Towards Ontological Commitments with ω-RIDL Markup Language

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Introduction

Ω-RIDL: A language for specifying ontological commitments and conceptual querying

=> Semantically unlocks legacy systems
Overview

- Ontologies and the DOGMA approach
- DOGMA Studio
- Wine auction site running example
- Summary
- Future Work
An ontology is an “explicit specification of a shared conceptualization of a certain domain” – T. Gruber
DOGMA

Developing Ontology Grounded Methods and Applications

$\gamma = \text{university}$

![Diagram showing the relationship between Jury, Thesis, Role, Co-role, and Context.]

Lexon: the elementary building block
“Double articulation principle”
Ontological Commitment

- Selection of lexons
- Axiomatization by applying semantic rules
- Interpretation through mapping of application symbols
DOGMA Studio

- Browses the Lexon base with NORM tree visualization based on ORM
- Create commitments with T-Lex tool
- Drag ‘n Drop selection of lexons
- Graphical constraints and textual in $\Omega$-RIDL
- Exports $\Omega$-RIDL ML
Running Example

Wine Ontology

commit

commit

Wine auction site

Wine store

XML

SQLite

RIDL

RIDL
<auction auction-date="2007-03-18">
  <lot lot-nr="1">
    <estimation>
      <low-price>280</low-price> <high-price>400</high-price>
    </estimation>
    <wine>
      <name>d'Yquem</name>
      <vintage>1999</vintage>
      <region>Sauternes</region>
      <country>France</country>
      <classification>1er Grand Cru Classé</classification>
      <quantity>12</quantity>
      <comment>OWC</comment>
    </wine>
  </lot>
  <lot lot-nr="2">
    <estimation>
      <low-price>200</low-price> <high-price>280</high-price>
    </estimation>
    <wine>
      <name>Beauséjour Bécot</name>
      <vintage>1994</vintage>
      <region>St Emilion</region>
      <country>France</country>
      <classification>1er Grand Cru Classé</classification>
      <quantity>12</quantity>
      <comment>Neck or better, OWC</comment>
    </wine>
  </lot>
</auction>
Wine Auction Conceptualization

Mined from different sources: domain experts, wikipedia, texts, ...
Auction Commitment

1. Selection
Auction Commitment

2. Axiomatization
each Wine is made by at most 1 Winery

<occurrenceConstraint comparator="lessThanOrEqual" number="1">
  <setExpression>
    <lexonBasePath>
      <context>Wine Auctions</context>
      <headTerm>Wine</headTerm>
      <role>made by</role>
      <coRole>making</coRole>
      <tailTerm>Winery</tailTerm>
    </lexonBasePath>
  </setExpression>
</occurrenceConstraint>
each Date is identified by
(Year of Date and Month of Date and Day of Date)

<externalUniquenessConstraint>
  <setExpression>
    <lexonBasePath>
      <context>Date and Time</context>
      <headTerm>Year</headTerm>
      <role>of</role>
      <coRole>with</coRole>
      <tailTerm>Date</tailTerm>
    </lexonBasePath>
  </setExpression>
  ...  <setExpression> ... 
  ...  <setExpression> ... 
</externalUniquenessConstraint>
Mandatory Constraint

*each Wine* is made in *at least 1 Vintage*

```
<occurrenceConstraint comparator="greaterThanOrEqual" number="1">
  <setExpression>
    <lexonBasePath>
      <context>Wine Auctions</context>
      <headTerm>Wine</headTerm>
      <role>made in</role>
      <coRole>of</coRole>
      <tailTerm>Vintage</tailTerm>
    </lexonBasePath>
  </setExpression>
</occurrenceConstraint>
```

*each Wine* is made in *exactly 1 Vintage*

```
<occurrenceConstraint comparator="greaterThanOrEqual" number="1">
  <setExpression>
    <lexonBasePath>
      <context>Wine Auctions</context>
      <headTerm>Wine</headTerm>
      <role>made in</role>
      <coRole>of</coRole>
      <tailTerm>Vintage</tailTerm>
    </lexonBasePath>
  </setExpression>
</occurrenceConstraint>
```
Other constraints

- Occurrence constraints
- Subset constraints
- Value constraints
Auction Commitment

3. Interpretation

- Maps paths in RDB to paths in Lexon Base
- Maps XPaths in XML to paths in Lexon Base

map /auction/@date on
Date of Auction

map /auction/lot on
Lot part of Auction

...
Conceptual Querying

list Name of Wine made in Vintage = 1947

- Translates the query to underlying datasources using commitments
- Searches the auction site and wine store DB
Summary

- DOGMA based specification of ontological commitments
- Close to natural language
- Integrated into DOGMA Studio
- Supports conceptual querying
Future Work

- Formalization of $\Omega$-RIDL
- $\Omega$-RIDL to $\Omega$-RIDL ML compiler
- Graphical assistance for creating mappings
- Conceptual query interpreter
- Further integration into DOGMA Studio
Questions

カップ 講演会を開催しました。

Q: 会社の歴史について教えてください。
A: 会社は1990年創業です。