A Recommender for Mobility as a Service

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1 Introduction

Mobility as a Service (MaaS) is a new mobility paradigm that aims to provide integrated and seamless access to transport services through one single digital platform [1]. The key concept behind MaaS is to place the user at the core of transport services by offering them bundled mobility solutions according to their individual needs. In this respect, users acquire and use "MaaS plans" that fit their transport needs. In a MaaS environment there can be a multitude of MaaS plans in order to meet the specific needs of different types of travelers, which are derived from all combinations of available transport services. For example, MaaS plans can combine and include public transport, taxi, car sharing, bike sharing, car rental and/or other related services such as parking, e-vehicle charging stations. It is evident that the selection space of MaaS plans for end users increases according to the available transport services, the combinations of which can generate large choice sets with complex structures. Moreover, travelers are not that familiar with the MaaS concept where mobility services are bundled. Consequently, finding a MaaS product that is aligned to the individual traveler's needs and preferences quickly and accurately is a cognitive task that travelers will not be able to manage easily.

2 Approach

Our goal is to supports travelers' decisions related to the selection of MaaS plans that match their preferences and needs by filtering and ranking the available MaaS plans. The proposed approach (Figure 1) is based on knowledge-based RS and specifically those that rely on Constraint Programming [2].

First, we provide a MaaS plans configurator tool to the MaaS operator in order to generate the appropriate list of available MaaS plans that will be offered to the user to choose from. Next, a knowledge engineer feeds the system with his/her expertise in the form of MaaS constraints e.g. "If a user does not possess a driving license, s/he will not be recommended with Car Sharing offerings in the MaaS plan". End-users' preferences are captured by explicitly asking them to answer a range of questions e.g. "How often do you use Public Transport?" provided by a knowledge acquisition interface. All the aforementioned information along with the available plans, are maintained in a knowledge base. Available MaaS plans are filtered when the MaaS constraints are applied in order to select those plans that match the user's preferences, concluding in a list of remaining MaaS plans

The ranking of the remaining plans is performed with the use of the Euclidean distance similarity metric. More specifically, in order to calculate the similarity between users we assemble a User Profile vector and MaaS plans vector. The result is a ranked list of MaaS plans where the top product is the most similar MaaS product to the user preferences. See [3] for a detailed description of our approach.

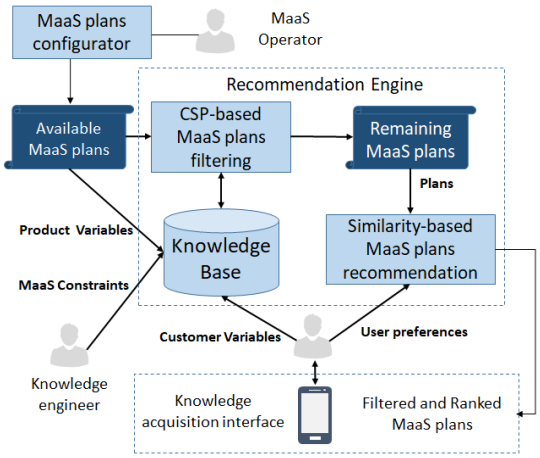

Figure 1: Overview of our knowledge-based CSP and similarity-based MaaS plans recommender.

3 Future Work

Our recommender combines the Constraint Satisfaction Problem theory, with a similarity mechanism based on the Euclidean distance. We are in the process of evaluating our proposed approach in real life conditions where travelers from the cities of Manchester, Budapest and Luxemburg will be using a MaaS app integrating the mobility plans recommender. Our aim will be to examine the effectiveness of our approach when suggesting MaaS plans to travelers. Moreover, we plan to explore how our knowledge-based approach can be combined with a data-driven one, by analyzing user mobility data such as GPS tracks in order to automatically infer user preferences and understand how these change in time. Our aim is to continuously adapt the recommended plans according to the changing user preferences, while overcoming the so-called knowledge acquisition challenge.

REFERENCES

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