ONTOMETRY MATCHING: A STATE-OF-THE-ART SURVEY

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OUTLINE

Introduction  Matching Problem  Techniques  Systems and Tools  Future  Conclusion
1. INTRODUCTION

Ontology:

- “A formal specification of a shared conceptualization” (Tom Gruber)
- Describe the types of objects and concepts that exist in a domain, and their properties and relations (Arvidsson, Flycht-Eriksson)
- Very important for exchange of data, information, and knowledge
- Applications: Database integration, peer-to-peer systems, e-commerce, semantic web services, social networks, ...
- Often necessary to interoperate on different ontologies (e.g. information sharing/integration)
2. MATCHING PROBLEM

● Different parties implement different ontologies for datasets

● Heterogeneity occur if, i.e., different languages, terminologies or modeling are used
  ● E.g., classes of data that are semantically equivalent, but differently labeled or defined.

● How to find relationships or correspondences between entities of different ontologies?
  ⇒ Ontology matching

● Correspondences do not necessary stand for equivalence between ontology entities, also possibly other relations
  ● E.g., consequence, subsumption, or disjointness.
2. **Matching Problem - Terminology**

- Ontology matching: discovering correspondences between semantically related entities of different ontologies
- Ontology alignment: results of ontology matching
- Ontology mapping: oriented, or directed, version of an alignment; maps entities of one ontology to at most one entity of another ontology.

2. Matching Problem (contd.)

Example matching a product with a monograph ontology (Source: Shvaiko P.: Ontology Matching SWAP (2006))
3. APPLICATIONS

● Traditional applications
  ● Ontology engineering
    ○ designing, implementing and maintaining ontology-based applications
  ● Information integration
    ○ schema integration, catalog integration and data warehousing

● Recently emerged
  ● P2P information sharing
  ● Autonomous communication
  ● Web service composition
  ● Query answering on the web (navigation on the web)
4. Techniques

Matching techniques

Element-level

Syntactic  External

String-based
- Name similarity, description similarity, global namespace
- Language-based
  - Tokenization, Morphology, elimination

Linguistic resources
- Lexicons, thesauri
- Based constraint
  - type similarity, key properties
- Alignment reuse
  - entire schema or ontology, fragments

Constraint-based type

Upper level, domain specific ontologies
- SUMO, DOLCE, FMA
- Data analysis and statistics
  - frequency distribution

Sensoric

Model-based
- SAT solvers, DL reasoners
- Taxonomy-based
  - taxonomy structure
- Repository of structures
  - structure metadata

Input type layer

Linguistic Internal Relational

Terminological Structural Extensional Semantic

Graph-based graph
- homomorphism, path, children, leaves

5. Systems and Tools
5. Systems and Tools: COMA++

User interface of COMA++
Source: Aumueller et al., 2005
5. Systems and Tools: COMA++

Architecture of COMA++
Source: Aumueller et al., 2005
5. SYSTEMS AND TOOLS: COMA++

Matching strategies of COMA++

- Fragment-based matching
- Reuse-oriented matching
5. **SYSTEMS AND TOOLS: OPTIMA**
5. SYSTEMS AND TOOLS: AGREEMENTMAKER
6. FUTURE

- Ontology matching frameworks
- Speed/automation/accuracy tuning
- Scalability issue
- Results visualization
Thank you for your attention!
REFERENCES


REFERENCES CONT'D.

