Ontology Repositories: Discussions and Perspectives

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Cupboard

OBO Foundry

BioPortal

OLS

Knoodl.com

OntoSelect

ONKI ONTOLOGY SERVICE

SchemaWeb

LinearOrdering Theories Types Collections
Sequer   reology
Integers Reals ZF-Sets VNGB-Sets   0.2

...

More or less provide the same set of features

- Upload/Submit ontologies
  - In a single space
  - In multiple spaces
  - With some form of validation
- Browse/Search
  - The ontology collection
  - Individual ontologies
- (Often) Description of ontologies. Documentation, (metadata?), stats/metrics
- Get the ontologies
- (Often) Programmatic access

So what is missing?

- Structure!
  - In the interaction with the user: how do you find a suitable ontology?
  - In the collection of ontologies: how are they related?
  - In the collection of repositories: shouldn't they work together?
- And many other things…

Supporting the user in finding ontologies

- This is a hard issue:
  - Most of the repositories have search engines attached... but are they sufficient?
  - Metrics to measure different aspects of ontologies (c.f. OntoSelect), but appropriate metrics hard to define and depend on the application
  - User Ratings and Reviews (cf. Cupboard [1]), but hard to obtain
  - Rich, metadata for ontologies (cf. OMV)
  - Appropriate summaries of ontologies (cf. Cupboard [2] and next slide)

[1] d'Aquin, M., Lewen, H. Cupboard - A Place to Expose your Ontologies to Applications and the Community. Demo, European Semantic Web Conference, ESWC 2009.
[2] d'Aquin, M., Euzenat, J., Le Duc, C., Lewen, H. Sharing and Reusing Aligned Ontologies with Cupboard. Demo, International Conference on Knowledge Capture - K-CAP 2009.

SWRC

Project

Document

Organization

Publication

Event

Person

1168 triples - RDF OWL

★★★★☆ - Read Reviews (1)

1 Alignments (Total: 1)

Ontology Name:	SWRC
URI:	http://kmi-web06.open.ac.uk:8081/cupboard/ontology/enrico/SWRC
Ontology Space:	enrico
Rating:	★★★★☆ Read Reviews (1)
Description:	
Creation Date:	

Provenance Metadata⊟

Creator:	Somebody _

Applicability Metadata⊟

Ontology Type:	Please select the ontology type

Format Metadata⊟

Ontology Language:	OWL(SHI)
Ontology Syntax:	RDF-XML

Availability Metadata⊟

Resource Location:	http://kmi-web06.open.ac.uk:8081/cupboard/ontology/enrico/SWRC

Statistics Metadata⊟

Number of Axioms:	1168
Number of Classes:	70
Number of Properties:	94
Number of Individuals:	1

★★★★☆ (By Holger LEWEN)

Since it is a biological domain ontology, its scope is more limited than the general top-level ontologies. It is however eas to reuse for biological ontologies.

★★★★★ (By Marta SABOU)

This is an upper level ontology that could be reused for any ontology in biology not just the fish domain. Concepts are clearly labeled and explained so understandability should not be an issue. Existing mappings to other ontologies (DOL(BFO, UMLS) should be an added value for projects that already reuse those ontologies.

Correctness

★★★★★ (By Holger LEWEN)

The ontology provides a sound representation of the biological world.

★★☆☆☆ (By Marta SABOU)

The ontology is correct, but it does not represent the fish domain rather upper-level entities in the biology/medical domai

Complexity

★★★★☆ (By Holger LEWEN)

The complexity of the ontology is adequate for reuse in other ontologies.

★★★★☆ (By Marta SABOU)

Relations between ontologies

- Useful to
  - Help users find appropriate ontologies (the last version, most general ones, ones compatible with ontologies already in use)
  - But also to provide an overview of the repository
- Only a few systems provide such information, only about basic relations:
  - Import (easy)
  - Versions (rarely)
  - Alignment/Mappings (sometimes, cf. Bioportal and Cupboard [2])

[2] d'Aquin, M., Euzenat, J., Le Duc, C., Lewen, H. Sharing and Reusing Aligned Ontologies with Cupboard. Demo, International Conference on Knowledge Capture - K-CAP 2009.

Particular relation: previous version

- Can be declared through an OWL primitive, but rarely used

Many different conventions used to identify versions:

http://lsdis.cs.uga.edu/projects/semdis/sweto/testbed_**v1_1**.owl vs
http://lsdis.cs.uga.edu/projects/semdis/sweto/testbed_**v1_4**.owl

http://160.45.117.10/semweb/webrdf/#generate_timestamp_**1176978024**.owl vs
http://160.45.117.10/semweb/webrdf/#generate_timestamp_**1178119183**.owl

http://loki.cae.drexel.edu/~wbs/ontology/**2004/01**/iso-metadata vs
http://loki.cae.drexel.edu/~wbs/ontology/**2004/04**/iso-metadata

http://lsdis.cs.uga.edu/projects/semdis/swetodblp/**january2007**/opus_**january2007**.rdf vs
http://lsdis.cs.uga.edu/projects/semdis/swetodblp/**october2006**/opus_**october2006**.rdf

- Need a common standard to identify versions of ontologies

Particular relation: inclusion

- Again, can be expressed through the owl:imports primitive

- But, very often, ontologies copy other ontologies (or part of them) without importing

- (At least) 2 different ways to include or be equivalent to an ontology:
  - Syntactically: the set of axioms is included
  - Semantically: can be syntactically different, but express the same meaning (same logical consequences)

Particular relation: (dis)agreement/ (in)compatibility

- There are many different ways in which 2 ontologies can disagree or be incompatible:
  - Inconsistent with each other,
  - Incoherent with each other,
  - Disparate modeling, etc.
- Plus, 2 ontologies can at the same time:
  - Neither agree nor disagree
  - Agree and disagree
- (cf. a formalization in [3])

[3] d'Aquin, M., (2009) Formally Measuring Agreement and Disagreement in Ontologies. International Conference on Knowledge Capture - K-CAP 2009.

Needs a formalization of relations between ontologies

- We built an ontology of relations between ontologies (DOOR [4])
  - Describe about 20 interlinked relations with ontological primitives (taxonomy, inverseOf, transitiveProperty, etc.) and rules
  - Allows to reason upon relations between ontologies, e.g. prevVersionOf(O1, O2) AND semanticallyEquivalentTo(O1, O2) → syntacticModificationOf(O1, O2)
- To be used in a complete system for detecting and managing ontology relations in large ontology repository
  - Currently developed on top of Watson and Cupboard
  - But generic and applicable to any repository (with ontologies in OWL currently)

[4] Allocca, C., d'Aquin, M., and Motta, E. DOOR: Towards a Formalization of Ontology Relations, International conference on knowledge engineering and ontology development, KEOD 2009

Interoperability/communication between repositories

- All the different repositories are currently built mostly isolated to each other
  - There is no common representation of metadata between ontologies
  - No common ways to identify (versions of ontologies)
  - No ways to share ontologies, annotations on ontologies, reviews of ontologies, etc.
- *One "Open Repository" to rule them all (and in the darkness bind them)?*