ROO: A Tool to Assist Domain Experts with Ontology Construction

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1. Introduction and Distinctive Characteristics

The time and effort required to create ontological structures is one of the major reasons for the reluctance of large organisations and businesses to utilise Semantic Web (SW) technologies. This is aggravated by the fact that most ontology construction tools are suited for knowledge engineers who may lack the necessary domain expertise to create the relevant ontologies. This can hinder the ontology construction process and impair the quality of the resultant ontology. There is an urgent need for intuitive tools which facilitate domain experts' involvement in the ontology construction process and are derived from existing practical experiences.

We have developed a novel tool for supporting domain experts with little or no knowledge engineering experience to build conceptual ontologies, which is drawn upon the experience in creating topographic ontologies at Ordnance Survey, Great Britain's mapping agency. The **distinctive characteristics** of our approach are: (i) catering for the needs of domain experts without knowledge engineering skills but also enabling users with experience in ontology development to inspect and edit the resultant ontology; (ii) exploiting techniques from intelligent user interfaces to assist the ontology construction process by following an ontology authoring methodology (the current implementation follows the methodology used at Ordnance Survey for developing several large ontologies with the active involvement of domain experts [2]); (iii) providing an intuitive interface to enter knowledge constructs in a controlled language (CL), Rabbit[1], designed to meet the needs of domain experts and compliant with OWL 1.1 [1]. The tool, called ROO (Rabbit to OWL Ontology authoring) is developed within the Confluence project and is distributed as open source[2].

2. Outline of the ROO tool

ROO is a Protégé plug-in which builds on the strengths and minimises the usability threats of existing CL tools for ontology construction. Its **usability features** include:
- providing suggestions by guessing what Rabbit constructs the users might enter;

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[1] The language is named after Rabbit in Winnie the Pooh, who is actually cleverer than Owl.
[2] The tool can be downloaded from http://sourceforge.net/projects/confluence, a demo is available at http://www.comp.leeds.ac.uk/confluence/

- showing the parsed structure to help the user recognise correct sentence patterns;
- providing a flexible way to parse English sentences using robust language technologies and automatically translate to OWL;
- using templates to facilitate the knowledge input process;
- immediate feedback and task-specific error messages.

ROO offers **task suggestions** based on monitoring the state of the ontology and the user's activities and suggests the most appropriate actions. For example, at the beginning of the ontology construction process, ROO will suggest that the scope and purpose of the ontology should be identified. In another case, when a user has already defined several concepts and relationships, ROO will suggest that the user should enter a natural language description for concepts missing such a description. The user interface is tailored accordingly, to simplify the execution of the suggested tasks.

The GUI in ROO extends existing Protégé GUI components. The user guidance is implemented as a rule system based on the JBoss Drools[3] rule engine. The Rabbit language processor currently parses and converts nine basic Rabbit patterns into OWL. The parsing of the Rabbit sentences is based on an extension of GATE[4].

3. Evaluation and Future Plans

ROO is being evaluated with regard to its usability and the use of the Rabbit constructs to define sample domain ontologies. An evaluation study has been conducted at the University of Leeds with eight users defining and extending an ontology of musical instruments. The initial ontology was created by a Music expert who performs in a jazz band. He provided knowledge sources and natural language descriptions but failed to define many Rabbit sentences due to limited help provided. An improved version of the tool was used by five usability experts in a cognitive walkthrough inspection. This discovered a number of usability problems. These were addressed in an improved version of ROO. It was used by another Music expert to extend the ontology by entering Rabbit constructs. A knowledge engineer then used ROO to examine and tune the ontology. Both users gave positive feedback on usability of the latest version, and found particularly useful the task suggestions and the help with Rabbit. Further studies are planned, our next step is to conduct an evaluation study with domain experts at Ordnance Survey to examine the efficiency and quality of the ontology authoring process. We are further extending ROO to cover the full Rabbit syntax, and are implementing additional support with ontology validation and inspection (which is currently done via Protégé).

References

1. G. Hart, M. Johnson, C. Dolbear J. Rabbit: Developing a Control Natural Language for Authoring Ontologies. *Proceedings of ESWC 2008 (to appear)*.
2. K. Kovacs, C. Dolbear, G. Hart, J. Goodwin, H. Mizen A Methodology for Building Conceptual Domain Ontologies. *Ordnance Survey Research Labs Tech. Report* IRI-0002 2006.

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[3] http://labs.jboss.com/drools

[4] http://gate.ac.uk