Exploiting tools in Ontology Evolution

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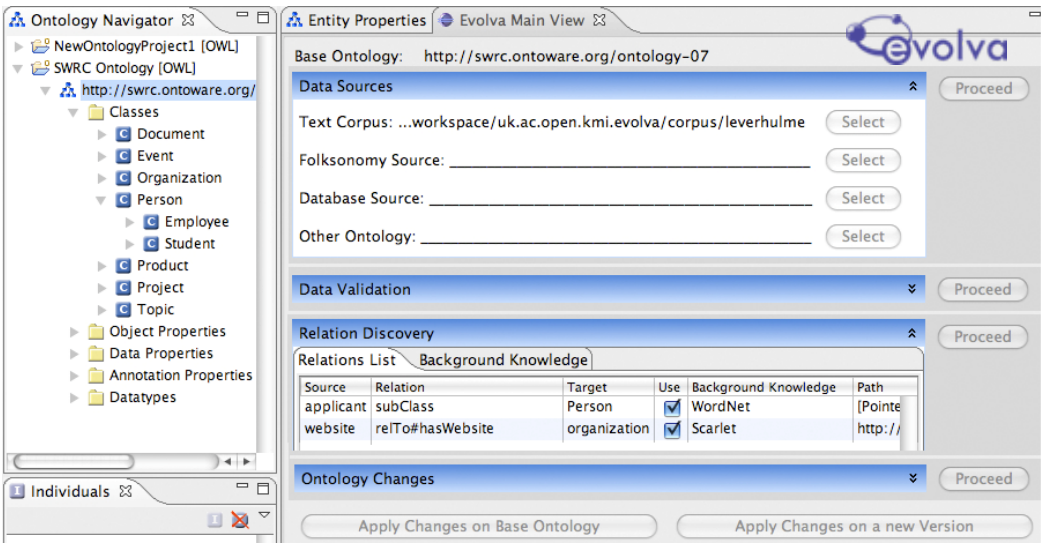
Motivation

The ontology evolution process involves updating the ontology with new changes in the domain in a timely manner. While it seems necessary to apply such an activity consistently for most ontology-based systems, it is often a time-consuming and knowledge intensive activity, as it requires a knowledge engineer to identify the need for change, to perform appropriate changes on the base ontology and to manage its various versions. In this section we discuss a methodology for supporting users in identifying domain changes from external data sources, with propositions of ontological changes derived from the use of various sources of background knowledge.

Approach for Supporting Users in Ontology Evolution

As ontology evolution is a painstaking and time-consuming process, various tools (e.g., Evolva) aim to decrease user involvement during the evolution process. **Evolva** [1] intends to be a *blueprint* for ontology evolution systems, It relies on the hypothesis that various forms of data corpus (texts, folksonomies, etc.) can be used to detect the need for an evolution, and to initiate it. Evolva also relies on the idea that, in order to integrate new pieces of information extracted from the exploited sources into the current ontology, evolution systems can rely on the automated use of external background knowledge [2], such as other ontologies, lexical resources (e.g., WordNet) or the Web.

While the goal of the Evolva framework is to reduce, as much as possible, human intervention within the evolution process, user input is required at the level of evolution management, and for fine-tuning various parts of the framework. The role of the user is needed, to properly parameterize the components, select the right sources of information and of background knowledge, validate the results of various steps and, generally, guide the evolution process to obtain high quality results. These tasks are not trivial, as they depend a great deal on the particular ontology to be evolved, the domain covered, the applications relying on the ontology and the reasons for its evolution. The experience of the knowledge engineer and his/her knowledge of the ontology and of the exploitable sources of information are therefore essential.



User Guidelines

We propose a methodological guideline for supporting ontology engineers and domain experts in exploiting tools that facilitate the evolution of their ontologies. The goal of this guideline is to complement the tool-based support provided by the Evolva framework proposed with concrete guidance on how to realize the various tasks of the evolution activity, using semi-automatic techniques in an efficient way.

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Tasks in the Evolution Activity

Task 1. Identify the part of ontology that is to evolve.
The first task required by the ontology development team is to select the part of the ontology that is to evolve. The evolution can be applied either on the entire ontology, or on a certain part of it.

Task 2. Set the data sources and extraction parameters.
Depending on the domain, domain experts should prepare the data sources that contain relevant information to the ontology context. Users are asked to specify the extraction parameters needed.

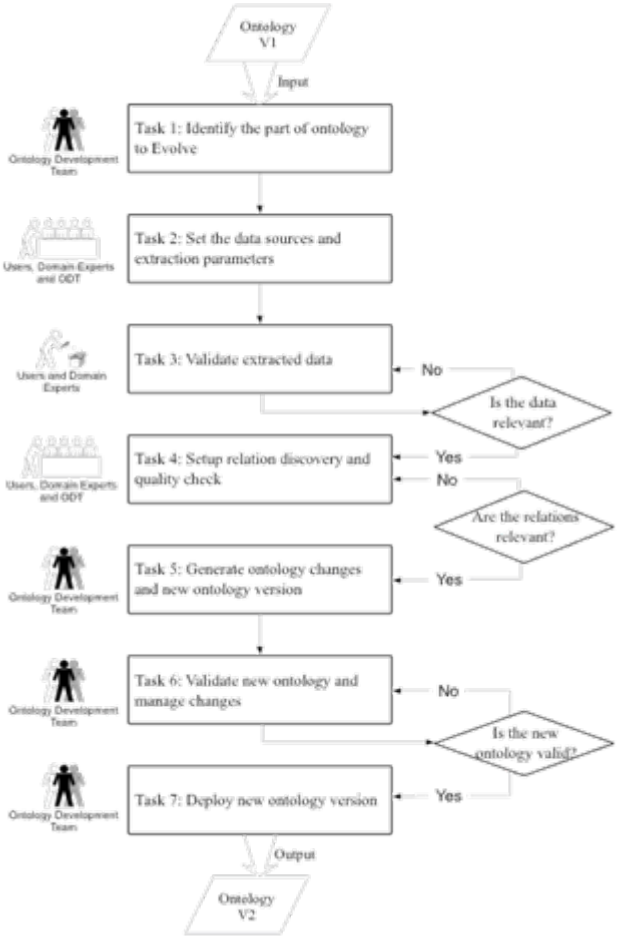
Task 3. Validate extracted data.
After extracting knowledge elements from the data sources, noise and irrelevant entities should be excluded. The user is supported by manual and automated validation techniques with customizable parameters. This task is completed after checking that all the data are valid to be processed further by the system.

Task 4. Setup relation discovery and quality check.
The relation discovery process links the validated data to the ontology. This requires the user to select the various types of background knowledge sources to be used. Domain experts, with the help of tools [3], should check the quality of relations, before using them later in the system.

Task 5. Generate ontology changes and new ontology version.
Based on the approved relations in the previous task, ontology changes are generated and applied on the new ontology version. Users should specify where to apply the changes, i.e., directly on the initial ontology or on a detached copy.

Task 6. Validate new ontology and manage changes.
Users in this task specify the checking methods to be applied on the new ontology version using reasoners, in addition to manually controlling the recorded ontology changes, for example.

Task 7. Deploy new ontology version.
Once the new version is approved, users should control the propagation of the new ontology version to the dependent components. Links to the previous ontology version should be checked, as well as whether the new ontology has been successfully saved and is accessible.



Additional information:

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- F. Zablith, M. Sabou, M. d'Aquin, E. Motta (2008). *Using Background Knowledge for Ontology Evolution.* International Workshop on Ontology Dynamics (IWOD) at ISWC, Karlsruhe, Germany. [2]
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