Facet Selection Algorithms for Web Product Search

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Online product search has nowadays become more important than ever, as consumers purchase more often on the Web [1]. A commonly used interaction paradigm in Web shops is the multifaceted search. Because of the large amount of possible product attributes, Web shops usually make use of static information to determine which facets should be displayed. Unfortunately, this approach does not take into account the user query, leading to a non-optimal facet drill down process.

In this paper, we focus on automatic facet selection, with the goal of minimizing the number of steps needed to find the desired product. We benchmark our proposed methods against those presented in [3]. The authors of [3] investigate how facet optimization can be performed for general-purpose Web documents. Three different strategies for simulating a faceted search session are employed in their evaluation. For our evaluation, we use the same simulation strategies because they cover a wide range of user types and doing so allows for a more fair comparison than when we would have come up with new simulation strategies.

The proposed facet selection methods share a few characteristics that are important to mention. First, they all rely on a model of the facet drill down process that is proposed in [2, 3]. We extend this drill-down process model with the possibility that multiple clicks (i.e., drill downs) can occur before a session is finished. Second, the methods are implicitly minimizing a search effort reduction cost function with the selected facets.

From [3], we include two of their proposed facet selection methods, which assume that a user is fully aware of the complete facets space. Both of these methods are minimizing the cost function by employing an utility-based approach. The difference between these methods is that one assumes a users picks the best facet on at a time, while the other assumes that a user will pick all the facets that belong to the target product at once.

We propose two new methods for facet selection. The first employs a hybrid approach that combines an entropy-based and utility-maximization algorithm to achieve better performance. The second proposed approach is adding a random effect in the mix, in order to escape local minima of the cost-reduction function. Furthermore, we include three additional baseline algorithms (two of which

are also used in [3]).

We implement our approach in a Web application called faccy.net. The evaluation is based on simulations employing 1000 queries, 980 products, 487 facets, and three drill down simulation strategies. As evaluation metrics we use the average number of clicks, the average utility, and the top-10 promotion percentage. The results show that one of our proposed algorithms significantly outperforms the other considered algorithms.

In future work, we would like to integrate the user selected facets in the optimization process. Such an approach might be able to learn from the clicking behavior of a user and improve the overall performance. Furthermore, we plan to evaluate our proposed approaches in a user-based study, measuring other performance aspects, such as the total time of a drill down process.

In his talk, Damir Vandic, PhD student at the Erasmus University Rotterdam, will discuss the results of this study. First, Damir Vandic will present the evaluated algorithms for facet selection in product search engines. Then, the results of the evaluation will be presented, contrasting the performance of the algorithms against the different strategies used for simulating user behavior. The work presented here follows from a recent publication [4].

References

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