Potato, Potahto, Iliad, Ilias: Entity Alignment with Knowledge Graph Embeddings and Language Models

A Knowledge Graph (KG) contains real-world information organized to enable data sharing, understanding and reasoning. In order to make a KG consistent, integration with existing KGs is required. One such task, Entity Alignment\(^1\) (EA), attempts to map equivalent entities from one KG (source) to another KG (target).

EA techniques are often hampered by entity name variations, multilingualism, and the heterogeneity of source-target KGs. Recent developments in Machine Learning and Natural Language Processing have been shown to mitigate these challenges.

In particular, KG Embeddings\(^3\) (KGEs) have proven invaluable through their ability to encode an entity’s graph substructure, describing its neighborhood and the relations attached to it. These dense representations enable similarity-based scoring functions to compute equivalence between entities.

In addition, pre-trained Language Models\(^4\) (PLMs) encode the semantics found in the literals attached to entity names and attributes. They have been shown to address name variations and multilingualism.

The goal of this thesis is to explore and combine the aforementioned techniques in order to integrate the German Digital Library\(^4\) Knowledge Graph (DDB-KG) to existing and well-established KGs, such as, the Integrated Authority File (GND) and Wikidata.

This thesis will be supervised by Mary Ann Tan, Dr. Russa Biswas, and Prof. Dr. Harald Sack, Information Service Engineering at Institute AIFB, KIT, in collaboration with FIZ Karlsruhe.

Call for Master Thesis

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Prerequisites

- Good programming skills in Python
- Interest in Cultural Heritage
- Interest in Natural Language Processing
- Interest in Machine Learning approaches
- Interest in Semantic Web technologies

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2. [https://doi.org/10.1109/TKDE.2017.2754499](https://doi.org/10.1109/TKDE.2017.2754499)
3. [https://doi.org/10.1007/s11431-020-1647-3](https://doi.org/10.1007/s11431-020-1647-3)
4. [https://www.deutsche-digitale-bibliothek.de](https://www.deutsche-digitale-bibliothek.de)