Introducing Fuzzy Trust for Managing Belief Conflict over Semantic Web Data

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Outline

• Introduction and context
• Problem of interpreting SW data
• Fuzzy trust for conflicting belief
• Evaluation
• Conclusions
Introduction and context

- Evaluate ontology mappings for large ontologies
- Human experts combine their assessments
- Final assessment is a collective judgment
- Subjective belief of human expert-software agent
Introduction and context

List all papers with keywords uncertain ontology mapping?

Answer composition component

Ontology mapping component

Paper = article = publication

WordNet

BibTeX/UMBC Ontology

BibTeX/MIT Ontology

The Open University
To determine similarity between terms:

- Use different linguistic or semantic information
- Use different similarity measures
- Use different background knowledge
- Combine them to get a more reliable view
In case of agreement

No problem combine them

Otherwise

Determine which cannot be trusted and exclude it
Determine binary trust

- For a number of agents (voters)
- Agents’ belief is subjective
- Involves certain degree of vagueness
- Trust and distrust cannot always be definitely assessed
Fuzzy trust for conflicting beliefs
Fuzzy trust for conflicting belief

Hypothesis set

$H_1 = \text{map\{article, publication\}}$

MAPPPING AGENTS

0.7

0.5

0.3

VOTING AGENTS

Ask voting
Linguistic variables (labels)
- Low trust ($L_t$)
- Medium trust ($M_t$)
- High trust ($H_t$)

Fuzzy sets for each voter
- $\mu$(Low trust)
- $\mu$(Medium trust)
- $\mu$(High trust)
Fuzzy trust for conflicting belief

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Sample ontologies from the benchmark

- Ontology Nr. 103: Language generalisation (OWL Lite)
- Ontology Nr. 204: Different naming conventions
- Ontology Nr. 205: Synonyms
- Ontology Nr. 221: No hierarchy
- Ontology Nr. 222: Flattened hierarchy
- Ontology Nr. 221: Expanded hierarchy
- Ontology Nr. 301: Real ontology – BibTex(MIT)
Evaluation

- With trust
- Without trust

Recall

1x  2x  3x
Benchmarks
Evaluation

![Graph showing Precision with and without trust across 1x, 2x, and 3x benchmarks.](image-url)
First results of the Ontology Alignment initiative 2008
Caterina Caracciolo et al.
Conclusions

• Dynamic trust assessment
• Fuzzy voting model
• Conflict resolution between agent beliefs
• Membership functions can change dynamically
Thank You!