IST Project Fact Sheet

Question answering learning technologies in a multilingual and multi-modal environment (QALL-ME)

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Nowadays, voice portals provide users with a broad variety of information (timetables, traffic circulation, weather forecast, cultural events, etc.), and are experiencing an exponential increment of popularity. Most of the times, the common factor of the sought after information is its dynamism: the world rapidly changes over the time, users ask (and pay) for completely fresh information. Gathering and maintaining all the relevant information, and providing users with complete and updated contents are undoubtedly a bottleneck and an expensive work for voice portals and web-based information services. Doing it better can mean the difference between their success and failure.

Open Domain Question Answering (QA), the core technology behind the QALL-ME project, provides at the same time both a research and technological framework to address the above-mentioned issues and a challenging applicative perspective for real use scenarios. In contrast to the technologies behind today's web search engines, the goal of QA is not to return a list of documents, but the actual sequence of data (i.e. words), which constitutes the answer.

The scientific and technological objectives of the project address three crucial directions: multilingual open domain QA, user-driven and context-aware QA, learning technologies for QA. The potential of open domain QA will be experimented and evaluated in the context of mobile applications for information seeking, a multi-modal scenario which includes spontaneous speech as input and the integration of textual answers with maps as for output. The selected domain is represented by local events in a town, usually available either through specialized web sites or local newspapers and publications.

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QALL-ME – Project Interview

1. What are the most challenges you are facing concerning multilingual Q/A technology?

In my opinion, the real challenge in Open Domain Question Answering (QA) is to consolidate the large amount of research carried out in the last 10 years into a technological platform for QA systems, where achievements are made stable and where prototyping and evaluation of new solutions are really fast. This need is particularly true for multilingual QA, where the integration of language-dependent components often requires that a complex architecture is set up as a prerequisite for any experimentation, discouraging small groups (often representing less diffused languages) to address the task.

The realization of such platform for multilingual QA is one of the main goals of the QALL-ME project.

2. How 'open' is open domain Q/A in QALL-ME?

While the domain of the QALL-ME demonstrator is limited to cultural events in a town, what is really "open" in QALL-ME is the underlying technology. The QALL-ME solution is not based on "Dialog Models", where the interaction is constrained by a limited number of hand-crafted plans; rather, we exploit all the potential of both language technologies for question interpretation and text based inference techniques for answer extraction, which do not require a fine grained definition of the concepts and relations of the domain.

3. We assume that the best interface must be "natural". Can you give an example of what that really means, and something that failed because it was not "natural".

The key idea toward natural interaction in QA is that the system has to share contextual and background knowledge with the user. As an example, contextual knowledge is necessary to interpret a "natural" question like "*Which cinemas are opened tomorrow?*", where both the place and the time have to be induced from the context, while background knowledge is used to provide a "natural" answer to the same question, avoid uninformative details such as the fact that the cinemas are all in the same country, which is supposed to be part of the user's knowledge.

4. What role do you see for metrics and benchmarks? And if so, which ones and why?

I am a strong supporter of evaluation processes based on metrics and benchmarks: this is the only way to objectively measure technological progresses. However, one crucial issue in QA is that evaluation still needs heavy human intervention, with the consequence that the generate-and-test cycle is too slow to lead to concrete advancements. In this direction, an evolution of current metrics and the availability of reliable benchmarks would definitely affect the production of close to the market technological solutions.

A concrete contribution given by the project to QA research is the creation of a freely available evaluation benchmark. The QALL-ME-benchmark includes a vast collection of questions (transcribed from speech data acquired in the early stages of the project) in four languages, annotated with different types of information relevant to the correct execution of the QA process.

5. People talk a lot about the importance of an architecture. Can you give us a concrete example of a system architecture and what it means to us?

From an architecture point of view, the project will develop a new generation of information access technologies based on QA web services in a distributed environment. Questions are processed by a central planner, and then routed to local QA services able to interact with each other on the basis of a shared repository of concepts. For instance, a question on "movies in Trento today" is automatically directed to a local QA system built on top of a web portal on cultural events in Trento. Local QA systems are instances of a general QA schema tuned both to specific domains (e.g. cultural events, product information, hotels, train timetables, encyclopaedias) and specific information sources (e.g. newspapers, catalogues, audio files, databases).

One of the advantages of the foreseen architecture lies in its availability for shared solutions. In this direction, most of the developed web services will be freely accessible by third parties, allowing people involved in QA research to experiment with ready-to-use components.

6. **Getting a new technology to be adopted by users takes time. What are the key enablers to speeding up this process, and what are you doing to help? How important are the non-technological issues in this process?**

The QALL-ME recipe is simple. First, we propose QA on mobile devices: they have high diffusion (in particular among young people), so almost everyone will be able to try and play. Second, people already have services providing information on mobiles (e.g. cultural events, train timetables), but the access is still really primitive. We think that in this context, QA-based services can show their added value and can be appreciated.

7. **Customers must see the added-value of a new approach or technology. When and how do you tell your customers about your new developments?**

Beside the scientific objective of pushing the state-of-the-art in QA research, one of the major goals of QALL-ME is to actually set up a working infrastructure for QA on mobile devices. To reach this objective, we believe that the dramatic growth of diffusion of SMS/MMS technology offers us the concrete possibility to reach a huge number of potential users, with a strong impact in the very short period. Based on such technology, during the three years of the project, a free service providing information about cinemas (what's playing, cinemas schedules, prices, driving instructions, etc.), theatres, and museums will be incrementally developed. These field trials, possibly sponsored by local cinemas and event organizers, have a twofold purpose. Firstly, they will provide us with immediate feedback about the performance of the developed service, and its real potentialities from a market perspective. Secondly, they represent the best way to let the users familiarize with the proposed QA technology, actually brought into their everyday life.

8. **What is the role of the EU Framework Programmes in your organisation's strategies?**

The impact of the EU Framework Programmes in my organization is definitely high. Both the content of single research lines and more general strategies are affected. Along the years, our activity in a broad variety of NLP areas (including QA, Word Sense Disambiguation, Information Extraction, Text Summarization), has been driven and made possible by the EU Framework Programmes. The many positive results we achieved, both at national and international level, represent a tangible evidence of their crucial importance to enable concrete advances in NLP research at a European level.