SNOMED CT and IHTSDO

Large scale ontology development and maintenance

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• IHTSDO and SNOMED CT
• Uses of SNOMED CT in health care
• SNOMED CT as an ontology
• IHTSDO tools
• Maintenance and quality assurance
• Development projects
IHTSDO and SNOMED CT

• International Health Terminology Standards Development Organisation
  • www.ihtsdo.org
  • 2007-
  • 15 countries (SE, DK, US, UK, AU, NZ, NL, ES, ...)

• Systematized Nomenclature of Medicine – Clinical Terms
  • Roots in CAP work since 1960ies + NHS work since 1980ies
  • Originally manually maintained
Uses of SNOMED CT

• Clinical coding
  • Clinical findings – symptoms, signs, disorders, …
  • Activities – treatments, diagnostics, …
  • Anatomical structures, Organisms, Substances, Pharmaceutical products, Devices, …

• Aggregation by subsumption hierarchies
SNOMED CT as an ontology

- EL+ ~ OWL2 EL
- 293,000 classes
- Defined w/ 830,000 role instances
- 765,000 English names
- 279,000 Swedish names

<table>
<thead>
<tr>
<th>Name</th>
<th>Syntax</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>top</td>
<td>$\top$</td>
<td>$\Delta^I$</td>
</tr>
<tr>
<td>bottom</td>
<td>$\bot$</td>
<td>$\emptyset$</td>
</tr>
<tr>
<td>nominal</td>
<td>${a}$</td>
<td>${a^I}$</td>
</tr>
<tr>
<td>conjunction</td>
<td>$C \cap D$</td>
<td>$C^I \cap D^I$</td>
</tr>
<tr>
<td>existential restriction</td>
<td>$\exists r.C$</td>
<td>${ x \in \Delta^I</td>
</tr>
<tr>
<td>concrete domain</td>
<td>$p(f_1, \ldots, f_k)$</td>
<td>${ x \in \Delta^I</td>
</tr>
<tr>
<td>GCI</td>
<td>$C \subseteq D$</td>
<td>$C^I \subseteq D^I$</td>
</tr>
<tr>
<td>RI</td>
<td>$r_1 \circ \cdots \circ r_k \subseteq r$</td>
<td>$r^I_1 \circ \cdots \circ r^I_k \subseteq r^I$</td>
</tr>
</tbody>
</table>
SNOMED CT as an ontology

- Ontology-based error detection in SNOMED-CT. W Ceusters, B Smith, A Kumar… - Medinfo, 2004
- The Semantics of Procedures and Diseases in SNOMED® CT. S Schulz, S Hanser, U Hahn… - Methods of information in …, 2006
- Would SNOMED CT benefit from Realism-Based Ontology Evolution? WM Ceusters, KA Spackman… - AMIA Annual Symposium …, 2007
- Why do it the hard way? The case for an expressive description logic for SNOMED. AL Rector… - Journal of the American Medical …, 2008
- Ontological analysis of SNOMED CT. G Héja, G Surján… - BMC Medical Informatics and …, 2008
- ...
IHTSDO tools

• IHTSDO workbench
  • Eclipse- and CollabNet-based infrastructure for ontology and terminology development
  • Open source

• IHTSDO classifier
  • EL+ classifier, based on CEL
Maintenance and Quality assurance

- Organizational structure
  - Four standing committees
- Staff terminologists/ontologists
- Project groups and SIGs
- Internal standards process
Quality assurance

- QA Framework is being implemented
- Content is being check against a set of production rules
- External audits
Development projects

- Current ongoing “ontologization” of SNOMED CT
  - Alignment to e.g. BioTop, BFO, FMA
  - Scalability and Reproducibility!
- Expressivity tests
  - Negation tests, Value restriction
  - Role inclusions, Concrete domains