Base will contain all the facts we know about the user, such as; name, previous trips, travel possessions, the trips themselves (with associated locations, weather conditions, interesting sites, attractions, and activities).

The Rule Base will be used to encode how the program will make connections between the user's preferences stored as beliefs and the trips. It will also try to match the user to other users in its knowledge base to find trips that similar users have taken and enjoyed and recommend them to the current user.

The Question Base can be used to store questions to ask the user to enquire about their preferences. The structure of this seems a little inflexible though upon first impression since we aim for a more natural feeling dialog than pre-coded questions so the usefulness of this tool for our system is still up for debate.

A different option for realising a natural language user dialog is employing the Natural Language Toolkit (NLTK) for python. NLTK provides different modules for natural language processing such as lexicons, parsers or text classification that can be used to map the user input to a number of discourse acts in order to extract the relevant information and update the belief system.

6 References

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