



Ontology-to-Ontology Matching System

Overview

The Ontology to Ontology (OtO) Matching System is a multi- strategy matching system for **schema-** and **instance-level** matching that is **domain independent** and **fully customizable**. It implements several different ontology matching processes, which can be roughly categorized into processes that include schema matching algorithms and processes that include instance matching algorithms.

Schema and Instance Matching System

Ontologies Selection
Source:
Target:

Schema Matching
☒ Schema Matching
☐ Local Matching
☐ Semantic Matching
☐ Instance Matching
Threshold:
File:
Maximum Similarity Matching: ☒

Instance Matching
☒ Instance Matching
Consider Anonymous Instances: ☐
Consider Parent Instances: ☐
Consider Thiq Instances: ☐
Threshold:
Algorithms:
☒ Profile
☒ Character Frequency
☒ Path
☒ Inclusion
☒ Exclusion
☒ Set Distance
☒ Profile First

Matching Results

Source Class	Target Class	Similarity	Accept	Weight (0.0-1.0)
baseball	baseball	1.0	☒	1.0
business_firm	business_firm	1.0	☒	0.0
actor	actor	1.0	☒	0.0
person	person	1.0	☒	0.0
organization	organization	1.0	☒	0.0
item	item	1.0	☒	0.0
wikipedia-class	wikipedia-class	1.0	☒	0.0
wikipedia-nationality	wikipedia-nationality	1.0	☒	0.0
wikipedia-daterofbirth	wikipedia-daterofbirth	1.0	☒	1.0
wikipedia-company_name	wikipedia-company_name	1.0	☒	1.0
wikipedia-variant	wikipedia-variant	1.0	☒	1.0
cogito-domain	cogito-domain	1.0	☒	0.0
wikipedia-format	wikipedia-format	1.0	☒	0.0
wikipedia-webdate	wikipedia-webdate	1.0	☒	0.0
wikipedia-branding	wikipedia-branding	1.0	☒	0.0
wikipedia-currentclub	wikipedia-currentclub	1.0	☒	0.0
wikipedia-cvener	wikipedia-cvener	1.0	☒	0.0
wikipedia-cityofbirth	wikipedia-cityofbirth	1.0	☒	0.0
wikipedia-key_people	wikipedia-key_people	1.0	☒	0.0
wikipedia-height	wikipedia-height	1.0	☒	0.0
wikipedia-slogan	wikipedia-slogan	1.0	☒	0.0
wikipedia-ground	wikipedia-ground	1.0	☒	0.0
wikipedia-birthdate	wikipedia-birthdate	1.0	☒	1.0
wikipedia-name	wikipedia-name	1.0	☒	1.0
wikipedia-rightarm1	wikipedia-rightarm1	1.0	☒	0.0
wikipedia-clubname	wikipedia-clubname	1.0	☒	1.0
wikipedia-type	wikipedia-type	1.0	☒	0.0
wikipedia-founded	wikipedia-founded	1.0	☒	0.0
wikipedia-area	wikipedia-area	1.0	☒	0.0
cogito-name	cogito-name	1.0	☒	1.0
wikipedia-company_year	wikipedia-company_year	1.0	☒	0.0
wikipedia-frequency	wikipedia-frequency	1.0	☒	0.0

Submit

Schema Matching

ID:1958270c-4946-4ac4-ab22-00c75088d233
= cogito-domain::
baseball
= wikipedia-name::
Art Ditmar
= wikipedia-position::
Pitcher
= cogito-Name::
Art Ditmar
= wikipedia-teams::
*Philadelphia / Kansas City Athletics (1954-1956, 1961-1962) *New York Yankees (1957-1961)
= wikipedia-debutyear::
1954
= cogito-first_sentence::
Arthur John Ditmar (born April 3, 1929 in Winthrop, Massachusetts) is a former starting pitcher in Major League Baseball who played for the Athletics (Philadelphia, 1954 - Kansas City, 1955-56, 1961-62) and the New York Yankees (1957-1961).
= type::
http://islab.dico.unimi.it/
/limb/tbox.owl#sportsperson
= cogito-tag::
sportsperson
= wikipedia-birthdate::
April 3, 1929

ID:4998819499604263722
= cogito-domain::
baseball
= wikipedia-name::
bD Itymar
= wikipedia-position::
Pitcher
= cogito-Name::
rAt Ddumar
= wikipedia-teams::
*Philadelphia a/k/a Kansas City Athletics
s3bb54-195616911-68) (*New York Yankees(nv5-191q
= wikipedia-debutyear::
1954
= cogito-first_sentence::
Arthur John Ditmar (born April 3, 1929 in Winthrop, Massachusetts) is a former starting pitcher in Major League Baseball who played for the Athletics (Philadelphia, 1954 - Kansas City, 1955-56, 1961-62) and the New York Yankees (1957-1961).
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= cogito-tag::
sportsperson
= wikipedia-birthdate::
April 3, 1929

OtO Matching System

Detailed matching result snapshot

Target Domains

OtO matching system targets semantic integration applications and communities that work with ontologies defined in **OWL** or **RDFS**. Specifically, the application of instance matching is crucial for entity resolution, ontology population and semantic integration.

Entity resolution refers to the capability of detecting whether two different resource descriptions refer to the same real-world entity, namely the individual, which is the main goal of the system.

Ontology population refers to the need of supporting experts in managing ontology changes through advanced and, when possible, automated techniques. It can be considered as part of ontology evolution, where an ontology evolves by acquiring new semantic descriptions of data, extracted from heterogeneous data sources. For ontology population, instance matching plays a crucial role in order to correctly perform the insertion activity and discover the relationship between the new incoming instances and the set of instances already in the ontology.

For **semantic integration**, the system offers advanced techniques for ontology schema matching but also instance matching, to correctly combine data describing individuals in different sources and to improve the accuracy of the schema alignment process. The notion behind this is that the more significant the overlap of common instances of two ontology concepts is, the more related these concepts are.

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Description

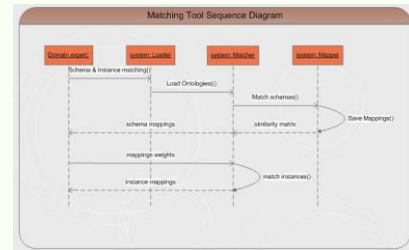
The OtO system implements seven different ontology matching processes, which can be categorized into processes that include schema matching algorithms and processes that include instance matching algorithms.

The schema matching process leverages lexical similarities, semantic similarities and syntactic similarities of the entities of the schema.

As far as the instance matching process is concerned, the system utilizes the instance matching process by using:

- the **rich semantic knowledge** gained from the output mappings of the schema matching process,
- the **implicit knowledge** of the domain expert by (semi-) automatically capturing the identification power of the instance properties and
- the **probability calculation of the result's truth**, in order to accurately and efficiently detect the ontology instances that represent the same real-world entity.

By all these means the system can detect data value differences, structural heterogeneities, as well as logical heterogeneities between the ontology instances.



OtO system sequence diagram

Additional Information

The OtO matching system has been customized and deployed for the needs of semantic integration and identity recognition in the EU projects :

- PlugIT (<http://plug-it-project.eu/>)
- eHealthMonior (<http://www.ehealthmonitor.eu/>)

Complete documentation can be found at:
http://www.ics.forth.gr/_publications/Daskalaki_Master_Thesis.pdf

Scientific documentation is available at Springer Link:
http://link.springer.com/chapter/10.1007%2F978-3-642-31095-9_19#page-1



Scientific documentation
at Springer Link

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