

Ontology Evaluation

Seminar in Applied Ontology Engineering WS 10/11

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December, 10th 2010

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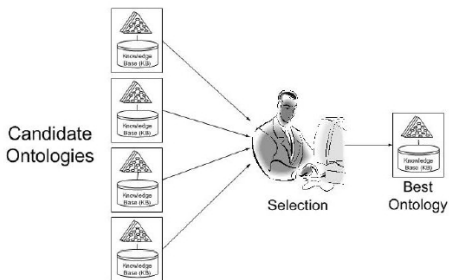


Figure: Ontology Evaluation [Tartir10]

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Definition

Ontology evaluation is tools and methods for comparing, validating and ranking similar ontologies.

More detailed:

- Quality check while ontology engineering process
- Check if ontology fulfills requirements
- Selection of ontologies for applications
- Inconsistency check

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Classifications

Classification according to approach

- **Golden Standard:** Compare Ontology with another
- **Application-based:** Application which evaluates ontology
- **Data-driven:** Compare if source data is covered by ontology
- **Assessment by humans:** Evaluating ontology according to criterias

Classification according to complexity level

- **Lexical, vocabulary or data layer:**
 - Scope ontology components
 - String matching algorithms (e.g. edit distance)
- **Hierarchy or taxonomy:**
 - Evaluate *is-a*, *is-a-part-of* and *similar* relations
- **Context or application level**
 - Useful if Ontology is part of a larger ontology
 - Ontology used in an application evaluated according to its output
- **Syntax, Structure, architecture, design**
 - Manually constructed ontologies
 - Ontology has to meet certain structure

Classification approach and complexity level

Level	Approach to evaluation			
	Golden standard	Application-based	Data-drive	Human assessment
Lexical, vocabulary, concept, data	X	X	X	X
Hierarchy, taxonomy	X	X	X	X
Context, application		X		X
Syntax, structure, architecture, design	X			X

Classification according to evaluation methods 1/2

- **Evolution based:** tracks changes over different versions

Changes in

- Domain* by adding or changing knowledge
- Concept* changing view or perspective
- Specification* result of translation into other language

Classification according to evaluation methods 2/2

- **Logical / Rule based**
 - User defines rules in OWL or RDF
 - Discover failures, inconsistencies and conflicts
 - **RuleML**

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- **Metric / Feature based:** Calculates statistics of given knowledge

Tools and Methods

OntoManager

- Truthfulness of ontology with respect to problem domain
- Finds weak places and modifies them on requirements
- On completed ontologies
- Requires Log Files
- Fully Automatic
- Metric Based
- Application Based
- Context / Application level

OntoManager

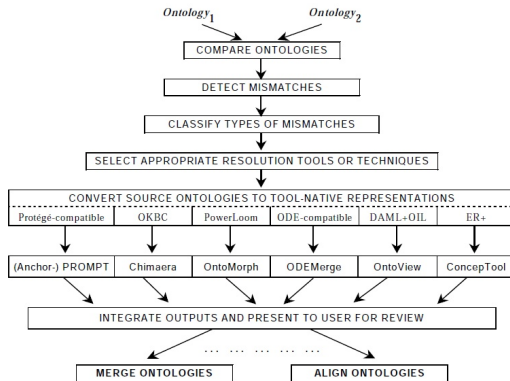


Figure: Ontomanager Structure¹

¹http://eprints.aktors.org/280/01/p132_ekaw2002.pdf

OntoMetric

- Compares Requirements and Features given by user
- Metric Approach
- Partially Automatic
- Application-based approach
- Lexical, vocabulary, concept and data level

OntoMetric

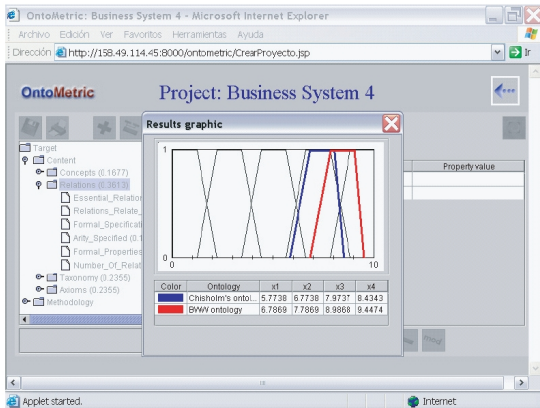


Figure: OntoMetric²

²<http://www.springerlink.com/content/b27333b8pgwvy1rt/>

OntoClean

- Cleans taxonomical structure of ontology
- Comparing to Golden Standard to detect inconsistencies
- Tool: **OntoEdit**
- Mostly Manually (requires deep understanding of philosophical notion)
- Hierarchical, Taxonomical Level

³<http://www.cs.man.ac.uk/~seanb/teaching/COMP30411/OntoClean.pdf>

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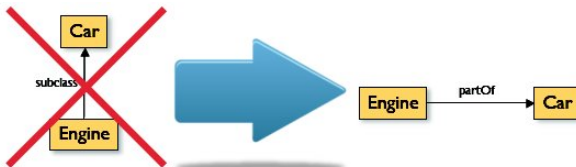


Figure: OntoClean³

³<http://www.cs.man.ac.uk/~seanb/teaching/COMP30411/OntoClean.pdf>

EvaLexon

- Information Retrieval Techniques from given text
- Linguistic level: Compares Words
- Reference: Text itself
- Metric based approach (recall, precision, coverage and accuracy)
- Data-Driven
- Lexical Vocabulary level

WEBCORE

- Similarity Measures
- Retrieves most similar Ontology based on user ratings
- Semi-Automatic (Requirements and Ratings by user)
- Lexical base
- Mixture of Golden Standard and Assessment by humans

WEBCORE

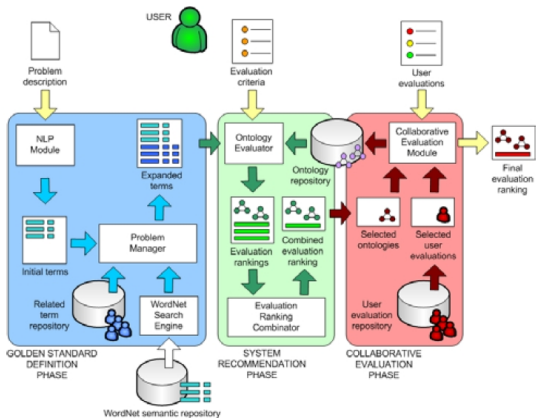


Figure: WebCORE architecture⁴

⁴<http://ir.ii.uam.es/publications/ckc07.pdf>

S-OntoEval

- Ontology as Semiotic Object
- Gives metrics of semiotic levels
- Structural: Syntax (Depth,Breath..)
- Functional: Compares actual ontology with Concept
- Usability: Pragmatic level: User-communication with Ontology

Conclusion

- Many methods, techniques and frameworks
- Ontology Evaluation = important not completely solved problem
- No Best Practice
- Open Research Area

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Thank you for your attention!
Questions?