Ontology Matching Through Absolute Orientation of Embedding Spaces

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Motivation

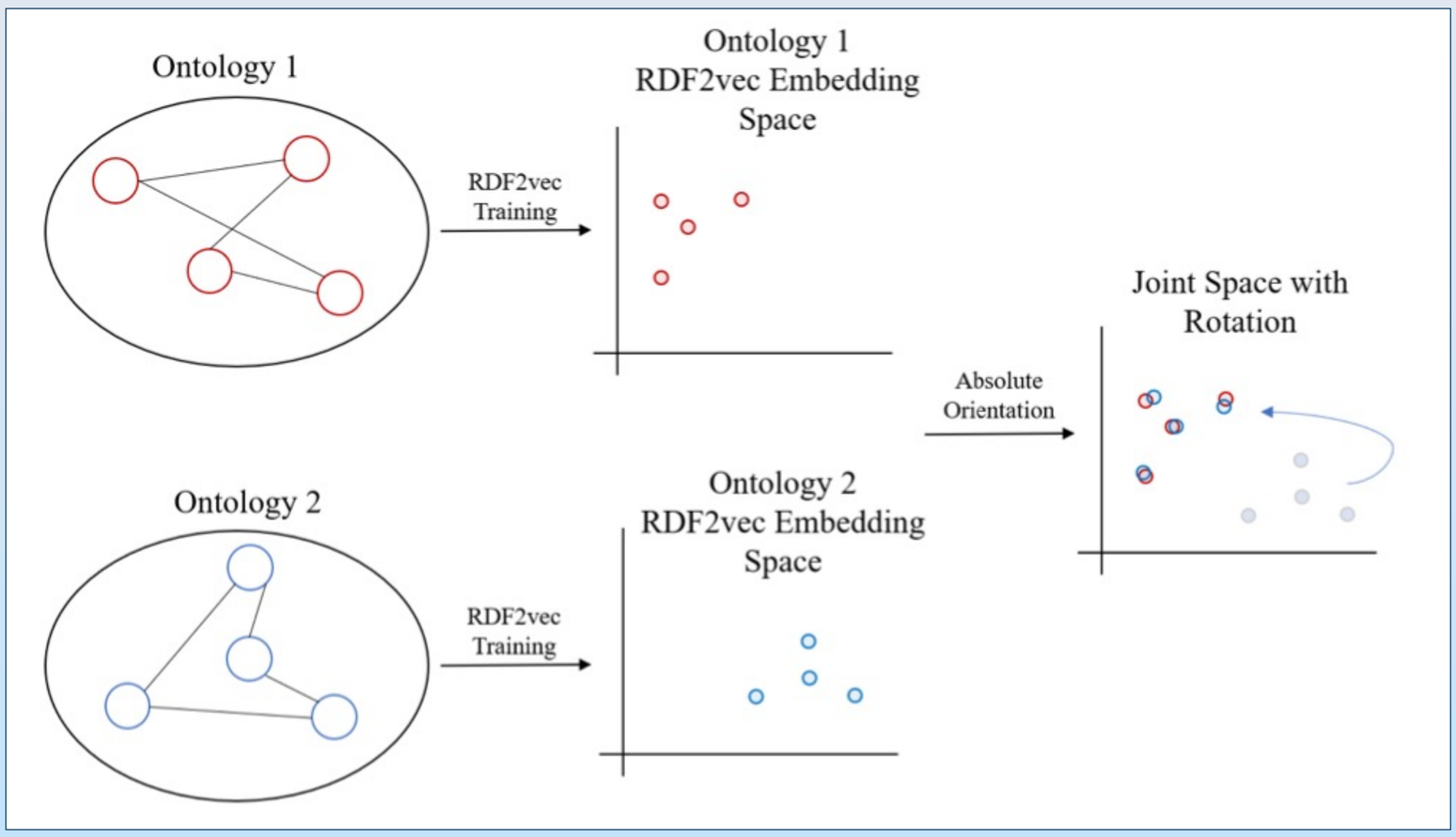
- **Ontology matching** is a core task when creating interoperable and linked open datasets.
- **Ontology matching** has applications in various fields such as data integration, data transfer, and data preparation.
- **Graph embeddings** encode the ontological structure.

Research Questions and Goals

- Can we leverage **knowledge graph embeddings and rotation operations** for ontology matching tasks?

Approach

- Given two ontologies, train separate knowledge graph embeddings using ***RDF2vec*** [1].
- Given a set of anchor points, use the ***Absolute Orientation*** [2] to rotate the embedding spaces onto each other.
- Match closest nodes.



PDF

Video Demo

GitHub

Results

- Approach was evaluated on synthetic experiments with different training size, alignment noise, and graph heterogeneity levels: It works particularly well on similarly structured graphs, it handles alignment noise better than size and structural differences.
- On the OAEI multifarm dataset German-English test case , with a sampling rate of 20%, our approach achieves micro scores of P = 0.376, R = 0.347, and F_1 = 0.361
- Approach is particularly promising in combination with non-structural matching components.

References

[1] Ristoski, Petar; Rosati, Jessica; Di Noia, Tommaso; De Leone, Renato; Paulheim, Heiko. RDF2Vec: RDF Graph Embeddings and Their Applications. Semantic Web Journal 10(4). 2019.
[2] Dev, S., Hassan, S., Phillips, J.M. Closed form word embedding alignment. Knowl. Inf. Syst. 63(3), 565–588 (2021) .