**Improving Multilingual DBpedia: Interlingual Property Mapping**

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**Abstract**

In this project, the target is to improve the multilingual DBpeida. Our approach is to develop a multilingual mapping tool that automatically map properties in different languages into the same ontology. Through the research period, we took the Dutch DBpedia (nl.dbpedia.org) version as an object of study. We found two main problems to be developed in a Dutch DBpedia page. In the original situation, it might either not able to automatically update value under a same property in different language or cause error when searching in a SPARQL query. We attempt to use the semantic web knowledge to build up a mapping method between multilingual properties. The result shows a high feasibility of our attempt in both mapping the multilingual properties and improving the SPARQL search quality.

**1 Introduction**

DBpedia is a crowd-sourced community effort to extract structured information from Wikipedia and make this information available on the Web. DBpedia allows users to ask sophisticated queries against Wikipedia, and to link the different data sets on the Web to Wikipedia data. This work may make it easier for the huge amount of information in Wikipedia to be used in some new interesting ways. Furthermore, it might inspire new mechanisms for navigating, linking, and improving the encyclopedia itself.

The English version of the DBpedia knowledge base describes 4.58 million things, out of which 4.22 million are classified in a consistent ontology, including 1,445,000 persons, 735,000 places (including 478,000 populated places), 411,000 creative works (including 123,000 music albums, 87,000 films and 19,000 video games), 241,000 organizations (including 58,000 companies and 49,000 educational institutions), 251,000 species and 6,000 diseases[[1]](#footnote-1).

In addition, they also provide localized versions of DBpedia in 125 languages. All these versions together describe 38.3 million things, out of which 23.8 million are localized descriptions of things that also exist in the English version of DBpedia. Altogether the DBpedia 2014 release consists of 3 billion pieces of information (RDF triples) out of which 580 million were extracted from the English edition of Wikipedia, 2.46 billion were extracted from other language editions. For Dutch DBpedia[[2]](#footnote-2) version, there has been significant progress on the mapping templates since launched in 2013. So far, the DBpedia is updated to version 4.0, from September of 2014.

**2. DBpedia Ontology**

The DBpedia Ontology is a shallow, cross-domain ontology, which has been manually created based on the most commonly used infoboxes within Wikipedia. The ontology currently covers 685 classes which form a subsumption hierarchy and are described by 2,795 different properties.

Since the DBpedia 3.7 release, the ontology is a directed-acyclic graph, not a tree. Classes may have multiple superclasses, which was important for the mappings to schema.org. A taxonomy can still be constructed by ignoring all superclasses except the one that is specified first in the list and is considered the most important.

The DBpedia Ontology currently contains about 4,233,000 instances. The table below lists the number of instances for several classes within the ontology:

| **Instances per class** | |
| --- | --- |
| **Class** | **Instances** |
| Resource (overall) | 4,233,000 |
| Place | 735,000 |
| Person | 1,450,000 |
| Work | 411,000 |
| Species | 251,000 |
| Organisation | 241,000 |

For the localized languages, instead of specially building an ontology, they are all mapped into a same ontology in the English version. Hence, there is a high demand on the original ontology, requiring it to be able to expand in a much larger scale.

**3. Property Mapping**

DBpedia properties also have properties of their own and while those subproperties are already mapped in the English DBpedia ontology. However, in other languages they are poorly mapped or sometimes not mapped at all. The problem with this is that the property itself exists in multiple languages, but does not ‘know’ that of itself. Hence, changing the value in one language does not change it in the rest. Therefore, we want to extend and map these sub properties in DBpedia for other languages than English.

We firstly find out 2 main problems in a Dutch DBpedia page. The first problem is the properties of a domain are not annotated/linked in an otology, while it is linked in English version. The second problem is that different spelling of a same property exist in Dutch version, somehow making the data inconsistent. In such situation, it is not applicable to use a certain language to search using a SPARQL query.

Research questions:

1. How can ontologies and their methods in different languages be tied together (mapped)?
2. How is DBpedia being mapped, and how can we use these methods to contribute?
3. How to conduct and analyze the evaluation for mapping the multilingual properties for a DBpedia ontology?

4.Method

Datasets

The DBpedia introduces several datasets on the multilingual properties.

The Mapping-based Properties: High-quality data extracted from Infoboxes using the mapping-based extraction. The predicates in this dataset are in the /ontology/ namespace. Note that this data is of much higher quality than the Raw Infobox Properties in the /property/ namespace. For example, there are three different raw Wikipedia infobox properties for the birth date of a person. In the the /ontology/ namespace, they are all mapped onto one relation http://dbpedia.org/ontology/birthDate. It is a strong point of DBpedia to unify these relations.

But at the same time, there also exists other kinds of datasets that to be improved. For example:

Mapping-based Properties (Cleaned)

This file contains the statements from the Mapping-based Properties, with incorrect statements identified by heuristic inference being removed.

Mapping-based Properties (Specific)

Infobox data from the mapping-based extraction, using units of measurement more convenient for the resource type, e.g. square kilometres instead of square metres for the area of a city.

**6. Related Work**

Our approach gains inspiration from the previous introduction of the DBpedia mapping method (Jens Lehmann et al. 2012). In the original DBpedia working mothology, the structured data (presented in RDF triples) is extracted and mapped with the extraction framework. Similar work on automatically map templates has also been conducted (Alessio et al.2012).

The mapping-based infobox extraction uses manually written mappings that relate infoboxes in Wikipedia to terms in the DBpedia ontology. The mappings also specify a data-type for each infobox property and thus help the extraction framework to produce high quality data. Mapping template is developed to fulfill the needs when mapping the infobox data values. A mapping assigns a type from the DBpedia ontology to the entities that are described by the corresponding infobox. In addition, attributes in the infobox are mapped to properties in the DBpedia ontology.

By looking through the previous work, we think this is still workable in our practice. In our project, we focus more on the detailed mapping between different named properties which contain the same value in the same format. It can be seen as relation extraction task. Because a same data value for multilingual properties has been formatted in the first mapping-based extraction. Through the improvement in the experiment, the results turn out to be acceptable.

**References**

<http://www.wiki.dbpedia.org/>

[1] Jens Lehmann, Robert Isele, Max Jakob, Anja Jentzsch, Dimitris Kontokostas, Pablo N.Mendes, Sebastian Hellmann, Mohamed Morsey, Patrick van Kleef, So ̈ren Auer, Christian Bizer. *In proceeding of Semantic Web 1 (2012) 1–5,* DBpedia - A Large-scale, Multilingual Knowledge Base Extracted from Wikipedia.

[2] Gosse Bouma and Sergio Duarte. *In proceeding of ACL, 2009*. Wikipedia entity retrieval for Dutch and Spanish

[3] Alessio Palmero Aprosio, Claudio Giuliano, Alberto Lavelli. Automatic Mapping of Wikipedia Templates

for Fast Deployment of Localised DBpedia datasets.

1. http://www.dbpedia.org/ [↑](#footnote-ref-1)
2. http://nl.dbpedia.org/ [↑](#footnote-ref-2)