BioASQ: A challenge on large-scale biomedical semantic indexing and question answering

BioASQ Consortium

1 Vision and Objectives

The BioASQ project (http://bioasq.org) aims to push research in information technology towards highly precise biomedical information retrieval systems. The project will achieve this goal through a competition (also called challenge or shared task), in which systems from teams around the world compete. BioASQ provides the data, software, hardware and the evaluation infrastructure for the challenge. By these means, the project will ensure that the biomedical experts of the future can rely on software tools to identify, process and present the fragments of the huge space of biomedical resources that address their personal questions.

The BioASQ team combines researchers with complementary expertise from 6 organisations in 3 countries: the Greek National Center for Scientific Research Demokritos (coordinator), participating with its Institutes of Informatics & Telecommunications and Biosciences & Applications, the German IT company Transinsight GmbH, the French University Joseph Fourier, the German research Group for Agile Knowledge Engineering and Semantic Web at the University of Leipzig, the French University Pierre et Marie Curie - Paris 6 and the Research Center of the Athens University of Economics and Business in Greece.

The BioASQ challenge comprises two tasks:

BioASQ Task a: Large-scale online biomedical semantic indexing. This task is based on the standard process followed by MedLine to index journal abstracts. The participants are asked to classify new MedLine documents, written in English, as they become available online, before MedLine curators annotate them manually. As new manual annotations become available, they are used to evaluate the classification performance of participating systems, using standard IR measures, as well as hierarchical variants of them. The participants are able to train their classifiers, using the whole history of manually annotated abstracts.

BioASQ Task b: Introductory biomedical semantic QA. Task b uses benchmark datasets containing development and test questions, in English, along with gold standard (reference) answers. The benchmark datasets are constructed by a team of biomedical experts from around Europe. Task b run in two phases:

- Phase A: In this phase, BioASQ released questions from the benchmark datasets and the participants have to respond with relevant concepts, articles, snippets and RDF triples.
- Phase B: This is the phase of the construction of the final answer, including Yes/No, Factoids, list and Summary questions.

2 Infrastructure, tools and benchmark data

In order to support the challenge and ensure its substainability, BioASQ has built a powerful and agile infrastructure for developing benchmark data sets for biomedical semantic indexing and question answering, as well as for using these data to evaluate participating systems, either automatically or manually. Most of the software produced by BioASQ is open-source and the data are provided free of charge for research use. In particular, we have developed the following:

– Annotation tool (https://github.com/AKSW/BioASQ-AT): This tool used by biomedical experts to create questions and answering material according to the specifications of tasks b.
– Assessement tool: The assessment tool is an extension of the annotation tools that help the experts while they assess the benchmark.
– BioASQ platform (http://bioasq.lip6.fr/): This platform allows setting up and managing evaluation campaign for question answering.
– Social network (http://sn.bioasq.org/): The network provides a common forum for biomedical experts to access and provide feedback on the benchmark data.
– Two benchmark datasets (http://bioasq.lip6.fr).

3 BioASQ's expected impact

The main long-term goal of BioASQ is to push significantly the research in information systems and methods that aim in turn at improved access to biomedical information. BioASQ is thus eager to collaborate with other EU projects that deal with information retrieval, question answering, data management and data summarization. The potential impact of the advances furthered by BioASQ are enormous and affect biomedical experts, companies providing services in this industry, including information technology providers, and eventually everyone who will benefit from improved biomedical processes. On the way to this big goal, BioASQ is set to facilitate a number of significant intermediate results, among which:

– Better understanding of the current semantic indexing and question answering technologies and their limitations.
– Improved awareness of the biomedical community about the possibility of significant improvement of their work, using intelligent information systems.
– Establishment of bridges among information technologists and biomedical experts.
– A number of tools, infrastructure and benchmark data that facilitate the organisation of BioASQ challenges, beyond the end of the project.

4 Results

The first round of the challenge started on April 2013 and comprised both tasks (Task 1a & 1b). In total 117 users and 73 systems registered to the automated evaluation system in order to participate in the challenge; 46 of them finally submitted their suggested solutions and answers. The final official results are available at the Web site of the project (http://www.bioasq.org/participate/first-challenge-winners). The second BioASQ challenge is currently running since February 2014.