

Abstract

Question answering (QA) aims at finding exact answers to a user's natural language question from a large collection of documents. Most QA systems combine information retrieval with extraction techniques to identify a set of likely candidates and then utilize some selection strategy to generate the final answers. This selection process can be very challenging, as it often entails identifying relevant answers amongst many irrelevant ones and ranking the relevant ones to the top positions. To address this challenge, many QA systems have incorporated semantic resources for answer ranking in a single language. However, there has been little research on a generalized probabilistic framework that models the correctness and correlation of answer candidates for multiple languages.

In this thesis, we propose two probabilistic models for answer ranking: independent prediction and joint prediction. The independent prediction model directly estimates the probability of an individual answer candidate given the degree of answer relevance and the amount of supporting evidence provided in a set of answer candidates. The joint prediction model uses an undirected graph to estimate the joint probability of all answer candidates, from which the probability of an individual candidate is inferred. The models consider both the relevance of individual answers as well as their correlation in order to rank the answer candidates. As a general probabilistic framework, the models support answer selection (1) in monolingual QA as well as (2) cross-lingual QA (3) on answer candidates returned by multiple extraction techniques (4) provided by different question answering systems.

An extensive set of experiments was done for monolingual QA (English, Chinese and Japanese) as well as cross-lingual QA (English-to-Chinese and English-to-Japanese) using TREC and NTCIR questions. The empirical results demonstrate the effectiveness of the independent prediction model and the joint prediction model for answer selection in multilingual QA and the joint prediction model is useful to generate a set of unique and comprehensive answers.