

Fuzzy logic hybrid model with semantic filtering approach for pseudo relevance feedback-based query expansion

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Abstract

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Abstract:

Individual query expansion term selection methods have been widely investigated in an attempt to improve their performance. Each expansion term selection method has its own weaknesses and strengths. To overcome the weaknesses and utilize the strengths of individual methods, this paper combined multiple term selection methods. In this paper, initially the possibility of improving the overall performance using individual query expansion (QE) term selection methods are explored. Secondly, some well-known rank aggregation approaches are used for combining multiple QE term selection methods. Thirdly, a new fuzzy logic-based QE approach that considers the relevance score produced by different rank aggregation approaches is proposed. The proposed fuzzy logic approach combines different weights of each term using fuzzy rules to infer the weights of the additional query terms. Finally, Word2vec approach is used to filter semantically irrelevant terms obtained after applying the fuzzy logic approach. The experimental results demonstrate that the proposed approaches achieve significant improvements

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Keywords

Metrics

Published in: 2017 IEEE Symposium Series on Computational Intelligence (SSCI)

Date of Conference: 27 November 2017 - 01 December 2017 INSPEC Accession Number: 17560392

Date Added to IEEE Xplore: 05 February 2018

DOI: 10.1109/SSCI.2017.8280930

ISBN Information:

Publisher: IEEE

Conference Location: Honolulu, HI, USA

I. Introduction

Current information retrieval (IR) systems attempt to find relevant information or documents with respect to user needs, modeled through a query from a large data corpus in an appropriate time interval [1]. IR systems are used in several application domains such as web search, digital library search, blog search, information filtering, recommender system and social search. A user query to an IR system contains multiple topic-specific keywords that represent the user's information needs, and ideally, the system returns the relevant documents. However, the user queries are usually short and because natural language is inherently ambiguous, the most critical language issue for retrieval effectiveness is the term mismatch problem: the indexes and the users often do not use the same words. This is known as the vocabulary problem [2]. To address the vocabulary problem, one of the most popular and successful techniques is to expand the original query with

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