Query-Task Mapping

Michael Völske
Ehsan Fatehifar
Benno Stein
Matthias Hagen

Overview

Search engine users submit their queries in order to accomplish some underlying task behind their search.

Previous work on task-based search has established methods for splitting a query log into sets of queries for the same task.

However, the related problem of quickly and accurately mapping a new query to the best-fitting task has received little attention so far.

We present three benchmark datasets, as well as four baseline mapping approaches for the query-task mapping problem.

Benchmark Datasets

We mine tasks from query logs and similar sources, and extend the task size with query suggestions mined from commercial search engines.

Session-based
Combination of Lucchese et al. [1] and Hagen et al. [2] annotated AOL Query Log excerpts.

WikiHow-based
Procedural-Task questions from article titles, considered as same-task if annotated as mutually related by WikiHow users.

Mapping Approaches

Construct an index of the task-split query log during preprocessing ( ). Later, when mapping ( ) a new query, rank the queries in the log and assign the majority task from among the top k matches.

Dataset
Preprocessing time (entire dataset)
Session-based 24.14s
TREC-based 26.90s
WikiHow-based 53.48s
Query-task mapping time (per query)
Session-based 2.80ms
TREC-based 2.95ms
WikiHow-based 4.21ms
Query-task mapping accuracy
Session-based 0.78
TREC-based 0.80
WikiHow-based 0.63

The procedural-task queries from the WikiHow dataset are noisier and harder to map; they benefit more from top-k smoothing.

Searches related to "hotels near villette" best hotel in paris

Sessions
TREC
WikiHow

Index
WMD
LSH
Trie

Tasks Queries Queries per Task

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Tasks</th>
<th>Queries</th>
<th>Queries per Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session-based dataset</td>
<td>223</td>
<td>771</td>
<td>3.5 55</td>
</tr>
<tr>
<td>+ Hagen et al. [2]</td>
<td>1,423</td>
<td>4,502</td>
<td>3.2 147</td>
</tr>
<tr>
<td>+ Google suggestions</td>
<td>1,423</td>
<td>29,441</td>
<td>20.7 924</td>
</tr>
<tr>
<td>+ Bing suggestions</td>
<td>1,423</td>
<td>41,780</td>
<td>29.4 1,368</td>
</tr>
<tr>
<td>TREC-based dataset</td>
<td>150</td>
<td>3,848</td>
<td>25.7 122</td>
</tr>
<tr>
<td>+ Additional TREC topics</td>
<td>276</td>
<td>7,771</td>
<td>28.2 144</td>
</tr>
<tr>
<td>+ Google suggestions</td>
<td>276</td>
<td>38,478</td>
<td>139.4 858</td>
</tr>
<tr>
<td>+ Bing suggestions</td>
<td>276</td>
<td>47,514</td>
<td>172.2 997</td>
</tr>
<tr>
<td>WikiHow-based dataset</td>
<td>7,202</td>
<td>15,914</td>
<td>2.2 22</td>
</tr>
<tr>
<td>+ Google suggestions</td>
<td>7,202</td>
<td>119,283</td>
<td>16.6 197</td>
</tr>
<tr>
<td>+ Bing suggestions</td>
<td>7,202</td>
<td>119,292</td>
<td>16.6 197</td>
</tr>
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Session-based dataset
WikiHow-based dataset

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Read the Paper
Get the Data

Icons by Freepik, Icon Pond, Smashicons from www.flaticon.com


Inverted index of task-split query log
BM25 score

Word mover’s distance

MinHash-LSH of binary term vectors
Estimated Jaccard similarity

Word2vec embeddings

Length of matching prefix

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TREC
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