

VisAVis: An Approach to an Intermediate Layer between Ontologies and Relational Database Contents

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Introduction

- VisAVis Protégé Plugin
- Features
 - Map between RDB and Ontologies
 - Execute queries expressed in RDQL

Motivation

- The Semantic Web Vision orders that web pages need to be annotated in terms of an ontology language
- What happens with Data stored in databases and is generated and retrieved automatically?

Definitions

- An Ontology can be defined as a model of a Knowledge Base
- Thus, we have the Terminological and the Assertional Box (ABox & TBox)
- Simplified point of view:
 - TBox \leftrightarrow Schema of the RDB
 - ABox \leftrightarrow Instance of the actual data

Mapping Process

- Capture Database Data
- Select an Ontology Class
- Validate the mapping
- Modify the resulting Ontology

Mapping Process

- Validate the mapping
 - Disjoint classes cannot have mappings to common data. Common data includes data in tables with a foreign key relation
 - Maintain subclass hierarchy in the database

Query Execution

- Parse requests
- Instead of returning the class resources, we check if the mapping property exists
 - Yes: redirect the query to the database
 - No: No changes

Use-Case Scenario

travel Protégé 3.1 (file:\C:\My%20Documents\My%20Ontologies\travel\travel.pprj, OWL Files (.owl or .rdf))

File Edit Project OWL Code Window Tools Help

OWLClasses Properties Forms Individuals Metadata VisAVis v1.0b

Ontology Window

Classes Properties Mappings List

- AccommodationRating
- Destination
 - QuietDestination
 - BackpackersDesti
 - RetireeDestination
 - BudgetHotelDestin
 - FamilyDestination
 - Beach
 - RuralArea
 - NationalPark
 - Farmland
 - UrbanArea
 - Town
 - City
 - Capital
- Activity
 - Accommodation
 - BudgetAccommod
 - BedAndBreakfast
 - Campground

Mappings List

- LuxuryHotel---->Field(s): hotels.name with condition(s)
- Hotel---->Field(s): hotels.name
- Safari---->Field(s): activities.description with condition(s)
- Museums---->Field(s): museums.name

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DB Type and Name: MySQL-travel

Linked To Ontology: travel.owl

Ontology Description

Info On Class Accommodation

Full URI: <http://www.owl-ontologies.com/travel.owl#Accommodation>

Direct Subclasses: BudgetAccommodation, BedAndBreakfast, Campground

Direct Superclasses: Thing

Database Window

Database Type: MySQL Choose

Host IP: 147.102.7.226 Port: 3306 Connect

Login: producer Password: *****

Choose Database: travel Go!

Data Tables

All System Table Table View Other

- hotels
 - id (int unsigned --> Integer)
 - name (text --> String)
 - description (text --> String)
 - stars (smallint --> Integer)
 - city_id (int --> Integer)
- hotels_facilities
 - hotel_id (int unsigned --> Integer)
 - facility_id (int unsigned --> Integer)
- museums
 - id (int unsigned --> Integer)
 - name (text --> String)
 - description (text --> String)
 - type_id (int --> Integer)
 - city_id (int --> Integer)
- museumtypes

Choose Your Data

Required Tables: museums

Desired Fields: museums.name

Conditions:

Field Name	Condition
Map To: Museums	

Map!

Number of rows: 0 (0 = all) Set

id	name	description	type_id	city_id
1	Museum of Greek F...	Embroideries, woo...	1	
2	The Benaki Museum	Various periods of ...	2	
3	National Historical ...	Greek War of Indep...	3	

Preview

Insert RDQL Query:

Execute

protégé

Use-Case Scenario

```
<owl:Class rdf:about="#Hiking" >
  <queryString>SELECT activities.description FROM
  activities, activities_types WHERE
  (activities.activity_type_id = activities_types.id)
  AND (activities_types.name = "Hiking")
</queryString>
<rdfs:subClassOf>
  <owl:Class rdf:about="#Sports"/>
</rdfs:subClassOf>
</owl:Class>
```

Implementation

- Java, version 1.5.0 or higher
- Jena framework, tested in versions 2.2 and 2.3
- Protégé, tested in 3.0, 3.1, 3.1.1, 3.2beta
- MySQL and PostgreSQL, with JDBC connection

Future Work

- Richer SQL builder
- Support for more databases
- Return results from both the database and the ontology

Questions

Thank you for your attention

- VisAVis plugin available at http://www.cn.ntua.gr/~nkons/essays_en.html