

IA301 Course: Logics and Symbolic AI. Guide to prepare your ontology report.

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1 What do I need to submit?

You should work in pairs. Send ***NOT 2 files*** but 1 single report PDF file (max. 5 pages) including a link where I can download your ontology. Send 1 report per couple (due 2 weeks after last practical session) to natalia.diaz@ensta-paris.fr. The report should be named with your team

name1_Surname1-AND-name2_surname2.pdf. Subject of the email must be: [IA301 Report]. In the report/README.md of your repo (including your report and ontology) you must include:

- The description of your designed ontology and what daily problem solves. E.g. it can support decision making -transport choices, sustainability good practices, car buying; see examples [1] on matchmaking-¹ [8]) using Protégé desktop editor.
- Only as many *Ontology facts worth reporting* as possible (indicate concrete -nr, letter, title- from those labelled *MUST* or *OPTIONAL* in MIRO repo²[4] you are reporting).
- Justifications for your ontology design decisions (link to URL to original domain info. source)³.
- Screenshots of your: 1. Full ontology graph, 2. Classes, data properties and object properties (and individuals, if applicable). 3. Classification power of your ontology. This means you need to add a screenshot of the definitions before invoking the reasoner, and another screenshot in your ontology showing what has correctly changed (inferred) after running the reasoner. In other words, one screenshot of your **asserted** ontology, and other with your **inferred** ontology. After invoking the reasoner (HermiT is the default one to use), the screenshot of the inferred ontology should show some correct changes).

How to get extra points?

- Construct an ontology that helps solving a UN SDG (Sustainable Development Goal)⁴ problem.
- Experiment with OOPS! [7]⁵: report number of ontology pitfalls you were able to fix in your ontology, briefly explaining what you did to solve them.
- Provide a visual representation of your ontology that allows to grasp all relations and entities visually.
- Explore: <https://gra.fo/> visual, collaborative, and real-time ontology and knowledge graph schema editor.)

¹FuzzyDL www.umbertostraccia.it/cs/software/fuzzyDL/fuzzyDL.html

²The Minimal Information for Reporting an Ontology (MIRO) Guidelines <https://github.com/owlcs/miro/blob/master/miro.md>

³If you lack inspiration, see how to justify ontology building decisions or Ontology Engineering Methodologies (Ch. 9) [3] and [http://read.pudn.com/downloads77/ebook/293072/Semantic%20Web%20Technologies%20-%20Trends%20and%20Research%20in%20Ontology-based%20Systems\(2006\).pdf](http://read.pudn.com/downloads77/ebook/293072/Semantic%20Web%20Technologies%20-%20Trends%20and%20Research%20in%20Ontology-based%20Systems(2006).pdf)

⁴<https://sustainabledevelopment.un.org/?menu=1300>

⁵Online OOPS! - Ontology Pitfall Scanner! <http://oops.linkedata.es/>

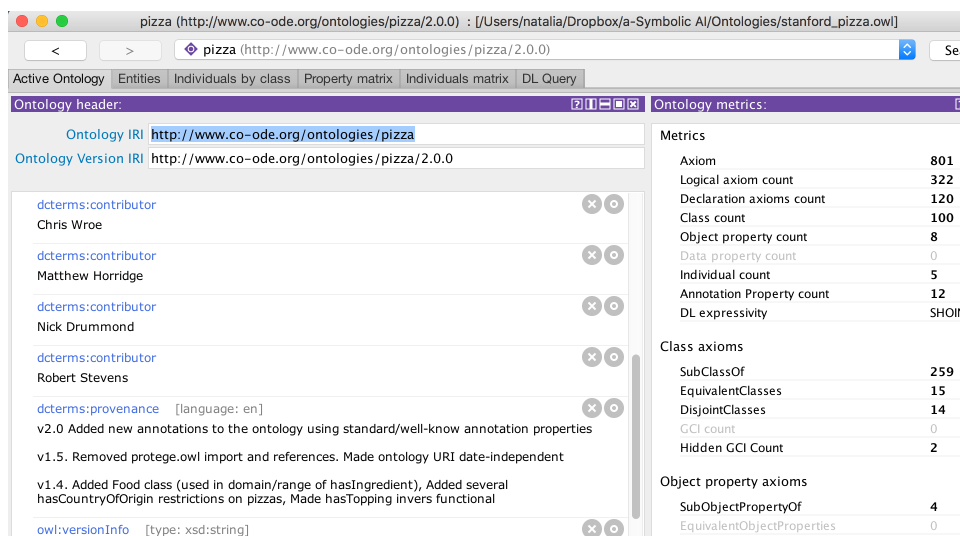
2 Let's get started!

1. How to run Protégé: In your laptop: Install Protégé (5.2 or 5.5 Beta, avoid WebProtégé until you consider yourself a Protégé expert ;))⁶ In the lab, run in the terminal "protege".
2. Find a pair! Think of a problem worth working on that requires an ontology.
3. Read the Protégé Guides: *Getting Started*, and Protégé for *Pizzas in 10 min*⁷
4. Read THE Protégé Tutorial⁸. In the same page you can download the Pizza ontology⁹ to play around with it at the same time.
5. Curious to learn more? Play with/extend some fun ontology (Wine [2]¹⁰ or Beer¹¹ ontologies :) → **When in doubt:** *Ontology development 101: A guide to creating your first ontology*¹²[5].
When stuck, see ¹³.

3 Evaluation: Ontology and Report

Evaluation will be based on:

- Nr of MIRO facts reported
- Nr of axioms, classes, and properties defined in the ontology -Report all ontology metrics values as below:



The screenshot shows the Protégé web interface for the 'pizza' ontology. The 'Ontology metrics' panel is visible, displaying the following data:

Metrics	
Axiom	801
Logical axiom count	322
Declaration axioms count	120
Class count	100
Object property count	8
Data property count	0
Individual count	5
Annotation Property count	12
DL expressivity	SHOIN

Class axioms	
SubClassOf	259
EquivalentClasses	15
DisjointClasses	14
GCI count	0
Hidden GCI Count	2

Object property axioms	
SubObjectPropertyOf	4
EquivalentObjectProperties	0

- How many of the concepts and relations above are consistent.
- Coverage of a particular domain problem tackled¹⁴

⁶Follow instructions from <https://protege.stanford.edu/> (if asked, choose version with Java Virtual Machine). If problems, see <https://tinyurl.com/y5msue>

⁷<https://protegewiki.stanford.edu/wiki/Protege4GettingStarted> and <https://protegewiki.stanford.edu/wiki/Protege4Pizzas10Minutes>

⁸http://mowl-power.cs.man.ac.uk/protegeowltutorial/resources/ProtegeOWLTutorialP4_v1_3.pdf

⁹<http://owl.cs.manchester.ac.uk/publications/talks-and-tutorials/protg-owl-tutorial/>

¹⁰https://github.com/NataliaDiaz/Ontologies/blob/master/DidacticOntologies/FuzzyWineOntologyAppCarlsson10/Wine_ontology2.5.owl

¹¹<https://www.cs.umd.edu/projects/plus/SHOE/onts/beer1.0.html>

¹²https://protege.stanford.edu/publications/ontology_development/ontology101.pdf

¹³<http://www.cs.cornell.edu/courses/cs431/2008sp/Lectures/public/lecture-4-09-08.pdf>

¹⁴How many and which concepts are defined, how many instances/properties the dataset has, comparisons with a corpus, comprehensibility/consumability by the humans that will use it, connectivity to provide flexible queries and ambiguity evaluation (common identifiers and labels prone to miss-comprehension)[6].

3.1 What is Protégé?

A useful ontology IDE for managing large ontologies and discovering existing ones. It allows to edit, visualize, and validate KBs. Download: <https://protege.stanford.edu/>.

3.2 Q & A

Problems? Check the FAQ constantly being updated here:

<https://docs.google.com/document/d/1rpPh69auU4PJ9Wh0b6QMp9IlhHflkN7EjLrq353OSbA/edit?usp=sharing>

If you have a question not answered there, you can add it as a comment in the google doc above and I will add the answer to the FAQ.

4 Useful links to explore and to help you get unstuck

1. W3C Glossary¹⁵.
2. MIRO – Minimum Information for Reporting of an Ontology guidelines: a community-validated set of recommendations on what should be reported about an ontology and its development, most importantly in the context of ontology description papers intended for publishing in scientific journals or conferences [4].
3. THE Protégé Tutorial¹⁶.
4. Building OWL Ontologies with Protégé. CS431 –Cornell Univ. 2008 C. Lagoze¹⁷.
5. Resources for Comp‘ Linguists 07 Description Logics - M. Regneri & M. Wolska¹⁸.
6. Tutorial on description logics. I. Horrocks and U. Sattler¹⁹
7. Probabilistic Logic Programming Languages, F. Riguzzi,²⁰.
8. Common Pitfalls creating ontologies²¹.
9. Building OWL Ontologies with Protégé CS431 –Cornell University, 2008 C. Lagoze²².
10. Ontology Engineering Methodologies (Ch. 9) [3]²³.
11. Resources for Comp‘ Linguists 07 Description Logics - M. Regneri & M. Wolska²⁴.
12. An introduction to Ontology Engineering. M. Keet²⁵.
13. Description Logic, Semantic Web and Ontology Development, S.Bragaglia²⁶.

¹⁵<https://www.w3.org/TR/rdf-mt/#glossIntensional>

¹⁶http://mowl-power.cs.man.ac.uk/protegeowltutorial/resources/ProtegeOWLTutorialP4_v1_3.pdf

¹⁷www.cs.cornell.edu/courses/cs431/2008sp/Lectures/public/lecture-4-09-08.pdf

¹⁸www.cse.iitd.ernet.in/~kkb/DL-1.pdf

¹⁹<http://www.cs.man.ac.uk/~horrocks/Slides/IJCARTutorial/Display/>

²⁰mcs.unife.it/~friguizzi/chapter2.pdf

²¹http://www.cs.man.ac.uk/~rector/papers/common_errors_ekaw_2004.pdf

²²www.cs.cornell.edu/courses/cs431/2008sp/Lectures/public/lecture-4-09-08.pdf

²³[http://read.pudn.com/downloads77/ebook/293072/Semantic%20Web%20Technologies%20-%20Trends%20and%20Research%20in%20Ontology-based%20Systems\(2006\).pdf](http://read.pudn.com/downloads77/ebook/293072/Semantic%20Web%20Technologies%20-%20Trends%20and%20Research%20in%20Ontology-based%20Systems(2006).pdf)

²⁴www.cse.iitd.ernet.in/~kkb/DL-1.pdf

²⁵<http://www.meteck.org/teaching/OEbook/>

²⁶*Fondamenti di Intelligenza Artificiale*, Uni. of Bologna, Italy <https://www.slideshare.net/StefanoBragaglia/ontology-development>

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