

# The Lookahead Principle for Preference Elicitation: Experimental Results

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**Abstract.** Preference-based search is the problem of finding an item that matches best with a user's preferences. User studies show that example-based tools for preference-based search can achieve significantly higher accuracy when they are complemented with suggestions chosen to inform users about the available choices.

We discuss the problem of eliciting preferences in example-based tools and present the lookahead principle for generating suggestions. We compare two different implementations of this principle and we analyze logs of real user interactions to evaluate them.

## 1 Introduction

People increasingly rely on web applications to search products in online catalogs. It is common to let the user express preferences on attributes and then let a database system find the most preferred item according to these preferences. We call this task *preference-based search*.

The most common search facility is based on a form that is directly mapped to a database query and returns a list of the most suitable options. The user has the option to return to the initial page and change his preferences and then carry out a new search. This is the case for example when searching for flights on the most popular travel web sites<sup>1,2</sup>. Such tools are only as good as the query the user formulates. A study [3] has shown that among the users of such sites only 18% are satisfied with their final choice.

Database researchers have studied query systems that evaluate predicates with a continuous degree of validity and allow partial matches, as in fuzzy sql (FSQL) [2] and **Preference SQL** [8].

A key issue for preference-based search systems is how to acquire or learn preferences from the user.

One way to obtain the user model is to elicit it by a set of questions. However, it has been shown that this can lead to significant inaccuracies in the user model,

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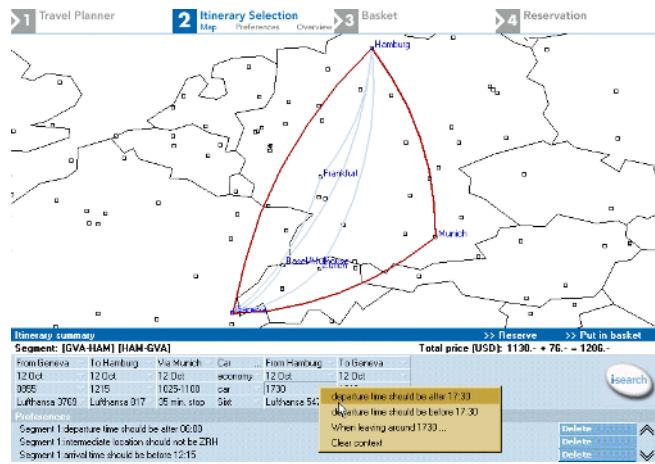
<sup>1</sup> <http://www.travelocity.com/>

<sup>2</sup> <http://www.expedia.com>

because users may not be able to give the correct answer at the time that they are asked by the elicitor [14]. In most cases, users do not know exactly what they are looking for: they might consider different trade-offs or they might even have conflicting desires about the features the item should have. Psychological studies [11] have shown that people construct their preferences while learning about the available products. Therefore preference-based search should also help users in formulating accurate preferences.

An alternative that often results in models of higher quality is to let users volunteer their preferences. For example, in [10] it has been shown that in a collaborative filtering system, letting users themselves propose items they want to rate yields better results than a strategy where the items are chosen to optimally elicit the preference model.

An interesting technique for letting users volunteer their preferences is an interaction where the system shows proposed options and lets users express their preferences as *critiques* stimulated by these examples. This technique is called *example* or *candidate* critiquing, and has been explored by several authors [5, 9, 18, 17].



**Fig. 1.** Isy-travel is an example-critiquing tool for planning business-trips. Here the user is planning a one-day trip from Geneva to Hamburg. The preference model is shown at the bottom, and the user can state additional preferences by clicking on features of the shown example.

Figure 1 shows Isy-travel, a commercial tool for business travelers [12]. Here, the user is shown examples of options that fit the current preference model well. The idea is that an example either is the most preferred one, or there is some aspect in which it can be improved. Thus, on any of the examples, any attribute can be selected as a basis for critiquing. For instance, if the arrival time is too late, then this can be critiqued. The critique then becomes an additional preference in the model.