

Ontology Alignment - Exercises and practical session

Computer Science Master 2 – Data Science – Paris Saclay University

November 26, 2024

1 Part 1: Ontology alignment

Consider the ontology given in Figure 1, showing a set of classes organised by the relation **is-a**.

- *Question 1.* To compute the similarity between two ontologies by exploiting their structure, give the sets of classes that can be obtained by calculating the following relations on the ontology O :

- $\text{is-a}^+(\text{physician})$
- $\text{is-a}^{-1}(\text{physician})$
- $\text{is-a}!(\text{physician})$

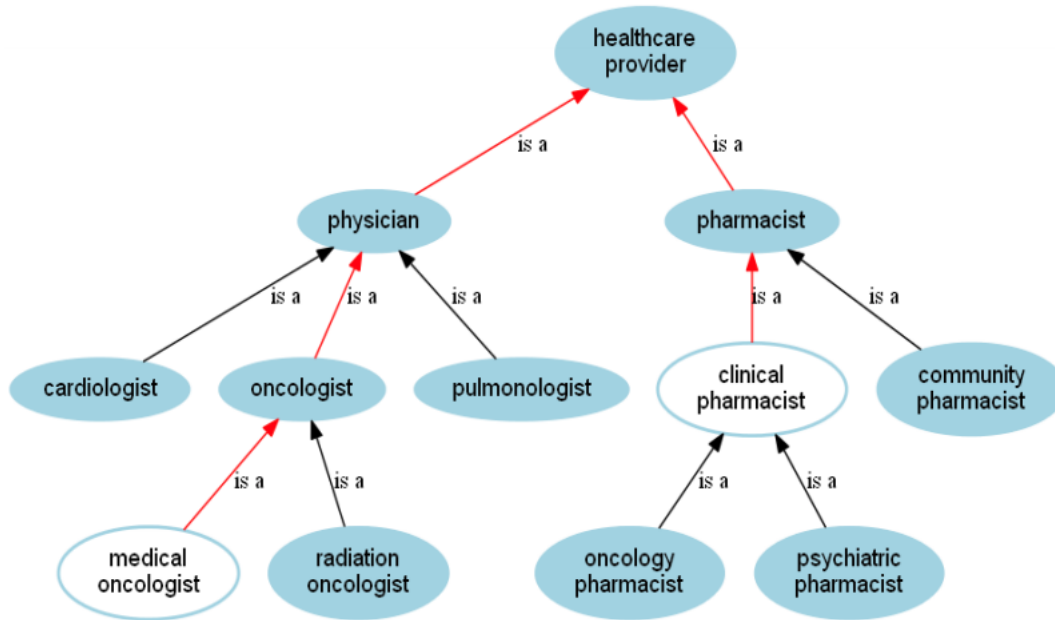


Figure 1: O : medical ontology

- *Question 2.* Given the ontologies $O1$ and $O2$ of figure 2, and the mapping $O1:\text{Artificial Intelligence} \equiv O2:\text{AI}$, compute the Wu and Palmer scores for the following class pairs :

1. (Machine Learning, Machine Translation)

2. (Game Theory, Robotics)
 3. (Semantic Web, Semantics)
- *Question 3.* For the same pairs of classes than in question 2, compute their similarity score using Jaccard measure:
 1. (Machine Learning, Machine Translation)
 2. (Game Theory, Robotics)
 3. (Semantic Web, Semantics)

What are your comments on the results. If you compare the results of similarity computation that you obtained in question 2 and the one that you obtained in question 3, what is the best similarity measure to use for aligning these ontologies?

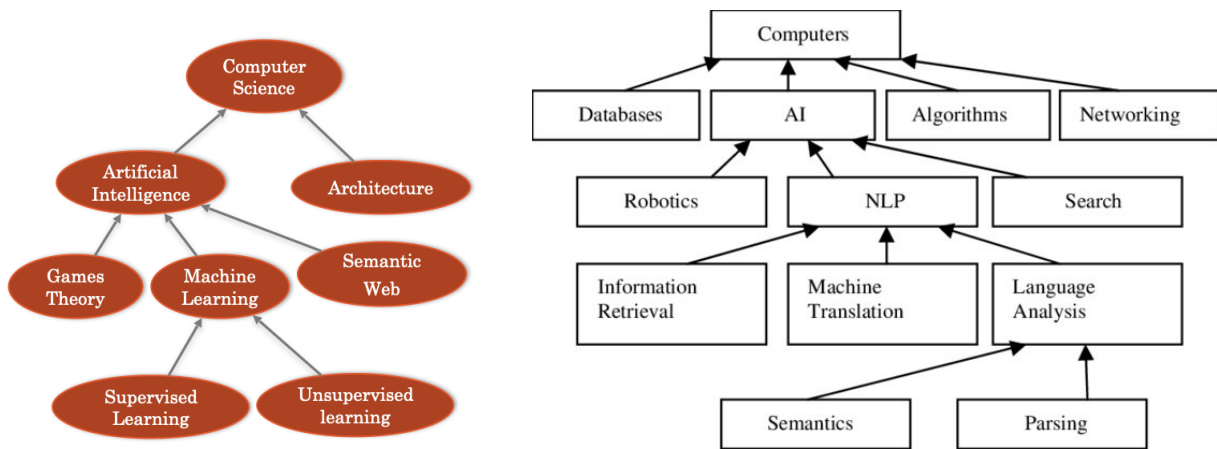


Figure 2: *O1* and *O2* ontologies in computer science field

Part 2: Practical session on ontology alignment

The objective of this practical session is to offer the students a practical session on ontology alignment tools and applications.

Environment

For this lab, we will use several ontology alignment tool that are given in the following:

- AML: AgreementMakerLight. Download the file AML_v3.2.zip from the link:
<https://github.com/AgreementMakerLight/AML-Project/releases>

The ontologies are downloadable from this link:

<https://ecampus.paris-saclay.fr/mod/resource/view.php?id=785422&redirect=1>.

To edit and visualise the ontology content, you can use web Protégé that you can find at: <http://webprotege.stanford.edu/>. To start, create a local folder `ontology-alignment` where

you will put all the lab materials and results.

Applying a first ontology alignment tool

Among ontologies that you downloaded, for this first step, we can focus on the mappings between: `dog.owl`, `cose.owl` and `energyresource.owl`.

Task1. Open the three ontologies using Protegee and report the number of classes, data properties and object properties in the following table:

	#classes	#data properties	#object properties
<code>dog.owl</code>			
<code>cose.owl</code>			
<code>energyresource.owl</code>			

Task2. Unzip the file `AML_v3.2.zip` that you can find at <https://ecampus.paris-saclay.fr/mod/resource/view.php?id=1529901&redirect=1> and run the following command in a terminal:

```
java -jar AgreementMakerLight.jar
```

This will open a user interface that allows to execute ontology matching tasks.

Apply AML on the following pairs of ontologies by considering the default parameters:

- (`dog.owl`, `cose.owl`)
- (`dog.owl`, `energyresource.owl`)
- (`cose.owl`, `energyresource.owl`)

For each of cases store the obtained results in your folder.

Task3. Apply AML on the following pair of ontologies by considering the default parameters:

- (`dog.owl`, `cose.owl`)

Do you obtain the same mappings than when LogMap is applied on (`dog.owl`, `cose.owl`)? What do you conclude on the symmetry of LogMap?

Task4. Consider the ontologies used in task1 (`dog.owl`, `cose.owl` and `energyresource.owl`) and others that are in `ontologies` folder, then run AML using custom mode (i.e., Match → Custom Match) by trying different parameters.

- you may change the alignment threshold
- you may also choose which elementary comparison method you want to use
- you may specify similarity measures, ...

Analyse the differences that you may observe when you change some parameters.