WojoodOntology: Ontology-Driven LLM Prompting for Unified Information Extraction Tasks

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SinaLab

Ontology-guided prompting for mapping between datasets using LLMs.

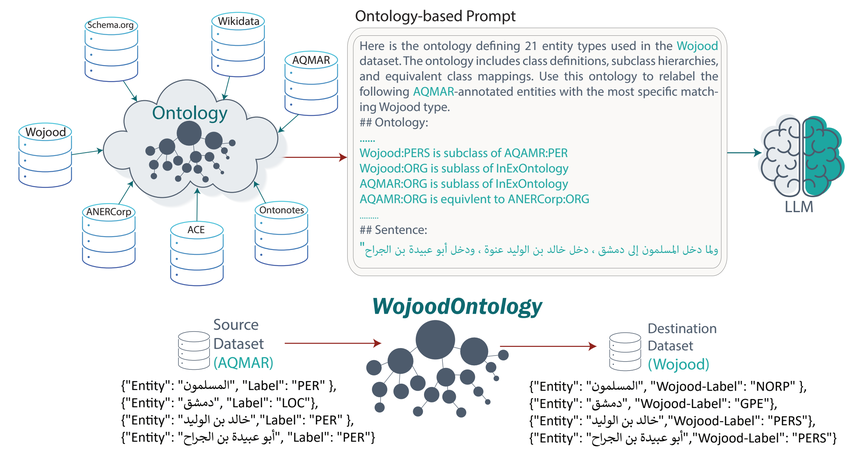
Two ontology-based mapping methods

- **Uni-directional mapping rules**

  Set of mapping rules for uni-directional tagset alignment

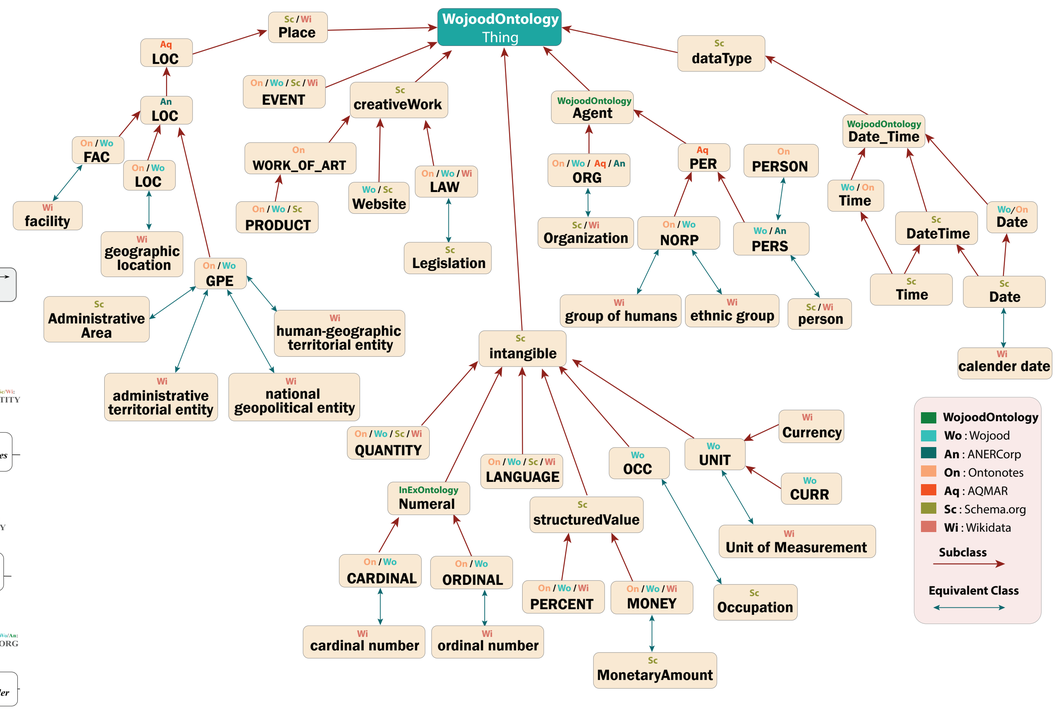
- **Ontology-Driven Prompting for Bi-directional Mapping**

  Incorporates the ontology concepts directly into prompts enabling large language models (LLMs) to perform more effective.

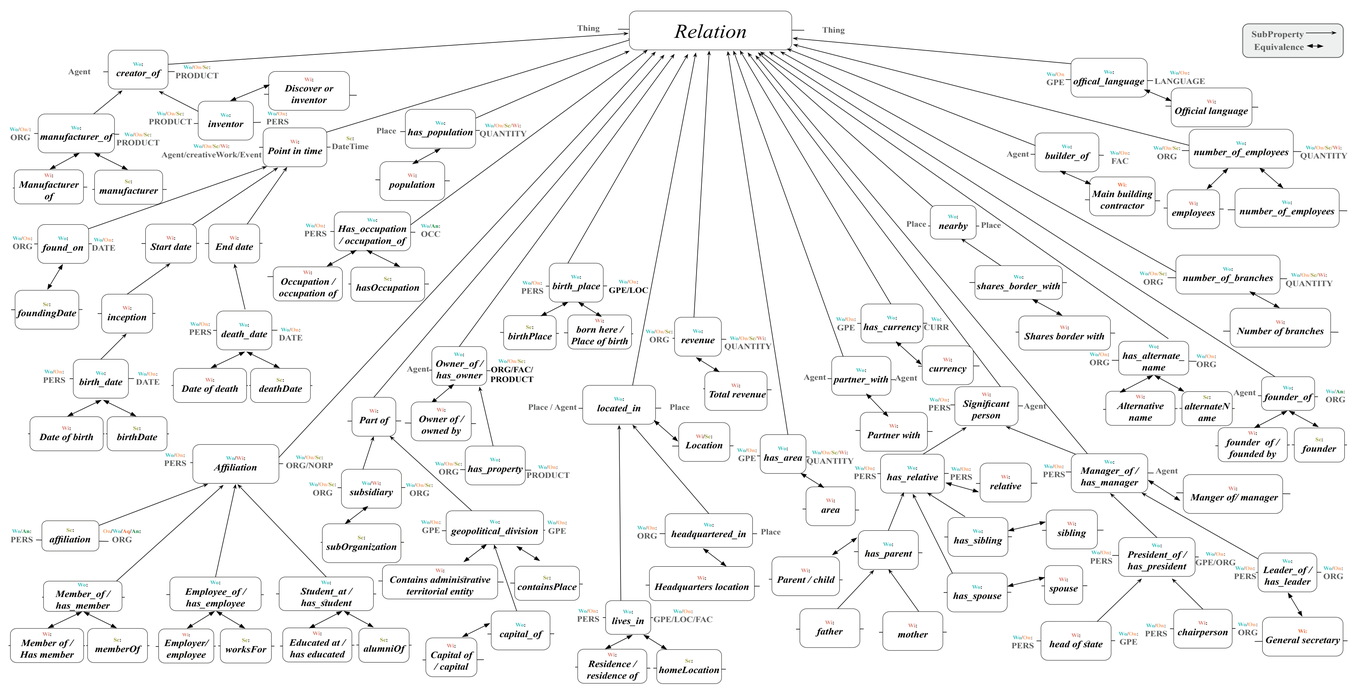


WojoodOntology: semantic mediation framework

- ***WojoodOntology*** a novel information extraction ontology
- Defines ***55 concepts*** (named entity types) and ***40 relationships*** subclass and equivalent class relations
- Facilitates the alignment of ***heterogeneous*** tagsets and guidelines



WojoodOntology (Class Hierarchy)



Relation Extraction Ontology (Relation hierarchy)

Experiments and Results

Uni-directional mapping rules

- Performance increases to 40%.
- The model achieved a 52% F1 score on the 90% of AQMAR.

Experimental Setting	F1	Improv.
Baseline(No Mapping)		
Wojood —> AQMAR	8%	–
Ontology-BasedMapping		
Wojood(mapped to AQMAR)	40%	+32%
Wojood+10% AQMAR(fine-tuned)	**52%**	**+44%**

Experiments on ontology-based unidirectional mapping rules (Wojood →AQMAR).

Ontology-Driven Prompting for Bi-directional Mapping

Zero-Shot Prompting

- Significant improvement compared with ontology integration (29% vs. 8% F1-score).

Few-Shot Prompting

- Performance improved to 49% F1-score using 7 examples without ontology.
- Includes (both the ontology and seven examples) increase to 55% F1-score.

Setting	Precision	Recall	F1-score
Zero-shot			
Ontology (w/ ent.)	0.3194	0.2388	0.2733
Ontology (w/o ent.)	0.3319	0.2595	0.2913
Few-shot			
Without Ontology	0.5109	0.4879	0.4991
With Ontology	**0.5730**	**0.5294**	**0.5504**

Ontology-based prompting performance in zero-shot and few-shot bi-directional entity mapping.

Downloads
https://sina.birzeit.edu/wojood

Paper

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Summary

Including the ontology in the prompts significantly improves model performance