Exercise in Information Retrieval (Master), Summer term 2016
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Exercise sheet 2
No submission

Exercise notes: By presenting (enough) exercise tasks, it is possible to receive bonus points for the (oral) exam. Those tasks are marked with a (*). You should prepare some slides for the task you want to present. We expect students to participate at discussions and to contribute input – in the form of presentations or questions – to the exercise that allows a good discussion.

http://www.is.inf.uni-due.de/courses/irmai_ss16

Presentation date: 5/12/2016

Task 1: Predicate Logic (*)

Klaus and Horst made the following observations during their stay in the Ruhrgebiet area:

(a) Female residents of Duisburg will only marry other residents of Duisburg. Male residents may get married to other residents of Duisburg as well as to residents of Essen. Residents of Mülheim never get married (because they always answer a very meaningful question with no).

(b) A resident of the Ruhrgebiet area lives in Essen if the father is from Duisburg and the mother is from Essen.

Describe the statements from above with predicate logic. Hint: You need to define predicates and functions.

Task 2: Datalog (*)

A set of facts for the following predicates is given:

male(X): Person X is male
female(X): Person X is female
married(X,Y): Person X and Y are married
child(X,Y): Person X is person Y’s child
alive(X): Person X is not dead (yet)

Create rules for the following relationships: Daughter, brother, niece, cousin, only child (singleton), brother-in-law, male ancestor, orphan, widow.
Task 3: Inference with Datalog in relational models (*)

Given the following two relations about dish preferences and similar dishes:

preferences

<table>
<thead>
<tr>
<th>β</th>
<th>Person</th>
<th>Dish</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.8</td>
<td>Peter</td>
<td>Meat</td>
</tr>
<tr>
<td>0.7</td>
<td>Peter</td>
<td>Curry</td>
</tr>
<tr>
<td>0.6</td>
<td>Peter</td>
<td>Mustard</td>
</tr>
<tr>
<td>0.2</td>
<td>Peter</td>
<td>Chocolate</td>
</tr>
<tr>
<td>0.3</td>
<td>Andreas</td>
<td>Meat</td>
</tr>
<tr>
<td>0.4</td>
<td>Andreas</td>
<td>Tomato</td>
</tr>
<tr>
<td>0.8</td>
<td>Andreas</td>
<td>Mustard</td>
</tr>
<tr>
<td>0.5</td>
<td>Andreas</td>
<td>Chocolate</td>
</tr>
</tbody>
</table>

similar

<table>
<thead>
<tr>
<th>β</th>
<th>Dish1</th>
<th>Dish2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9</td>
<td>Sausage</td>
<td>Meat</td>
</tr>
<tr>
<td>0.7</td>
<td>Milk</td>
<td>Chocolate</td>
</tr>
</tbody>
</table>

Additionally, let there be the following inference rules:

likes(X, Y) :- preferences(X, Y)
likes(X, Y) :- similar(Y, Z), preferences(X, Z)

Calculate the result for the following queries:

(a) Does Peter like the German Currywurst (Curry + Sausage)?
(b) Do Andreas and Peter like Milk?

Calculate the result according to extensional and intensional semantics respectively.

Task 4: Web Ontology Language (OWL) (*)

Take a look at the price comparison website Skinflint¹ and browse to the hardware category.

Choose a sub-category and create an OWL representation of the products including classes, literals and data types. You may use OWL2 Functional Syntax or OWL2 XML Syntax. Pay close attention to cardinalities.

¹https://skinflint.co.uk/