Enhancing Terminological Knowledge With Upper Level Ontologies

Selja Seppälä and Amanda Hicks

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University at Buffalo
The State University of New York

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Proposal

- Using a formal upper level ontology
  - General categories and relations
  - Language- and domain-independent
  - Used in mid-level and domain-specific ontologies
  - Rigorously defined via axioms
- Examples
  - Descriptive Ontology for Linguistic and Cognitive Engineering (DOLCE) (Masolo et al., 2001)
  - Basic Formal Ontology (BFO) (Arp et al., 2015)

Benefits for practice

- Integration of multilingual and multi-domain terminological resources
- Easier sharing and reuse of terminologies
- Avoid semantic conflicts and need for mappings
- Integration with information system tools
- Inferencing to reason over and process text
  - The KYOTO Project (Vossen et al., 2010)
    High recall and improved precision on domain-specific information fact extraction using DOLCE

Benefits for research

- Rigorous metalanguage
- Compatible conceptual analyses
- Comparable research results
- Language- and domain- independent generalizations
  - BFO-Based Ontological Analysis Framework (Seppälä, 2012, 2015)
    Use of BFO categories and relations to study definition contents and develop definition writing tools using BFO-Definition-Models

➔ Developing an integrated terminological science

Implementation

- Familiarize with the upper level ontology
- Use existing mappings of WordNet (WN) as aids for integration
  - WN-DOLCE mapping (Laparra et al., 2012)
  - WN-BFO mapping (Seppälä, 2015a; Seppälä and Hicks, forthcoming)

Conclusion

- Upper level ontologies can fruitfully complement
  - Any terminological resource whether or not already ontologized
  - Other descriptive frameworks in terminology
- We encourage terminologists to use them to enhance research and resources

seljamar@buffalo.edu
aehicks@ufl.edu

THANK YOU

BFO 2.0

- Third and most recent version of the Basic Formal Ontology (BFO)
- A domain-neutral upper-level ontology (Smith et al., 2012)
- Represents the types of things that exist in the world and relations between them (35 types)
- Serves as an integration hub for mid-level and domain-specific ontologies, such as the Ontology for Biomedical Investigations (OBI) and the Cell Line Ontology (CLO), which thus become interoperable (Smith and Ceusters, 2010)
- Subdivided into CONTINUANTS (e.g., OBJECTS and FUNCTIONS) and OCCURRENTS (e.g., PROCESSES and EVENTS)
- Continuants can be either independent (e.g., physical OBJECTS like persons and hearts) or dependent (e.g., the ROLE of a person as a physician or the FUNCTION of a heart to pump blood)
- Previous versions (BFO 1.0 and BFO 1.1) have been mapped to BFO 2.0 (Seppälä et al., 2014)

The KYOTO Project (Vossen et al., 2010)

- Representing domain-specific terms in a computer-tractable axiomatized formalism
- Allows machines to reason over texts in natural language
- Maps multilingual WordNets to DOLCE
- Used for multilingual text mining and information extraction
- Adaptable to different domains
- Experimental results
  - Leveraging ontological information in domain-specific fact extraction NLP
  - Environmental domain
  - High recall and improved precision

The BFO-Based Ontological Analysis Framework (Seppälä, 2012, 2015)

- Uses an ontological metalanguage based on categories and relations of Basic Formal Ontology (BFO)
- For terminological domain- and language-independent analyses
- The BFO-based metalanguage provides an additional level of understanding to existing descriptive frameworks
- Experimental results
  - BFO categories used as models to predict contents of definitions
  - BFO-Templates account for about 75% of the contents of definitions of terms from 15 distinct domains
  - The rest of the definition contents can be described using the BFO categories and relations

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