ENSTA Paris
École Nationale Supérieure de Techniques Avancées

IA301 Project Report
Future Career Recommendation

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1 Introduction

Future Career Recommendation System is designed to solve growing problems of professional uncertainty of different segments of the population, described in Sustainable Development Goal 4, subgoal 4. Especially among young people, who are often faced with the question of early decisive choice directly affecting their future.

2 Description (MIRO)

A. *Basics*

A.1 Ontology name: Future Career Recommendation (FCR), v20.11.01

A.2 Ontology owner:

- Kevin Alexandro Sanchez Diaz, kvn9616@gmail.com
- Yevhenii Sielskyi, youdjin.sel15@gmail.com
- Javier Andres Martinez Boada, jm0818610@gmail.com

A.3 Ontology license: Creative Commons Attribution 4.0 International License

A.4 Ontology URL: [*futureCareerRecommendation.owl*]

A.5 Ontology repository: https://github.com/kvnsnchz/fcr

A.6 Methodological framework: the methodology used is based on the discussion of each concept and its hierarchy, taking into account the questions that the ontology can answer and the implication of each change in the connection and effect of the general system.

B. *Motivation*

B.1 Need: Here is an ontological resource to help find connections between students their studies and companies and their needs

B.2 Competition: Human Resources Management Ontology develops the problem from another perspective.

B.3 Target audience: Students, Educational Centers and Companies

C. *Scope, requirements, development community*

C.1 Scope and coverage: The ontology includes the necessary concepts to describe the preferences, competences and education of the students/professionals, as well as the jobs and companies to be able to match these, a tabulated visualization up to the third level can be seen in section 3.

C.2 Development community:

- Kevin Alexandro Sanchez Diaz, kvn9616@gmail.com

- Yevhenii Sielskyi, youdjin.sel15@gmail.com
- Javier Andres Martinez Boada, jm0818610@gmail.com

C.3 Communication: https://github.com/kvnsnchz/fcr/issues

D. *Knowledge acquisition*

D.1 Knowledge acquisition methodology: The ontology was developed mostly using the common sense, in concepts like Person, Enterprise, etc, for more complicated concepts like Enterprise Size, Sector, etc, different sources of information were used that can be appreciated in section 3.

E. *Ontology content*

E.1 Knowledge Representation language: OWL version 2.

E.2 Development environment: Protégé, VOWL.

E.5 Entity naming convention:

- Classes and Individuals: full name in camel case without contractions.
- Object and Data properties: specific name in lower camel case like canWorkAs, hasJobTask, etc.

E.6 Identifier generation policy: identifiers with a semantic sense of easy interpretation.

E.7 Entity metadata policy:

- Class Annotations: rdfs:label (mandatory), rdfs:comment (optional), rdfs:seeAlso (optional).
- Individuals, Object and Data property Annotations: rdfs:label (mandatory)

E.10 Axiom patterns: Ontology Design pattern.

F. *Managing Change*

F.1 Sustainability plan: the FCR ontology was maintained throughout the development of the project and is in its state of the art. If changes are to be made using pull requests and evaluating them manually, the pull requests must describe and justify the changes made.

F.2 Entity deprecation strategy: it is evaluated where the class is used and the properties or relationships that are affected by it are removed or modified.

F.3 Versioning policy: the version will be taken for the year in two digits followed by the month and the number of the change in the current month; for example 20.11.01 is the first version that was released in November 2020, if in this same month another version is released the version would be 20.11.02

G. *Quality Assurance*

G.1 Testing: see section 4

G.2 Evaluation: see section 4

G.3 Example of use: see section 4

3 Tabular Visualization

Each class and its derivatives were developed given our own experience and thought, those that were consulted contain the reference next to their class. For convenience, only classes up to a third level of depth were included. For a more detailed description, you can visit the following *link*

1 *Person*

- 1.1 Student
- 1.2 NonProfessional
- 1.3 Professional

2 *Employment Status* (1)

- 2.1 Unemployed
- 2.2 Employed
  - 2.2.1 Self-Employed
  - 2.2.2 Employee
  - 2.2.3 Worker

3 *Background*

- 3.1 Skill
  - 3.1.1 SoftSkill
  - 3.1.2 TechnicalSkill
- 3.2 Knowledge
- 3.3 Experience
  - 3.3.1 ProfessionalExperience
  - 3.3.2 Volunteer Experience
- 3.4 Hobby/Interesst (2)
  - 3.4.1 EducationalHobby
  - 3.4.2 CompetitiveHobby
  - 3.4.3 GeneralHobby
  - 3.4.4 ObservationHobby
  - 3.4.5 CollectionHobby

4 Graphic Visualization

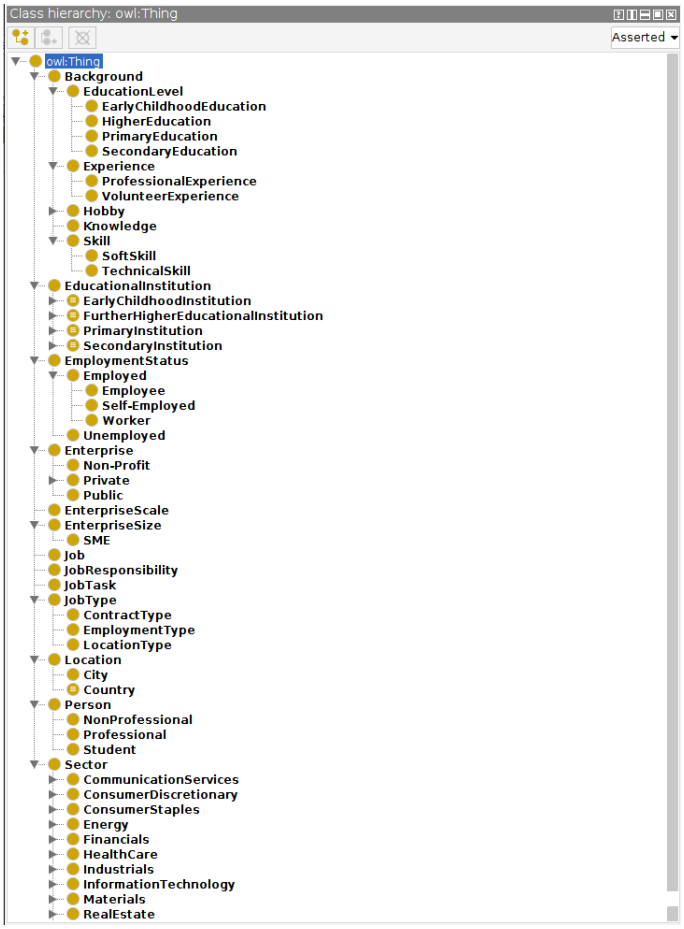

Figure 1: Ontology Classes

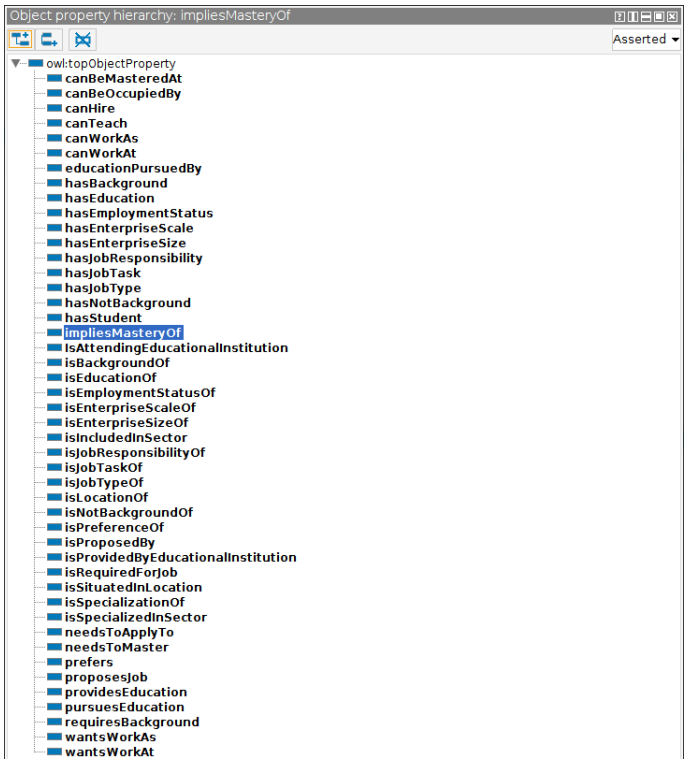

Figure 2: Ontology Object Properties

Figure 3: Ontology Data Properties

Figure 4: Ontology Individuals

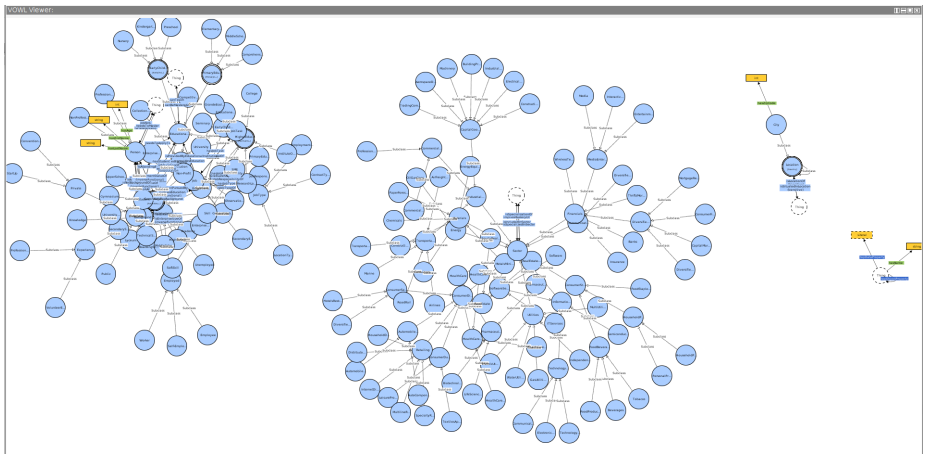

Figure 5: Ontology VOWL Graph

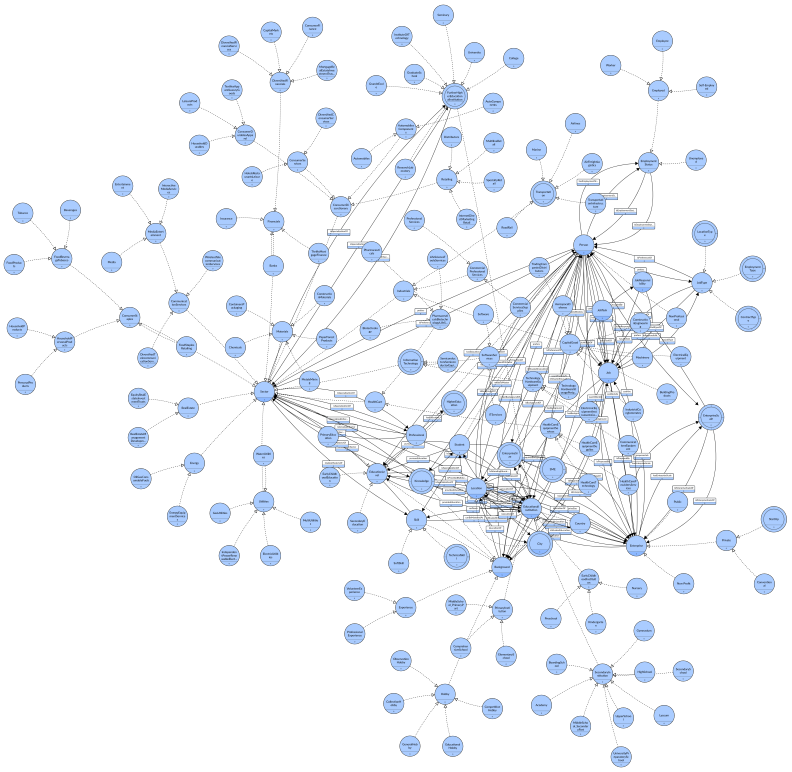

Figure 6: Ontology Grafo Graph

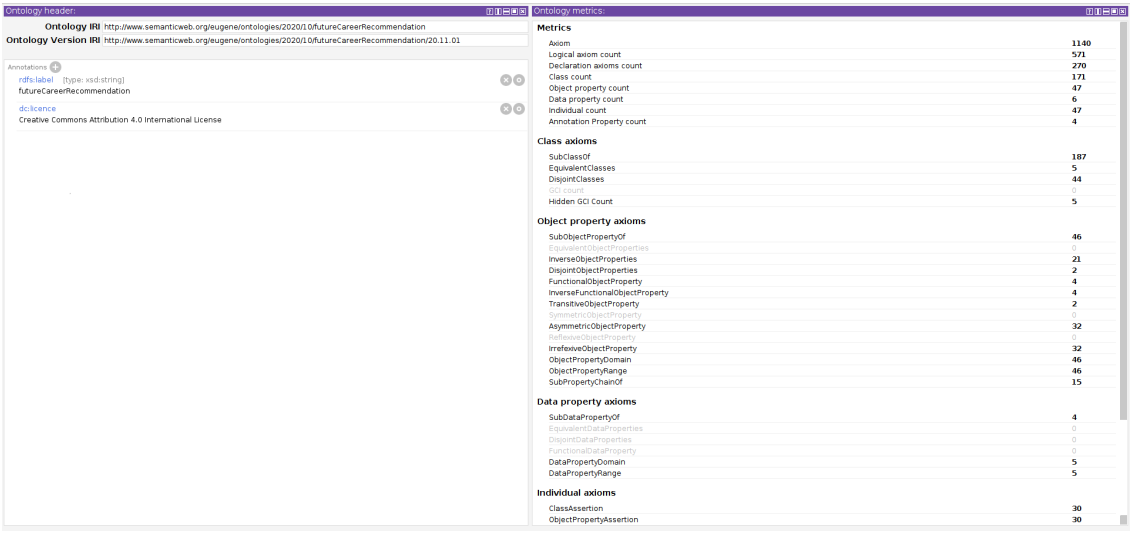

Figure 7: General information and statistics about ontology

5 Inference results

Figures 8 — 16 represent the results of the Reasoner, where the classes and object properties, highlighted in bold font, were **asserted** and can be considered as recommendation system's input, whereas the classes and object properties with normal font — **inferred results**. There are certain individuals that have only inferred properties and types (France, figure 17) and the most interesting ones with 4-6 inferred properties (Eugene, Javier, Google and Lili, figures 8, 13, 15 and 16 respectively). The individuals with the most of inferred properties are Persons, in general, since they represent target audience of the developed system.

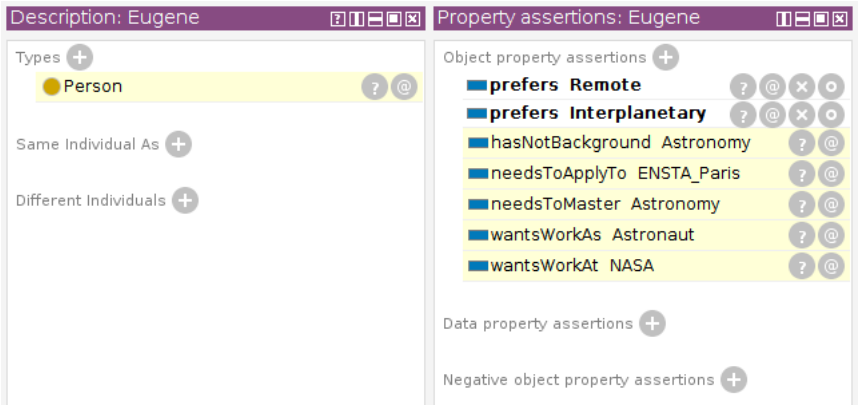

Figure 8: Eugene

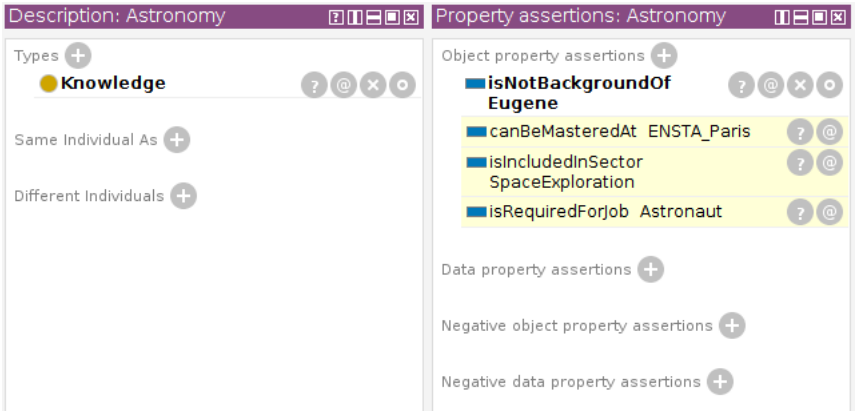

Figure 9: Astronomy

Figure 10: Space

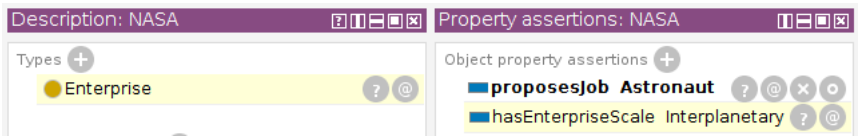

Figure 11: NASA

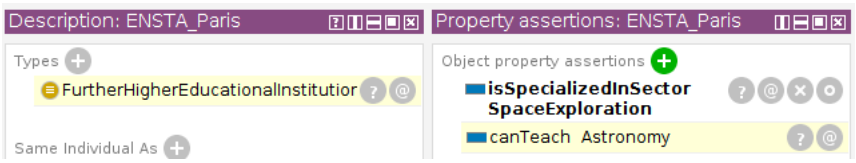

Figure 12: ENSTA_Paris

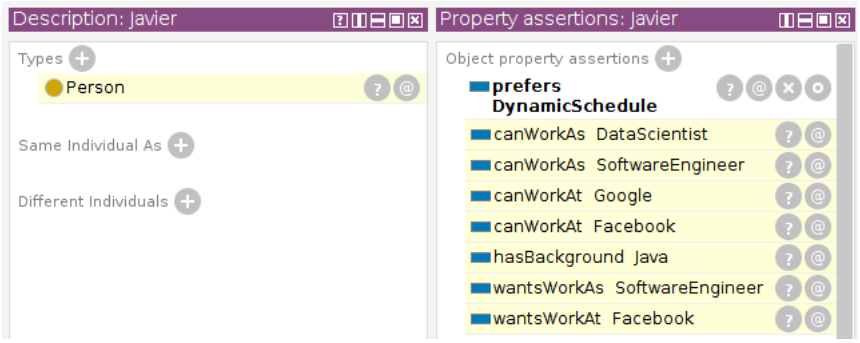

Figure 13: Javier

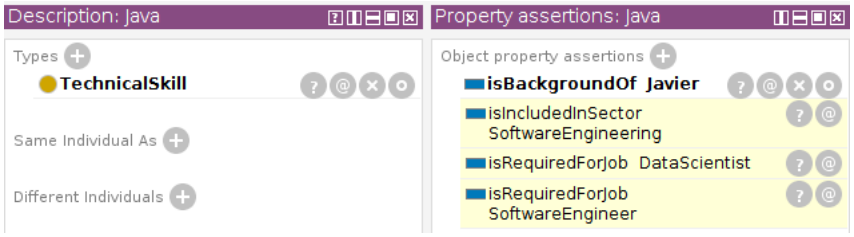

Figure 14: Java

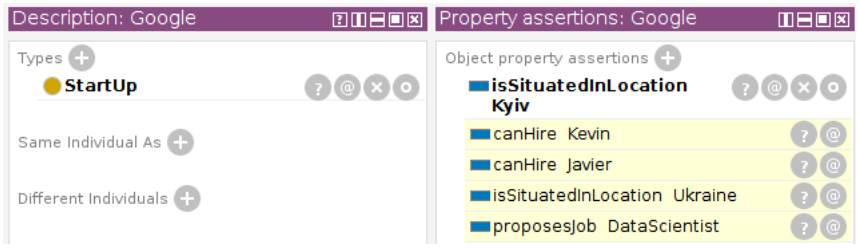

Figure 15: Google

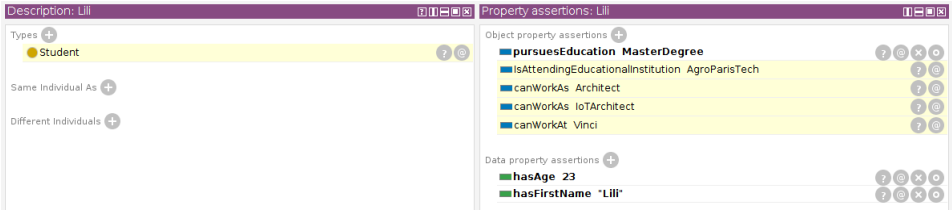

Figure 16: Lili

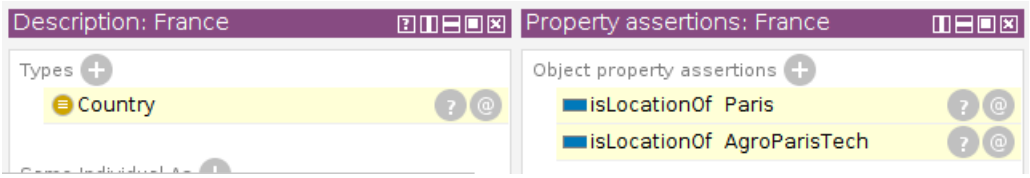

Figure 17: France

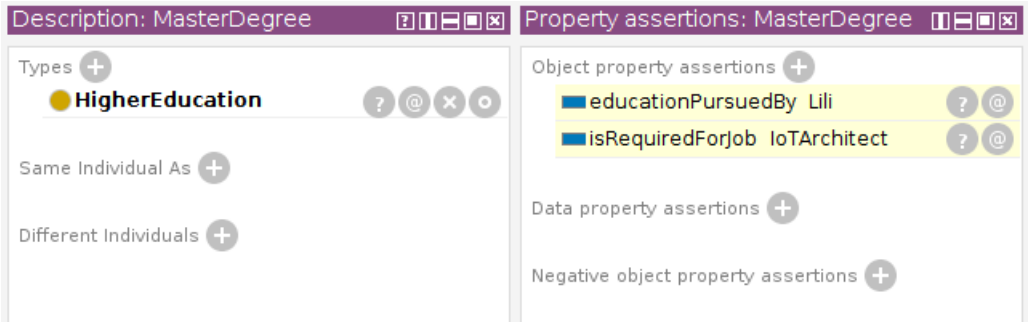

Figure 18: Master

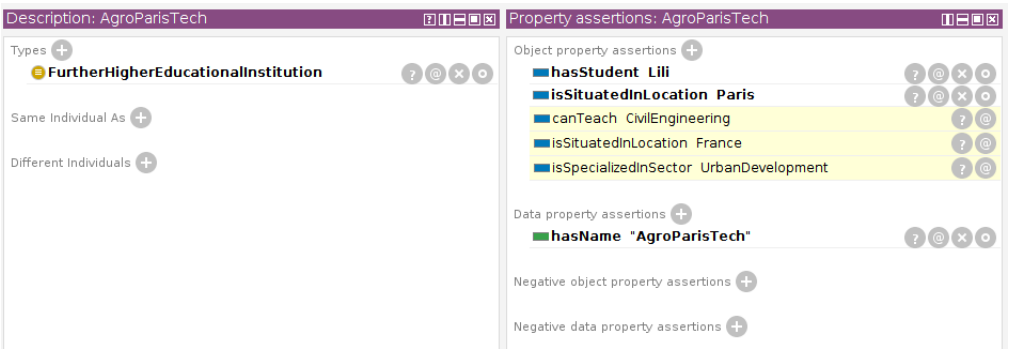

Figure 19: AgroParisTech

References

[1] "Global industry classification standard," Oct 2020. [Online]. Available: https://en.wikipedia.org/wiki/Global_Industry_Classification_Standard

[2] "List of hobbies," Nov 2020. [Online]. Available: https://en.wikipedia.org/wiki/List_of_hobbies

[3] "Glossary: Enterprise size." [Online]. Available: https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Enterprise_size

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