

## Chapter 18

# Analysis and Assessment of Cross-Language Question Answering Systems

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### ABSTRACT

*Within the sphere of the web, the overload of information is more notable than in other contexts. Question answering systems (QAS) are presented as an alternative to the traditional information retrieval (IR) systems seeking to offer precise and understandable answers to factual questions instead of showing the user a list of documents related to a given search. Given that the QAS is presented as a substantial advance in the improvement of IR, it becomes necessary to determine its effectiveness for the final user. With this aim, seven studies were undertaken to evaluate: 1) in the first two, the linguistic resources and tools used in these systems for multilingual retrieval (Research 1, Research 2), and 2) the performance and quality of the answers of the main monolingual and multilingual QA of general domain and specialized domain in the web in response to different types of questions and subjects, so that different evaluation means can be applied (Research 3, Research 4, Research 5, Research 6, Research 7).*

### INTRODUCTION

Within the sphere of the Web, the overload of information is more notable than in other contexts. Thus, too often, on planning a search with tools from the Web (search engines, directories, or meta-search engines), the number of web pages found proves excessive and not all of them are relevant or useful for the objectives of the user.

Cross-language information retrieval (CLIR) is an active sub-domain of Information Retrieval (IR). Like IR, CLIR is centered upon the search for documents, reconciling queries and documents which are written in different languages. Cross-lingual information access covers a wide range of tasks that en-

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able users to access information in languages other than their own, including IR, Question Answering, information extraction and summarization. CLIR enables users to find information in languages they do not know, but CLIR search results are not immediately useful because a separate translation techniques must be applied before the user can read the results. This type of systems has opened a new research field that examines the most effective methods for IR and investigates which resources are required for a correct translation.

Question answering systems (QAS) are presented as an alternative to the traditional Information Retrieval (IR) systems, seeking to offer precise and understandable answers to factual questions instead of showing the user a list of documents related to a given search (Jackson and Schilder, 2005). The functioning of QAS is based on short-answer models (Blair-Goldensohn et al., 2004), and the main advantage that it offers is that the user does not have to consult complete documents to collect the information needed, as the system provides the correct answer in the form of a number, a noun, a short phrase, or a brief fragment of text.

In relation to the types of QAS, the present work focuses on the analysis and assessment of multilingual and cross-language QAS. These systems need to include some type of linguistic translation resource, tool, or technique for the proper retrieval of the result, since the QAS can retrieve the answer from a collection of documents written in languages differing from the one in which the question is formulated. Given that the QAS is presented as a substantial advance in the improvement of IR (Kolomiyets and Moens, 2011), it becomes necessary to determine its effectiveness for the final user. With this aim, 7 studies were undertaken to evaluate: a) in the first two, the linguistic resources and tools used in these systems for multilingual retrieval (Research 1; Research 2); and b) the performance and quality of the answers of the main monolingual and multilingual QA of general domain and specialized domain in the Web (QuALiM, SEMOTE, START, TrueKnowledge, and HONqa) in response to different types of questions (of definition, of facts, and of lists) and subjects (e.g. art, literature, biology, medicine, names, history, economy, or sports), so that different evaluation means can be applied (Research 3, Research 4, Research 5, Research 6, Research 7).

## **BACKGROUND**

In the field of CLIR tools are being created that can greatly assist specialists in their work; as well as helping other users find a wide variety of information. These tools are evolving but several years of study and research are still needed to improve implementations. One of the main difficulties facing these tools is the task of translating queries made by users and the documentary sources found in response (Diekema, 2003). Given the current expansion in research, development, and the creation of CLIR systems, it was considered worthwhile analysing and evaluating the resources used by one type of these systems: multi-lingual QAS.

Frequently, a keyword query entered into a web search tool (search engine or meta-search engine) to satisfy a user's information need, provides too many result pages – many of which are useless or irrelevant to the user. In effect, modern IR systems allow us to locate documents that might have the associated information, but the majority of them leave it to the user to extract the useful information from an ordered list (Dwivedi & Singh, 2013). In contrast to the IR scenario, a QAS processes questions formulated into Natural Language instead of keyword based queries, and retrieves answers instead of

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