Graph-based Editor for SWRL Rule Bases

RuleML 2013 Challenge

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Outline

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2. Graph-based Editor
3. Demo time!
4. Conclusions and Future Work

http://draco.kari.put.poznan.pl/ruleml2013_SWREditor
Motivation

• Ontologies and rules are **too complex** to handle by an ordinary user

• Rules written in declarative code are **hard to read/write**

• Decision **tables and trees** have different representation of facts and rules

• Graphs are **easy-to-understand** by an untrained user

• Integration of an **ontology, rules and data** in one graph-based form is convenient and understandable

• We want to **provide** an easy-to-use and easy-to-understand **tool**, where ontologies, rules and graphs can support user’s work
Graph-based Editor (1)

- Represents **ontology, rules and data** as directed graphs
- Supports OWL and SWRL (Semantic Web Rule Language)
- Performs **reasoning** by the Pellet engine
- Presents **results** of the reasoning process on a graph
Graph-based Editor (2)

- Each graph consists of **nodes** (classes/objects/values) and **edges** (relations)
- Each **type of node** is represented in different colour and shape
- Two kinds of ontology visualization: **trees** (taxonomies of classes and properties) and graphs
- Rules can be **created visually** and **executed**
- Reasoning process **modifies** all graphs and trees (if applicable)
- Graph structure can be **manipulated** by using specialized layouts or by manual rearrangement
### Graph-based Editor (3)

<table>
<thead>
<tr>
<th>Element</th>
<th>Graph-based representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>OWL Class</td>
<td><img src="image1.png" alt="Diagram" /></td>
</tr>
<tr>
<td>OWL Class instance</td>
<td><img src="image2.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Object property between two OWL instances</td>
<td><img src="image3.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Datatype property between an object and a value</td>
<td><img src="image4.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>
Demo Time!
Family Relationships Ontology

- We **modified** an ontology developed by Christine Golbreich
- The ontology contains the usual **classes** (*Person, Man, Woman* etc.) and **relationships** within a family (*hasConsort, hasChild, hasParent*, etc.)
- Moreover, it contains also a number of **SWRL rules**
- We **added** some classes, relations and rules
- We introduced a set of **instances**
Family Relationships Ontology - Instances

- F00
- M00
- M13
- F10
- F11
- M10
- M21
- F21
- F30
- F31

- F01
- M01
- F12
- M11
- M12
- M22
- F22
- F32
- M30
- M31
Family Relationships Ontology - Rules

Person(?x), Person(?y), Person(?w), Person(?z), hasParent(?w,?z), hasParent(?x,?y), hasSibling(?y,?z)

→

hasCousin (?x, ?w)

Person(?x), Person(?y), Person(?w), hasGrandparent(?x,?y), hasFather(?y,?w)

→

hasGreatGrandfather (?x, ?w), GreatGrandfather(?w)
Conclusions and Future Work

• Our tool integrates ontology, rules, and data in a graph-based representation and supports reasoning by the Pellet engine.

• All elements are represented on a directed graph.

• Creation of SWRL rules is simpler than usual.

• Graph-based representation is very intuitive, easy-to-understand and easy-to-use.

• We will extend our tool to support:
  ▪ Queries execution with graphical answers,
  ▪ Database interface,
  ▪ OWL 2 RL and QL Profiles
  ▪ Ontology creation and modification
THE END

Thank you for your attention!
Demo presentation and download at

http://draco.kari.put.poznan.pl/ruleml2013_SWRLEditor