Ontology Integration for the Linked Open Data

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Abstract

The Linked Open Data (LOD) cloud contains tremendous amounts of interlinked instances, from where we can retrieve abundant knowledge. In order to access to the linked data, we have to be familiar with the ontology of each data set. However, because of the heterogeneous and big ontologies, it is time consuming to learn all the ontologies manually and it is difficult to observe which properties are important for describing instances of a specific class. In order to construct an ontology that can help users easily access to various data sets, we propose the Framework for Integrating ONtologies (FITON) that can reduce the heterogeneity of the ontologies, retrieve core ontology schemas, and construct easily understandable integrated ontology.

FITON solves three main problems: ontology heterogeneity problem, difficulty in identifying core ontology schemas, and missing domain or range information problem. The three main components of FITON solve each problem, which are graph-based ontology integration, machine-learning-based approach, and integrated ontology constructor. The graph-based ontology integration approach solves the ontology heterogeneity problem by analyzing the graph patterns of the interlinked instances and integrates heterogeneous ontologies by retrieving related classes and properties that are critical to link the same instances in different data sets. The machine-learning-based approach retrieves core ontology schemas (top-level classes and frequent core properties) by applying Decision Table and Apriori, that can help Semantic Web application developers easily understand the ontology schemas of the data sets. Furthermore, the integrated ontology constructor automatically adds missing domain, range, and annotations that can provide us rich information about the ontology. The integrated ontology constructed by FITON can help us discover missing links, detect misused properties, recommend standard ontology schemas for the instances, and improve the information retrieval with simple SPARQL queries.
To my family and friends.
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