

Semantic Annotation Workflow using Bio-Ontologies

Emmanuel Castanier, Clement Jonquet, Soumia Melzi, Pierre Larmande,
Manuel Ruiz, Patrick Valduriez

► **To cite this version:**

Emmanuel Castanier, Clement Jonquet, Soumia Melzi, Pierre Larmande, Manuel Ruiz, et al.. Semantic Annotation Workflow using Bio-Ontologies. Workshop on Crop Ontology and Phenotyping Data Interoperability, Mar 2014, Montpellier, France. 1 p., 2014. lirmm-01052546

HAL Id: lirmm-01052546

<https://hal-lirmm.ccsd.cnrs.fr/lirmm-01052546>

Submitted on 28 Jul 2014

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Institut de biologie computationnelle

Semantic Annotation Workflow using Bio-Ontologies

Castanier E.¹, Jonquet C.², Melzi S.², Larmande P.³, Ruiz M.⁴, Valduriez P.¹

1 – Zenith, INRIA-LIRMM
2 – SMILE, UM2-LIRMM
3 – DIADE, IRD
4 – AGAP, CIRAD } Montpellier, France

Introduction

Biologists have adopted ontologies:

- To provide canonical representation of scientific knowledge
- To annotate experimental data to enable interpretation, comparison, and discovery across databases
- To facilitate knowledge-based applications for decision-support, natural language processing, and data integration

But **off-the-shelf solutions for the biologist** to use ontologies are rare (versions, format, availability, license, overlap, etc.)

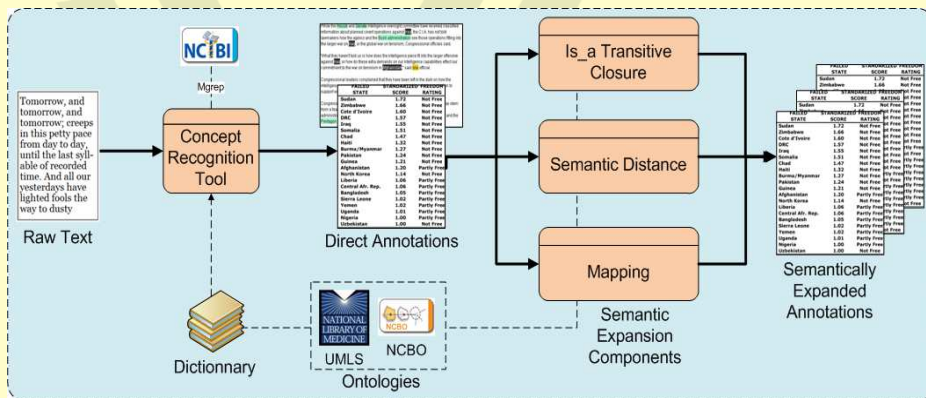
The challenge

Automatically process complex biological resources text content and generate annotations :

- Large-scale – to scale up to many resources and ontologies
- Automatic – to keep precision and accuracy
- Easy to use and to access – web service approach
- Customizable – to fit very specific needs
- Smart – to leverage the knowledge contained in ontologies

There have been **success stories to reproduce**: GO annotations, PubMed indexing, etc.

NCBO Annotator: Ontology-based annotation workflow



- First, direct annotations are created by **recognizing concepts** in raw text.
- Second, annotations are **semantically expanded** using knowledge of the ontologies.
- Third, all annotations are **aggregated and scored** according to the context in which they have been created.

Customized IBC Annotator for database schemas

BioSemantic

Rich internet application



Convert SQL database to RDF/RDFS
Upload it to NCBO Platform for annotation



WebSmatch

Use WebSmatch matching techniques to find mapping for Entries/Instances

Web service calls



NCBO platform

Ontologies stored and indexed by NCBO platform



Ontologies database

- Convert **SQL database schemas to RDF/RDFS** with BioSemantic
- Annotate with NCBO Annotator and WebSmatch using customized NCBO services
- **Annotator relies on WebSmatch** to create mappings between elements of schemas and ontological concepts
- **Indexing IBC related data** with the workflow to enhance semantic search and mining of data

R. Coletta, E. Castanier, P. Valduriez, C. Frisch, D-H. Ngo, Z. Bellahsene: Public data integration with WebSmatch. *Workshop on Open Data*. 2012, pp. 5-12.

C. Jonquet, N. H. Shah, M. A. Musen. *The Open Biomedical Annotator*. In *AMIA Symposium on Translational Bioinformatics*. 2009. pp. 56-60.

C. Jonquet, P. LePendu, S. Falconer, A. Coulet, N. F. Noy, M. A. Musen, N. H. Shah. *NCBO Resource Index: Ontology-Based Search and Mining of Biomedical Resources*, *Web Semantics*. 2011. Vol. 9 (3), pp. 316-324.

J. Wollbrecht, P. Larmande, F. De Lamotte, M. Ruiz. *Clever generation of rich SPARQL queries from annotated relational schema: application to Semantic Web Service creation for biological databases*. *BMC Bioinformatics*. 2013; 14:126.

In collaboration with

SIFR project

www.lirmm.fr/sifr

