Using BFO Categories for Creating Generic Definition Templates

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Background

• Research in terminology and NLP
• Interests
  – Developing definition authoring tools
  – Creating language- and domain-independent definition templates
• Proposal
  – Using BFO categories to model definition contents
Modeling definition contents

• Why BFO?
  – Upper-level ontology ➔ domain- and language-independent
  – Realist ontology ➔ definitions express relations between things in the world
Modeling definition contents

ligament (AEO_0000090)
(Anatomical Entity Ontology)

A strap of predominantly extracellular matrix connecting two bones.

GENUS
  is_a OBJECT

SPECIFIER
  has_part OBJECT

SPECIFIER
  bearer_of REALIZABLE ENTITY
Example: modeling definitions of OBJECTS

<table>
<thead>
<tr>
<th>OBJECT</th>
<th>ligament (AEO_0000090) (Anatomical Entity Ontology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>is_a INDEPENDENT CONTINUANT</td>
<td>GEN  is_a OBJECT  A strap</td>
</tr>
<tr>
<td>has_part OBJECT</td>
<td>SPE  has_part OBJECT  of predominantly extracellular matrix</td>
</tr>
<tr>
<td>participates_in PROCESS</td>
<td>SPE  bearer_of REALIZABLE ENTITY  connecting two bones.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBJECT</th>
<th>net boom (oil spill cleanup)</th>
</tr>
</thead>
<tbody>
<tr>
<td>is_a CONTINUANT</td>
<td>GEN  is_a OBJECT  A boom</td>
</tr>
<tr>
<td>bearer_of QUALITY</td>
<td>SPE  has_part OBJECT  that is made of netting</td>
</tr>
<tr>
<td>bearer_of REALIZABLE ENTITY</td>
<td>SPE  bearer_of REALIZABLE ENTITY to facilitate the retention of viscous oils.</td>
</tr>
<tr>
<td>located_at TEMPORAL REGION</td>
<td></td>
</tr>
<tr>
<td>located_in SITE</td>
<td></td>
</tr>
</tbody>
</table>
Creating definition templates 1

Analyzing BFO categories as relational configurations (RC):

‘ENTITY+relation+RELATUM’

Ex: OBJECT has_part OBJECT
    OBJECT participates_in PROCESS
Output example: BFO 1.0

CONTINUANT
is_a ENTITY

INDEPENDENT CONTINUANT
is_a CONTINUANT
bearer_of QUALITY
bearer_of REALIZABLE ENTITY
located_at TEMPORAL REGION
located_in SITE

OBJECT AGGREGATE
is_a INDEPENDENT CONTINUANT
has_part OBJECT

OBJECT
is_a INDEPENDENT CONTINUANT
has_part OBJECT
participates_in PROCESS

FIAT PART OF OBJECT
is_a INDEPENDENT CONTINUANT
part_of OBJECT
Creating definition templates 2

Creating relational models (the templates) with proper and inherited RCs

OBJECT

INDEPENDENT CONTINUANT

is_a SNAP CONTINUANT
bearer_of QUALITY
bearer_of REALIZABLE ENTITY
located_at TEMPORAL REGION
located_in SITE
participates_in PROCESSUAL ENTITY

OBJECT

is_a INDEPENDENT CONTINUANT
has_part OBJECT
participates_in PROCESS

Relations inherited from the entity type INDEPENDENT CONTINUANT

Relations characterizing the entity type OBJECT
Creating definition templates 3

Applying the models to textual definition corpora

• Segmenting

• Annotating

• Statistical analyses to see which relations are more relevant for defining

➡ Relevant models from generic ones
Advantages

• (Semi-)formal structuring of textual definitions
  ➔ Homogeneity
  ➔ Internal structure linked to the ontology
• No complex BFO labels displayed (only in metadata)
  ➔ Increased readability & user-friendliness
• Allows more complex querying via the definition
  (through metadata AND text)
• Domain-adaptable through corpus analysis
• Methodology applicable to more specific categories from ontologies extending BFO
Further applications of the relational models

- Content checking
  - Annotating existing definitions

- Definition authoring
  - Corpus tagging to extract defining information