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Improving Query Suggestions Based On Search Box Edits

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ABSTRACT

Users often enter terms into a search box and then modify the query. Such modifications may be based on, e.g., the real-time query suggestions offered by the search engine, or the user thinking of a different phrasing for the query. Such changes to entered search terms prior to executing the search are not captured in the search history, and are not taken into account for tailoring post-search query suggestions or search results. This disclosure describes the use of a trained machine learning model to customize query suggestions and/or search results based on terms previously typed in the search box, obtained with the user's permission.

KEYWORDS

- Search engine
- Search history
- Query terms
- Query suggestions
- Search suggestions
- Query editing
- Query modification

BACKGROUND

People use a search engine to look up information using search queries related to their information needs. Search engines provide search suggestions as the user starts entering their query in a search box. For example, if the user starts typing "eras" suggestions such as "eraser" "erase tool" etc. may be automatically provided in the search box.

If the user permits, the user's history of past searches is taken into account when making query suggestions and/or displaying results for the current query. For example, if a user searches for "eraser," (which can refer to a film by the name, to a software tool, to the common object eraser, etc.) followed by a search for "art supplies," a suggested post-search search query for a subsequent search with the term "eraser" can be "eraser art." Similarly, the relevance of the results retrieved for a subsequent search related to "eraser" is adjusted by taking into account the user's past search for "art supplies" subsequent to the initial search for "eraser."

However, after entering search terms in the search box, users do not always proceed with retrieving the corresponding results by clicking the search button or pressing enter. In many cases, users type terms into the search box and end up changing the query based on the real-time query suggestions offered by the search engine, or based on their own thinking of a different phrasing for the query. Such modifications to the query prior to viewing search results may be driven by one or more reasons, such as not receiving relevant real-time query suggestions and realizing that the entered terms need to be changed to get desired results, the real-time query suggestions serving as a reminder of an alternate search, etc. Such changes to entered search terms prior to executing the search are not captured in search history. Therefore, initially entered search terms that are edited prior to issuing the query to the search engine are not taken into account for tailoring post-search query suggestions or in identifying search results.

DESCRIPTION

This disclosure describes techniques for search engines to customize query suggestions and/or search results based on terms previously typed in the search box (but not actually utilized to conduct a search), obtained with the user's permission. If the user permits, such customization can incorporate search terms even if the user deletes and/or modifies them prior to issuing the

query to the search engine. For example, consider that a user first types into the search box the terms “common garden flower purple” but changes the query to “purple lily like flower” prior to issuing the query to the search engine. In such a case, a search suggestion provided to the user can include the query “purple lily like flower common in gardens.”

In general, a user can type “term1 term2 term3” into the search box and see various real-query suggestions, such as “term1 term2 term3 suggestion_term1 suggestion_term2 suggestion_term3,” “term1 term2 term3 suggestion_term4 suggestion_term5 suggestion_term6,” etc. The user can then edit the initial terms and ultimately issue the query “term2 suggestion_term1 suggestion_term6 term4 term5” to the search engine. In this case, the user has deleted “term1” and “term3” from the initial input, incorporated “suggestion_term1” and “suggestion_term6” from two of the real-time query suggestions, and added “term4” and “term5” not present in the initial input or in the query suggestions. Next, the user examines the search results and issues a follow up search with the query “term2 suggestion_term6 term3 term4 term5.” With user permission, it can be determined that the results returned for the second query can be considered as highly relevant based on user interactions such as clicking on several of the results, spending time on the results page, navigating to the second page of results, etc.

If the user permits, a suitable machine learning model is trained using data such as above, that can include the initial entered search terms, the real-time editing of the search terms (e.g. the time a user took to delete a term and replace with another term), the terms in the corresponding real-time query suggestions, the terms in the search query that is ultimately issued to the search engine, and the number of returned results that the user clicked or viewed. Once trained, the model can be utilized to generate query suggestions based on the terms entered in the search box, taking into account changes that the user makes to the search terms prior to issuing the query.

The use of a trained machine learning model accommodating the large variety of reasons behind users changing search terms prior to issuing queries.

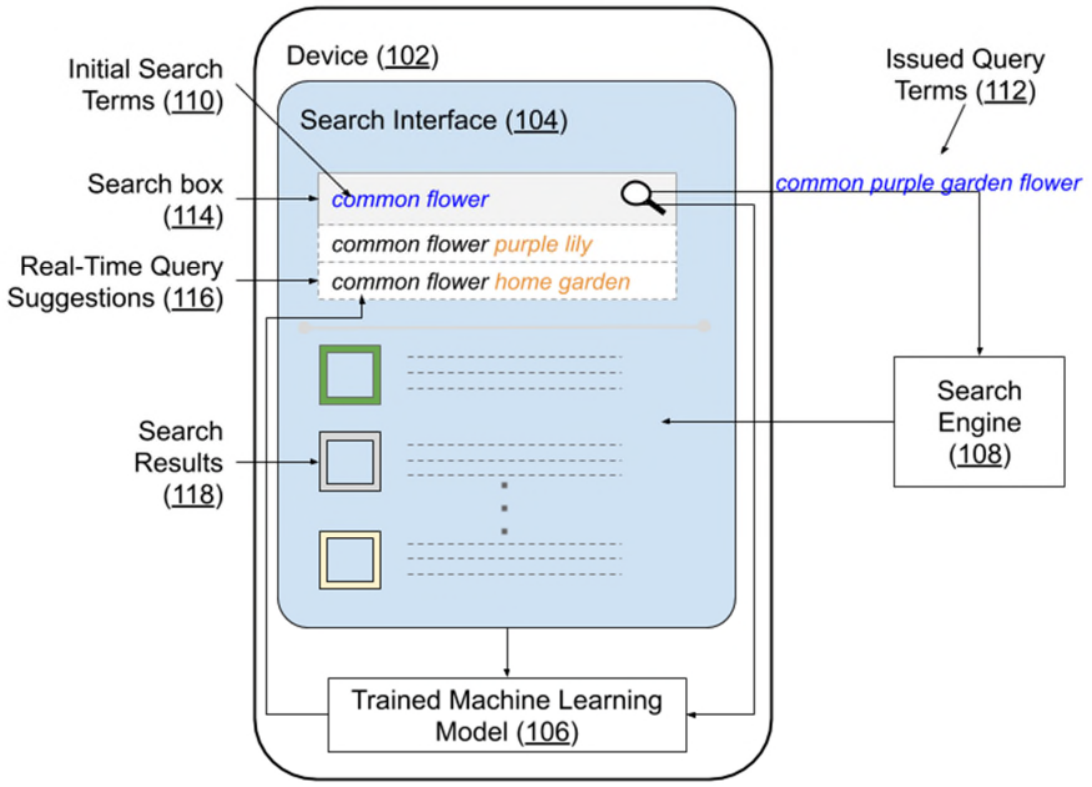

Fig. 1: Enhancing query suggestions based on input edits in the search box

Fig. 1 shows an example of operational implementation of the techniques described in this disclosure. A user enters initial search terms “common flower” (110) in the search box (114) of search interface (104) accessed via a user device (102). Based on the real-time query suggestions (116) related to the initial terms, the user modifies the terms and ultimately issues the query “common purple garden flower” (112). With the user’s permission, the user’s edits in the search box are provided as input to a trained machine learning model (106) to enhance the query suggestions. Further, if the user permits, the user journey of entering and modifying a

query, issuing the query, and the user's interaction with the search results (118) provided by the online search engine (108) can be utilized to further train the machine learning model.

Training of the model can include formulating user journeys as a set of features in the training data. Each row in the training data may be labeled with the number of search results that the user found of interest, e.g., viewed or clicked. Other formulations of training data and any suitable type of machine learning technique can be used.

Implementation of the techniques enables customized query suggestions that take into account additional information regarding the user's query formulation process, indicated by edits made to search terms prior to issuing a query, and how fast/slow the edits are made. The described techniques can use any machine learning model suitable for the purposes. The techniques can be incorporated within a general-purpose search engine as well as any application or service that provides search functionality. Use of the machine learning model that takes into the query formulation journey can enhance the relevance of query suggestions and/or the relevance ranking of search results, thus improving the search user experience (UX).

Further to the descriptions above, a user is provided with controls allowing the user to make an election as to both if and when systems, programs or features described herein may enable collection of user information (e.g., information about a user's search history, search term edits, user's interaction with search results, or a user's preferences), and if the user is sent content or communications from a server. In addition, certain data may be treated in one or more ways before it is stored or used, so that personally identifiable information is removed. For example, a user's identity may be treated so that no personally identifiable information can be determined for the user. Thus, the user may have control over what information is collected about the user, how that information is used, and what information is provided to the user.

CONCLUSION

This disclosure describes the use of a trained machine learning model to customize query suggestions and/or search results based on terms previously typed in the search box, obtained with the user's permission. The model is trained using data based on prior user journeys that can include, with user permission, the initial entered search terms, the terms in the corresponding real-time query suggestions, the ultimate search query, and the search results that were viewed.