

# **Ontology mapping for personalization in adaptive e- learning**

Tatyana Ivanova

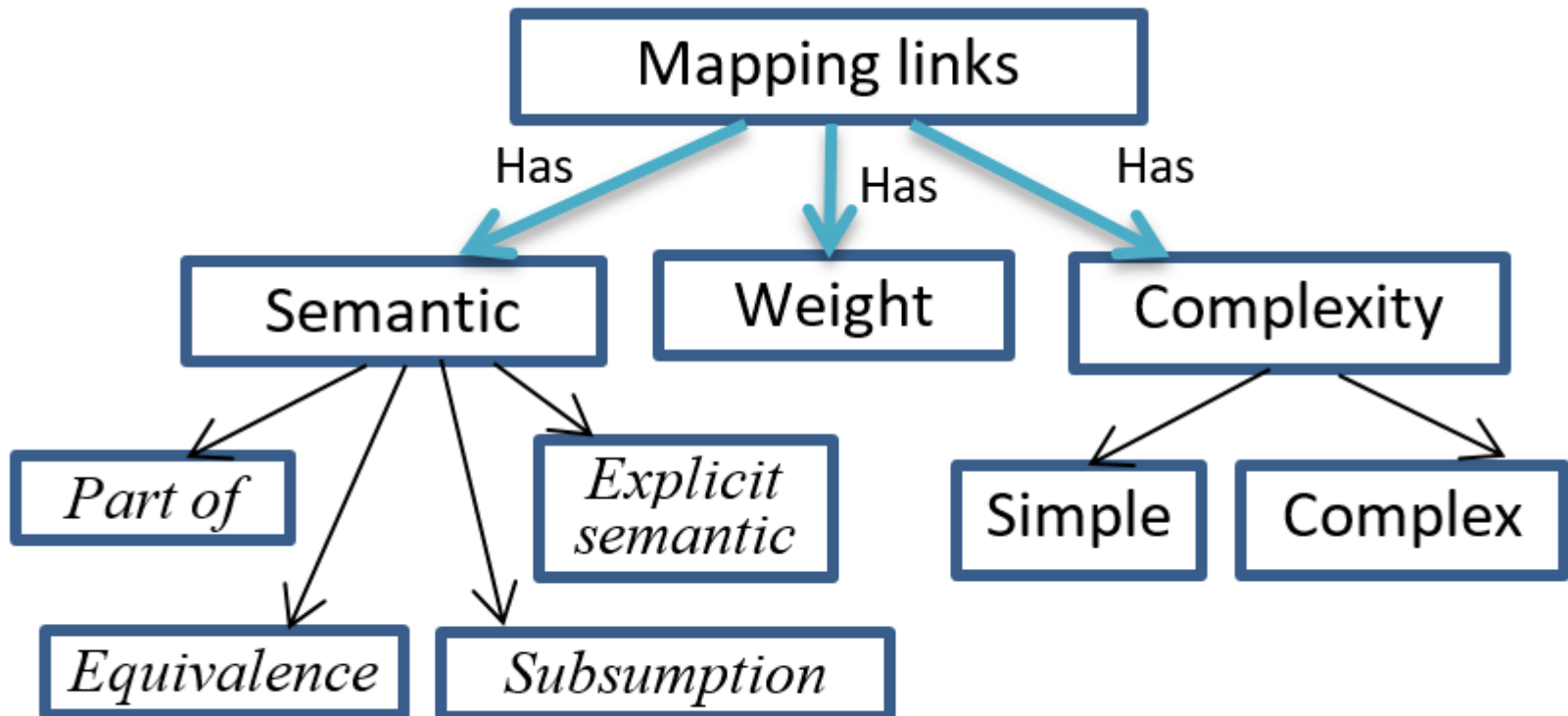
Technical University of Sofia, Bulgaria

tiv72@abv.bg

# **Our main research questions are:**

- To find the mappings of what types educational ontologies are frequently used in e-learning;**
- To identify mapping techniques, appropriate for specific learning tasks;**
- To identify mapping techniques, appropriate for specific educational ontologies;**
- To outline trends and problems in ontology mapping in e-learning domain.**

# Types of mapping links



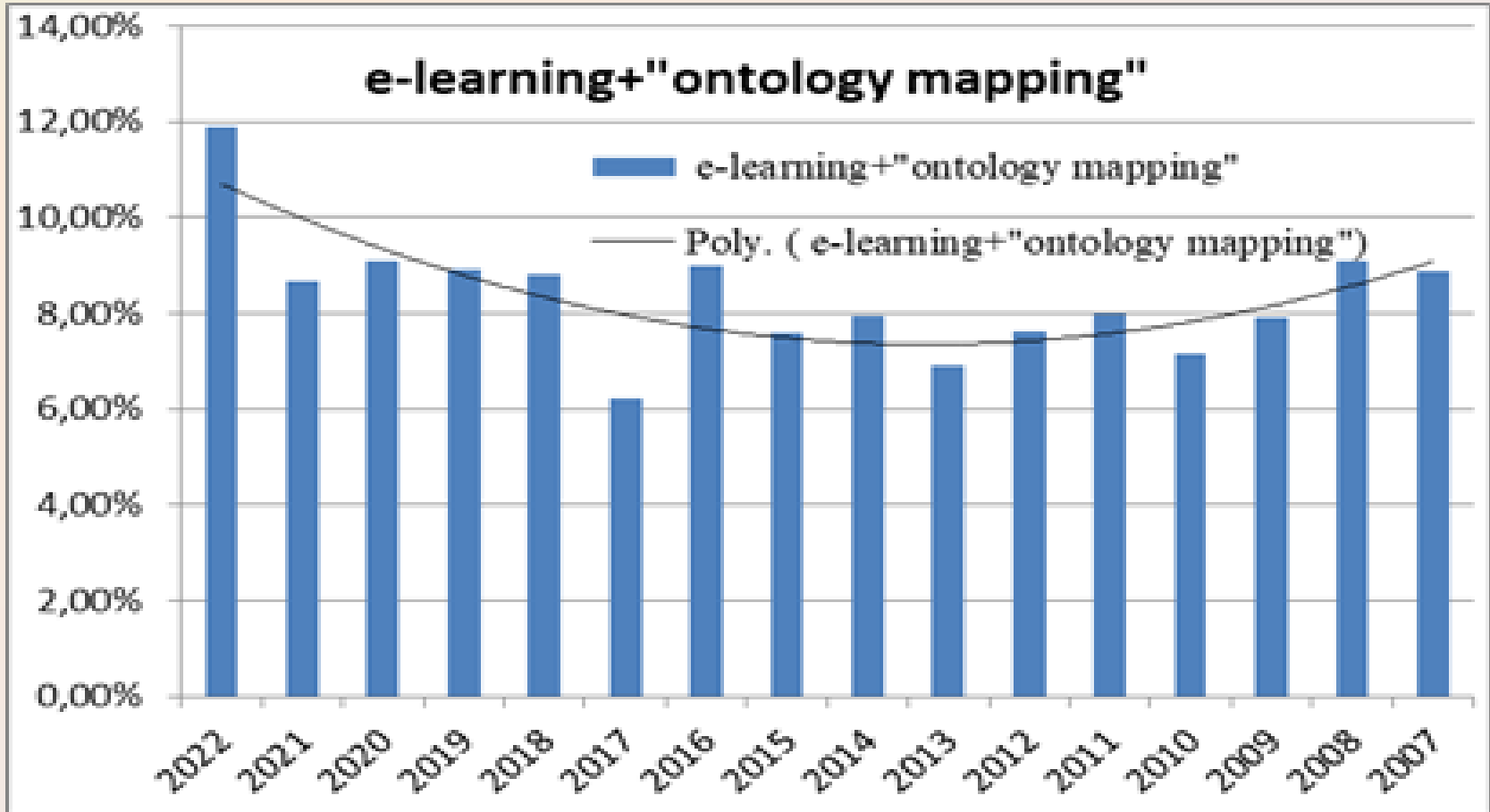
# Purposes of usage of ontology mapping in e-learning (literature review)

|                            | Main purpose of using mapping |                           |                |                       |                         |                        |                            |
|----------------------------|-------------------------------|---------------------------|----------------|-----------------------|-------------------------|------------------------|----------------------------|
|                            | Managing resources            | Interoperability          | Reuse          | Assessment            | Personal learn          | Search                 | Recommendation             |
| Cited by                   | 12, 37, 16                    | 20,16,53, 65, 10          | 1, 43, 56      | 20,7,3,               | 16,1, 0,2,0             | 115,59,17, 14, 0,1, 56 | 3,5,14,17, 83              |
| Type of mapped ontologies  | domain                        | Domain Learning standards | Domain profile | Domain, domain Domain | Domain, profile, LOM    | Domain, domain domain  | domain domain profile      |
| Used additional techniques | Annotation                    | NLP, SPARQL               | Annotation     | Concept map           | Rules, machine learning | Filtering clustering   | Data integration filtering |
| Year                       | 09, 13, 15                    | 13,16,06, 13, 17          | 19, 17, 11     | 13,05,20,             | 16, 09, 21,19,22        | 06,13,05,0 7, 21,21,11 | 21,20, 18, 18, 19          |
| Mapping type               | Automatic Interactive         | Automatic                 | Semiautomatic  | Automatic             | Automatic Interactive   | automatic              | Automatic, interactive     |

# Ontology mapping approaches and techniques

| Approaches     | Techniques                 |
|----------------|----------------------------|
| Terminological | String-based,              |
|                | Language-based             |
|                | Linguistic resource –based |
| Structural     | Taxonomy-based             |
|                | Tree-based                 |
| Semantic       | Rule-based                 |
|                | Machine Learning-based     |
|                | Statistical analysis       |
|                | Reasoning-based            |

# Percentages of research on ontology mapping for e-learning



# Mapping techniques, the most useful in E-learning:

- String-based;
- Language-based mapping methods;
- Techniques for mapping linguistic ontologies are the most useful in e-learning domain when mapping learning content ontologies;
- Pattern-based and rule-based approaches also work well in E-Learning domain;
- Semantic-based ontology mapping techniques have a great potential, but practically they are rarely used. The main difficulty is in combining semantics' deductive techniques with the inductive structure of ontology.
- Semantic-based ontology mapping, mapping consistency checking and discussion on inconsistent mappings are also useful during learning.

# Conclusion: Trends and challenges

- Using machine learning is important trend in ontology mapping;
- Statistical and machine learning techniques do not work well in e-learning domain, because of the fact that ontologies are relatively small, significantly different, and this is also true for the learning content.
- Main trend in ontology mapping is to combine results of multiple matching techniques are combined for better accuracy (for example, linguistic and structural).
- Mapping strategies are used to combine different techniques. Different mapping and evaluation strategies can be used in different sub domains of e-learning.
- Human-based evaluation is important!
- Future challenges are to enhance usage of deductive reasoning, generalization and modularity of semantic mapping methods;



# Questions?

Tatyana Ivanova

Technical University of Sofia,  
Bulgaria

[tiv72@abv.bg](mailto:tiv72@abv.bg)