Searching Ontologies

Authors: Mathieu d'Aquin, Holger Lewen

Motivation

There can be many different reasons to search for ontologies. At the start of the ontology development process, finding external ontologies that cover (at least partly) the same domain can provide useful elements to reuse. In other cases, ontologies may be needed in a particular application or may characterize a given dataset. Finally, when carried out on the basis of an existing ontology, ontology search can be used to find ontological resources that complete the ontology in ontology evolution, or to find alternative ontologies to align with for the purpose of interoperability.

Ontology Search Engines and Repositories

There is a wide variety of resources that can be used to search for ontologies online. These resources include ontology search engines, ontology repositories and ontology registries. For example, Watson (http://watson.kmi.open.ac.uk) is a Semantic Web search engine which acts in a similar way as a classical, Web search engine for Semantic Web resources that are automatically crawled. Cupboard (http://cupboard.open.ac.uk) is an ontology publication system where users can create ontology spaces and upload their ontologies. Ontologies can then be reviewed and searched using a search engine similar to Watson. Oyster is a peer-to-peer ontology sharing system where users can register metadata describing their ontologies that can then be searched amongst the network of users.

Tools such as the Watson plugin have also been developed to facilitate the process of integrating relevant elements from the ontologies found into the ontology under development.
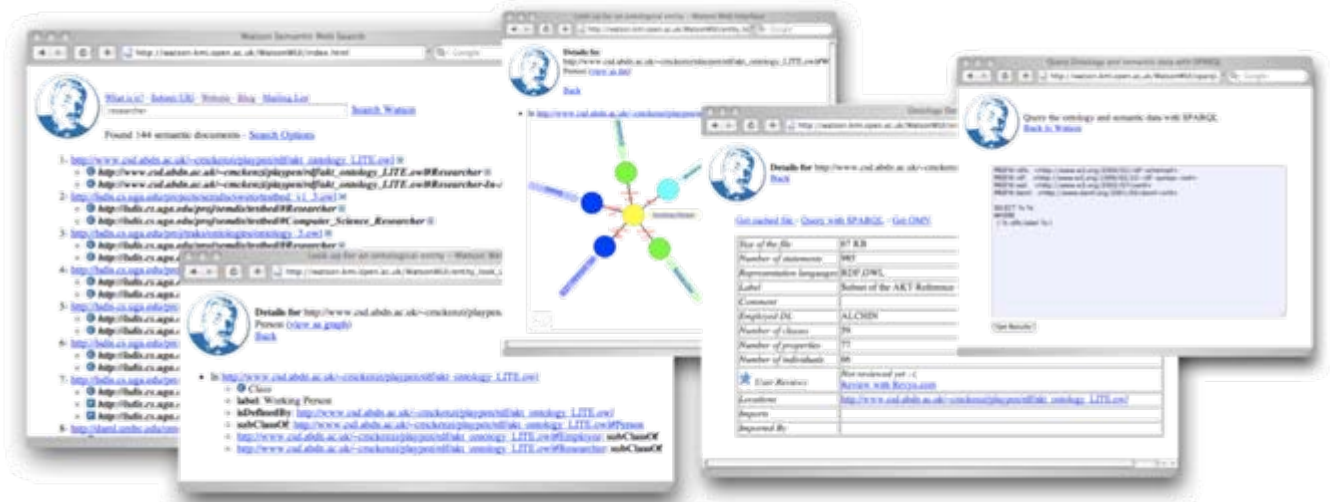
Issues in Searching Ontologies

There are a number of issues to be considered in the process:
- Choosing a search engine or repository to be used. Some repositories are dedicated to certain domains
- Combining results from several searches, possibly from different search engines or repositories
- Evaluating and assessing the results
- Extracting from the results the relevant sub-parts
- Re-processing the results to fit the target ontology or application

Searching Ontologies

Definition

Ontology Search refers to the activity of locating external ontologies that can reused to build an ontology or application

Goal

To find ontologies to be reused or exploited.

Input

A query made of key words and specifications (e.g., keywords march classes)

Output
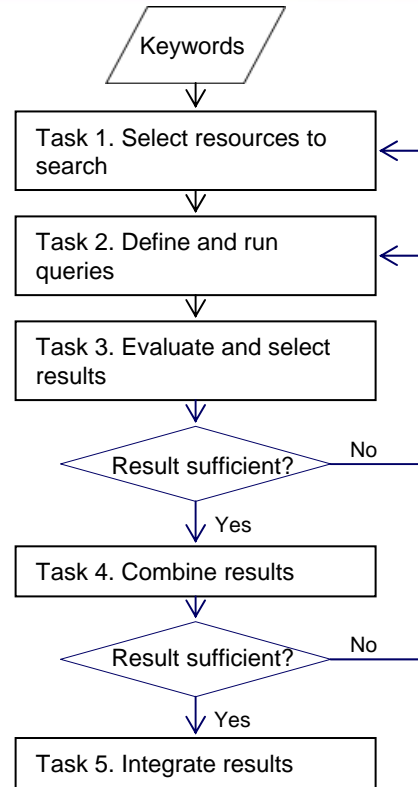
A set of ontologies, with relevant elements to be integrated

Who

Ontology development team, software developers and ontology practitioners.

When

After ontology specification in case of ontology development.
During evolution process.
For the purpose of alignment or application development.

Summary of the process

Keywords

↓

Task 1. Select resources to search

↓

Task 2. Define and run queries

↓

Task 3. Evaluate and select results

↓

Result sufficient? — No

Yes ↓

Task 4. Combine results

↓

Result sufficient? — No

Yes ↓

Task 5. Integrate results

Task 1: The first task in the process of searching for ontologies is to select a search engine or repository adequate to the task at hand. A repository with ontologies specific to the target domain should be used with priority.

Task 2: In the second step, the queries to the search engine are defined and run to obtain a set of candidate ontologies to be selected.

Task 3: Probably the most challenging task in this process concerns the evaluation and selection of the results. Evaluation depends on the target application of the search ontologies. A variety or criteria can here be used, including the coverage, complexity, correctness and reusability of the ontologies. Some repositories such as Cupboard include evaluation mechanisms to help with this task. In addition, not only whole ontologies can be selected, but also parts of ontologies. In this case, the ontology searching process relates to the ones of ontology modularization and ontology statement reuse. If the selected results are judged sufficient, the process can carry on. Otherwise, the original query can be refined to obtain another set of candidate ontologies.

Task 4: In the cases where several sets of candidate ontologies have been obtained (from several queries or different ontology search engines/repositories), then the results need to be combined, checking particularly for redundancy and consistency.

Task 5: Finally, once a valid set of ontologies or ontology modules has been selected, it needs to be integrated within the target ontology or application.

Additional information:

Contact person: m.daquin@open.ac.uk

❑ d'Aquin, M., Baldassare C., Gridinoc, L., Sabou, M., Angeletou, S.,Motta, E., (2007) Watson: Supporting Next Generation Semantic Web Applications. WWW/Internet conference 2007, Vila real, Spain.

❑ d'Aquin, M., Sabou, M., Motta, E., (2008) Reusing Knowledge from the Semantic Web with the Watson Plugin. Demo, International Semantic Web Conference, ISWC 2008.

❑ d'Aquin, M., Lewen, H, (2009) Cupboard -- A Place to Expose your Ontologies to Applications and the Community. Demo, European Semantic Web Conference, ESWC 2009.

❑ NeOn Deliverable 1.4.3: Cupboard—Supporting Ontology Reuse by Combining a Semantic Web Gateway, Ontology Registry and Open Ratings Systems.