An Update on COLORE and OOR

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February 19, 2010
Overview

- COLORE (Common Logic Ontology Repository) project, which is building an open repository of first-order ontologies that serve as a testbed for ontology evaluation and integration techniques, and that can support the design, evaluation, and application of ontologies in first-order logic.

- All ontologies are specified using Common Logic (ISO 24707).
The repository consists of theories (sets of axioms) referred to as modules.

An ontology is a theory that consists of one or more modules, so that relationships between ontologies can be defined with respect to the relationships between their modules.
Ontology Relationships

Extension
- Conservative extension
- Nonconservative extension

Interpretation
- Relative interpretation: For any sentence $\sigma$ in $L_0$,
  \[ T_0 \models \sigma \Rightarrow T_1 \models \pi(\sigma) \]
- Faithful interpretation: For any sentence $\sigma$ in $L_0$,
  \[ T_0 \not\models \sigma \Rightarrow T_1 \not\models \pi(\sigma) \]
- Definable equivalence
Kinds of Theories

- A theory $T_2$ is a definitional extension of a theory $T_1$ iff every constant, function, and relation in any model of $T_2$ is definable in some model of $T_1$.

- A module $T_{core}$ in the repository is a core theory iff no function and no relation in models of $T_{core}$ is definable in the models of any other theory unless that theory is synonymous.

- A core hierarchy is a set of core theories $T_1, \ldots, T_n$ such that $\mathcal{L}(T_i) = \mathcal{L}(T_j)$, for all $i, j$. 
Use Cases

Downloading Ontologies
- module aggregation
- translators
- retrieving ontologies with respect to particular relationships e.g. all ontologies that are interpretable by a given ontology

Uploading Ontologies
- consistency checking
- annotation (specifying new relationships)
- testing relationships
- inferring relationships
Theoretical Applications

Relative Interpretation Theorems
- specify the conditions under which two ontologies are equivalent

Nondefinability Theorems
- show that one ontology is in some sense stronger since it is able to define concepts that other ontologies cannot define.
Applications

- Ontology verification (Gruninger, Hahmann, Hashemi, and Ong in FOIS 2010)
- Semantic mappings (Gruninger in Commonsense 2009, [Hashemi and Gruninger 2010])
- Ontology Design (Hashemi and Gruninger in KEOD 2009)
Current Modules

**Generic Domain Ontologies**
- Time (Catalog of Temporal Theories)
- Duration
- Mereotopologies (RCC, RT)
- Processes (PSL, Event Calculus, OntoSTIT)
- Object recognition (CardWorld)

**Mathematical Structure Ontologies**
- partial orderings and lattices
- linear orderings
- graphs and incidence structures
- geometries
- algebraic structures (groups, rings, fields, vector spaces)
Will This Work with OOR?

The Repository

- The building blocks of COLORE are modules (sets of axioms)
- The building blocks of OOR are class hierarchies

Relationships

- COLORE is organized by metatheoretic relationships between ontologies
- OOR does not represent relationships between ontologies.

Relationships

- Ontologies in COLORE are written in Common Logic.
- OOR is restricted to the underlying language for Protege.