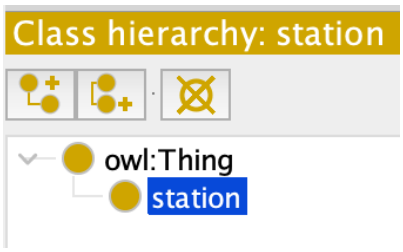
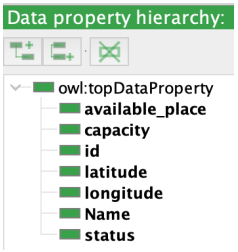
Web datamining and semantics report : Maxence Raveau, Hugo Ravé, Sébastien Yung
Subject : Bicycle sharing stations in Rennes and Montpellier

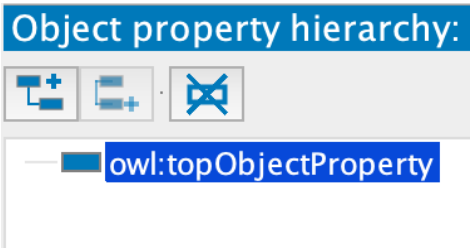
To design our ontology using protege software we have chosen two sets of data. It represents Bicycle sharing stations in Rennes and Montpellier.
Montpellier :
https://data.montpellier3m.fr/dataset/disponibilite-des-places-velomagg-en-temps-reel

Rennes :
https://data.rennesmetropole.fr/explore/?sort=modified

Ontology for the bicycle sharing stations was designed as follows :







To use our datasets, since it was modeled differently we had to convert the geo json into json ld files. This was done on python creating the following context

We set up a triple store using Apache Jena Fuseki containing our triples
We ran these queries on our ontology :

Get the name, the number of spots, the number of available spots, the id of the station, the latitude and the longitude in Rennes :

```
SELECT   ?nom ?emplacementsactuels ?nombreemplacementsdisponibles ?idstation ?lat ?lon
WHERE {
  ?subject <http://www.owl-ontologies.com/unnamed.owlville> "Rennes" .
  ?subject <http://www.owl-ontologies.com/unnamed.owlnom> ?nom .
  ?subject <http://www.owl-ontologies.com/unnamed.owlnombreemplacementsactuels> ?emplacementsactuels .
  ?subject  <http://www.owl-ontologies.com/unnamed.owlnombreemplacementsdisponibles> ?nombreemplacementsdisponibles .
  ?subject <http://www.owl-ontologies.com/unnamed.owlidstation> ?idstation.
  ?subject <http://www.owl-ontologies.com/unnamed.owllat> ?lat .
  ?subject <http://www.owl-ontologies.com/unnamed.owllon> ?lon .
}
LIMIT 200
```

Table | Response | 10 results in 0.012 seconds — Simple view ☐ Ellipse ☑ — Filter query results — Page size: 1000

	nom	emplacementsactuels	nombreemplacementsdisponibles	idstation	lat	lon
1	Musée Beaux-Arts	"16"^^<http://www.w3.org/2001/XMLSchema#integer>	"6"^^<http://www.w3.org/2001/XMLSchema#integer>	5510	"48.109601e0"^^<http://www.w3.org/2001/XMLSchema#double>	"-1.67408e0"^^<http://www.w3.org/2001/XMLSchema#double>
2	Plaine de Baud	"24"^^<http://www.w3.org/2001/XMLSchema#integer>	"21"^^<http://www.w3.org/2001/XMLSchema#integer>	5546	"48.112461e0"^^<http://www.w3.org/2001/XMLSchema#double>	"-1.643674e0"^^<http://www.w3.org/2001/XMLSchema#double>
3	Brest - Verdun	"24"^^<http://www.w3.org/2001/XMLSchema#integer>	"10"^^<http://www.w3.org/2001/XMLSchema#integer>	5534	"48.113009e0"^^<http://www.w3.org/2001/XMLSchema#double>	"-1.693264e0"^^<http://www.w3.org/2001/XMLSchema#double>
4	Marbeuf	"20"^^<http://www.w3.org/2001/XMLSchema#integer>	"5"^^<http://www.w3.org/2001/XMLSchema#integer>	5538	"48.111749e0"^^<http://www.w3.org/2001/XMLSchema#double>	"-1.702077e0"^^<http://www.w3.org/2001/XMLSchema#double>
5	Gros-Chêne	"17"^^<http://www.w3.org/2001/XMLSchema#integer>	"12"^^<http://www.w3.org/2001/XMLSchema#integer>	5578	"48.125408e0"^^<http://www.w3.org/2001/XMLSchema#double>	"-1.664806e0"^^<http://www.w3.org/2001/XMLSchema#double>
6	Painlevé	"29"^^<http://www.w3.org/2001/XMLSchema#integer>	"21"^^<http://www.w3.org/2001/XMLSchema#integer>	5580	"48.123506e0"^^<http://www.w3.org/2001/XMLSchema#double>	"-1.659762e0"^^<http://www.w3.org/2001/XMLSchema#double>
7	Joliot-Curie - Chateaubriand	"30"^^<http://www.w3.org/2001/XMLSchema#integer>	"29"^^<http://www.w3.org/2001/XMLSchema#integer>	5581	"48.124389e0"^^<http://www.w3.org/2001/XMLSchema#double>	"-1.651203e0"^^<http://www.w3.org/2001/XMLSchema#double>
8	Pont de Strasbourg	"20"^^<http://www.w3.org/2001/XMLSchema#integer>	"3"^^<http://www.w3.org/2001/XMLSchema#integer>	5587	"48.109859e0"^^<http://www.w3.org/2001/XMLSchema#double>	"-1.656028e0"^^<http://www.w3.org/2001/XMLSchema#double>
9	Mabilais	"25"^^<http://www.w3.org/2001/XMLSchema#integer>	"9"^^<http://www.w3.org/2001/XMLSchema#integer>	5591	"48.105086e0"^^<http://www.w3.org/2001/XMLSchema#double>	"-1.693069e0"^^<http://www.w3.org/2001/XMLSchema#double>
10	Champs Libres	"24"^^<http://www.w3.org/2001/XMLSchema#integer>	"8"^^<http://www.w3.org/2001/XMLSchema#integer>	5516	"48.105537e0"^^<http://www.w3.org/2001/XMLSchema#double>	"-1.674328e0"^^<http://www.w3.org/2001/XMLSchema#double>

Same query for Strasbourg :

```
SELECT   ?nom ?emplacementsactuels ?nombreemplacementsdisponibles ?idstation ?lat ?lon
WHERE {
  ?subject <http://www.owl-ontologies.com/unnamed.owlville> "Strasbourg" .
  ?subject <http://www.owl-ontologies.com/unnamed.owlnom> ?nom .
  ?subject <http://www.owl-ontologies.com/unnamed.owlnombreemplacementsactuels> ?emplacementsactuels .
  ?subject  <http://www.owl-ontologies.com/unnamed.owlnombreemplacementsdisponibles> ?nombreemplacementsdisponibles .
  ?subject <http://www.owl-ontologies.com/unnamed.owlidstation> ?idstation.
  ?subject <http://www.owl-ontologies.com/unnamed.owllat> ?lat .
  ?subject <http://www.owl-ontologies.com/unnamed.owllon> ?lon .
}
LIMIT 200
```

Table | Response | 21 results in 0.01 seconds — Simple view ☐ Ellipse ☑ — Filter query results — Page size: 50

	nom	emplacementsactuels	nombreemplacementsdisponibles	idstation	lat	lon
1	124 Auberge de jeunesse	16	10	124	48.568644	7.795621
2	111 Campus d'Illkirch	30	25	111	48.529616	7.734226
3	101 Centre	32	10	101	48.578462	7.749776
4	102 Centre 2	20	19	102	48.578462	7.749776
5	126 Espace Européen de l'Entreprise	16	8	126	48.612597	7.711630
6	103 Gare de Strasbourg	31	21	103	48.585082	7.735024
7	115 Hoenheim Gare	16	4	115	48.628353	7.760103
8	112 Hohwart	10	3	112	48.549190	7.740754
9	123 Koenigshoffen	26	19	123	48.579100	7.713481
10	127 Ostwald Hôtel de Ville	16	11	127	48.551032	7.711200
11	114 Parking Austerlitz	30	21	114	48.578005	7.751863
12	113 Parking Broglie	30	16	113	48.585415	7.749395
13	109 Place Arnold	28	18	109	48.584504	7.768772
14	108 Gare Nord	32	27	108	48.585678	7.733542
15	106 Gare Sud	32	11	106	48.584209	7.734519
16	116 Place Islande	16	7	116	48.580314	7.776203

Get the details of the station in Strasbourg where the stations currently has more than 10 spots to park a bike :

```
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>


SELECT   ?nom  ?nombreemplacementsdisponibles ?lat ?lon
WHERE {
  ?subject <http://www.owl-ontologies.com/unnamed.owlville> "Strasbourg" .
  ?subject <http://www.owl-ontologies.com/unnamed.owlnom> ?nom .
  ?subject  <http://www.owl-ontologies.com/unnamed.owlnombreemplacementsdisponibles> ?nombreemplacementsdisponibles .
  ?subject <http://www.owl-ontologies.com/unnamed.owllat> ?lat .
  ?subject <http://www.owl-ontologies.com/unnamed.owllon> ?lon .
  FILTER(xsd:integer(?nombreemplacementsdisponibles) > 10).
}

```

Table | Response | 14 results in 0.01 seconds — Simple view ☐ Ellipse ☑ — Filter query results — Page size: 50

	nom	nombreemplacementsdisponibles	lat	lon
1	111 Campus d'Illkirch	25	48.529616	7.734226
2	102 Centre 2	19	48.578462	7.749776
3	103 Gare de Strasbourg	21	48.585082	7.735024
4	123 Koenigshoffen	19	48.579100	7.713481
5	127 Ostwald Hôtel de Ville	11	48.551032	7.711200
6	114 Parking Austerlitz	21	48.578005	7.751863
7	113 Parking Broglie	16	48.585415	7.749395
8	109 Place Arnold	18	48.584504	7.768772
9	108 Gare Nord	27	48.585678	7.733542
10	106 Gare Sud	11	48.584209	7.734519
11	125 Place du Marché Neudorf	19	48.565864	7.759242
12	110 Robertsau Boecklin	25	48.598096	7.777902
13	105 Rotonde	24	48.591639	7.725089
14	107 Université	24	48.582023	7.766771

Looking for the stations in a 1km radius around the given spot (approximative result) :

```
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
# Recherche les stations dans un rayon de 1 km autour du point
#48.529616,7.734226

SELECT   ?nom  ?nombreemplacementsdisponibles ?lat ?lon
WHERE {
  ?subject <http://www.owl-ontologies.com/unnamed.owlville> "Strasbourg" .
  ?subject <http://www.owl-ontologies.com/unnamed.owlnom> ?nom .
  ?subject  <http://www.owl-ontologies.com/unnamed.owlnombreemplacementsdisponibles> ?nombreemplacementsdisponibles .
  ?subject <http://www.owl-ontologies.com/unnamed.owllat> ?lat .
  ?subject <http://www.owl-ontologies.com/unnamed.owllon> ?lon .
  FILTER(xsd:float(?lat) < (48.529616 + 1/111) && xsd:float(?lat) > (48.529616 - 1/111) && xsd:float(?lon) < (7.734226 + 1/76) && xsd:float(?lon) > (7.734226 - 1/76) ).
}
```

Table | Response | 1 result in 0.01 seconds

Simple view ☐ Ellipse ☑ Filter query results Page size: 50

	nom	nombreemplacementsdisponibles	lat	lon
1	111 Campus d'Illkirch	25	48.529616	7.734226

Get the name of stations and the city they are located in :

```
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>

SELECT   ?nom  ?ville
WHERE {
  ?subject <http://www.owl-ontologies.com/unnamed.owlville> ?ville .
  ?subject <http://www.owl-ontologies.com/unnamed.owlnom> ?nom .
}
```

Table | Response | 31 results in 0.01 seconds

Simple view ☐ Ellipse ☑ Filter query results Page size: 50

	nom	ville
1	Musée Beaux-Arts	Rennes
2	Plaine de Baud	Rennes
3	Brest - Verdun	Rennes
4	Marbeuf	Rennes
5	Gros-Chêne	Rennes
6	Painlevé	Rennes
7	Joliot-Curie - Chateaubriand	Rennes
8	Pont de Strasbourg	Rennes
9	Mabilais	Rennes
10	Champs Libres	Rennes
11	124 Auberge de jeunesse	Strasbourg
12	111 Campus d'Illkirch	Strasbourg
13	101 Centre	Strasbourg
14	102 Centre 2	Strasbourg
15	126 Espace Européen de l'Entreprise	Strasbourg

Same query but we show if there is any spots to park currently and how many spots there are in total (optional query) :

```
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>

SELECT   ?nom  ?ville ?nombreemplacementsactuels ?nombreemplacementsdisponibles
WHERE {
  ?subject <http://www.owl-ontologies.com/unnamed.owlville> ?ville .
  ?subject <http://www.owl-ontologies.com/unnamed.owlnom> ?nom .
  OPTIONAL { ?subject <http://www.owl-ontologies.com/unnamed.owlnombreemplacementsdisponibles>  ?nombreemplacementsdisponibles }
  OPTIONAL { ?subject   <http://www.owl-ontologies.com/unnamed.owlnombreemplacementsactuels>  ?nombreemplacementsactuels }
}
```

Table | Response | 31 results in 0.012 seconds

Simple view ☐ Ellipse ☑ Filter query results Page size: 50

	nom	ville	nombreemplacementsactuels	nombreemplacementsdisponibles
1	Musée Beaux-Arts	Rennes	"16"^^<http://www.w3.org/2001/XMLSchema#integer>	"6"^^<http://www.w3.org/2001/XMLSchema#integer>
2	Plaine de Baud	Rennes	"24"^^<http://www.w3.org/2001/XMLSchema#integer>	"21"^^<http://www.w3.org/2001/XMLSchema#integer>
3	Brest - Verdun	Rennes	"24"^^<http://www.w3.org/2001/XMLSchema#integer>	"10"^^<http://www.w3.org/2001/XMLSchema#integer>
4	Marbeuf	Rennes	"20"^^<http://www.w3.org/2001/XMLSchema#integer>	"5"^^<http://www.w3.org/2001/XMLSchema#integer>
5	Gros-Chêne	Rennes	"17"^^<http://www.w3.org/2001/XMLSchema#integer>	"12"^^<http://www.w3.org/2001/XMLSchema#integer>
6	Painlevé	Rennes	"29"^^<http://www.w3.org/2001/XMLSchema#integer>	"21"^^<http://www.w3.org/2001/XMLSchema#integer>
7	Joliot-Curie - Chateaubriand	Rennes	"30"^^<http://www.w3.org/2001/XMLSchema#integer>	"29"^^<http://www.w3.org/2001/XMLSchema#integer>
8	Pont de Strasbourg	Rennes	"20"^^<http://www.w3.org/2001/XMLSchema#integer>	"3"^^<http://www.w3.org/2001/XMLSchema#integer>
9	Mabilais	Rennes	"25"^^<http://www.w3.org/2001/XMLSchema#integer>	"9"^^<http://www.w3.org/2001/XMLSchema#integer>
10	Champs Libres	Rennes	"24"^^<http://www.w3.org/2001/XMLSchema#integer>	"8"^^<http://www.w3.org/2001/XMLSchema#integer>
11	124 Auberge de jeunesse	Strasbourg	16	10
12	111 Campus d'Illkirch	Strasbourg	30	25
13	101 Centre	Strasbourg	32	10
14	102 Centre 2	Strasbourg	20	19
15	126 Espace Européen de l'Entreprise	Strasbourg	16	8

Ask query :

```
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
#CONSTRUCT WHERE { ?x foaf:name ?name }


ASK  { ?subject
<http://www.owl-ontologies.com/unnamed.owlnombreemplacementsdisponibles>  29 }
```

Table Response Response in 0.008 seconds

✔ True

Describe query :

```
DESCRIBE ?x
WHERE    { ?x   <http://www.owl-ontologies.com/unnamed.owlnombreemplacementsdisponibles> 21 .}
```

Press CTRL + <spacebar> to autocomplete

Table Response 14 results in 0.012 seconds

Simple view Ellipse Filter query results Page size: 50

	subject	predicate	object
1	n3-10	<http://www.owl-ontologies.com/unnamed.owlidstation>	"5580"^^<http://www.w3.org/2001/XMLSchema#string>
2	n3-10	<http://www.owl-ontologies.com/unnamed.owllat>	"48.123506e0"^^<http://www.w3.org/2001/XMLSchema#double>
3	n3-10	<http://www.owl-ontologies.com/unnamed.owllon>	"-1.659762e0"^^<http://www.w3.org/2001/XMLSchema#double>
4	n3-10	<http://www.owl-ontologies.com/unnamed.owlnom>	"Painlevé"^^<http://www.w3.org/2001/XMLSchema#string>
5	n3-10	<http://www.owl-ontologies.com/unnamed.owlnombreemplacementsactuels>	"29"^^<http://www.w3.org/2001/XMLSchema#integer>
6	n3-10	<http://www.owl-ontologies.com/unnamed.owlnombreemplacementsdisponibles>	"21"^^<http://www.w3.org/2001/XMLSchema#integer>
7	n3-10	<http://www.owl-ontologies.com/unnamed.owlville>	"Rennes"^^<http://www.w3.org/2001/XMLSchema#string>
8	n3-11	<http://www.owl-ontologies.com/unnamed.owlidstation>	"5546"^^<http://www.w3.org/2001/XMLSchema#string>
9	n3-11	<http://www.owl-ontologies.com/unnamed.owllat>	"48.112461e0"^^<http://www.w3.org/2001/XMLSchema#double>
10	n3-11	<http://www.owl-ontologies.com/unnamed.owllon>	"-1.643674e0"^^<http://www.w3.org/2001/XMLSchema#double>
11	n3-11	<http://www.owl-ontologies.com/unnamed.owlnom>	"Plaine de Baud"^^<http://www.w3.org/2001/XMLSchema#string>
12	n3-11	<http://www.owl-ontologies.com/unnamed.owlnombreemplacementsactuels>	"24"^^<http://www.w3.org/2001/XMLSchema#integer>
13	n3-11	<http://www.owl-ontologies.com/unnamed.owlnombreemplacementsdisponibles>	"21"^^<http://www.w3.org/2001/XMLSchema#integer>

Construct query :

```
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
#CONSTRUCT WHERE { ?x foaf:name ?name }


CONSTRUCT WHERE { ?subject <http://www.owl-ontologies.com/unnamed.owlville> "Rennes" .}
```

Table Response 10 results in 0.016 seconds

Simple view Ellipse Filter query results

	subject	predicate	object
1	n3-0	<http://www.owl-ontologies.com/unnamed.owlville>	"Rennes"^^<http://www.w3.org/2001/XMLSchema#string>
2	n3-1	<http://www.owl-ontologies.com/unnamed.owlville>	"Rennes"^^<http://www.w3.org/2001/XMLSchema#string>
3	n3-2	<http://www.owl-ontologies.com/unnamed.owlville>	"Rennes"^^<http://www.w3.org/2001/XMLSchema#string>
4	n3-3	<http://www.owl-ontologies.com/unnamed.owlville>	"Rennes"^^<http://www.w3.org/2001/XMLSchema#string>
5	n3-4	<http://www.owl-ontologies.com/unnamed.owlville>	"Rennes"^^<http://www.w3.org/2001/XMLSchema#string>
6	n3-5	<http://www.owl-ontologies.com/unnamed.owlville>	"Rennes"^^<http://www.w3.org/2001/XMLSchema#string>
7	n3-6	<http://www.owl-ontologies.com/unnamed.owlville>	"Rennes"^^<http://www.w3.org/2001/XMLSchema#string>
8	n3-7	<http://www.owl-ontologies.com/unnamed.owlville>	"Rennes"^^<http://www.w3.org/2001/XMLSchema#string>
9	n3-8	<http://www.owl-ontologies.com/unnamed.owlville>	"Rennes"^^<http://www.w3.org/2001/XMLSchema#string>
10	n3-9	<http://www.owl-ontologies.com/unnamed.owlville>	"Rennes"^^<http://www.w3.org/2001/XMLSchema#string>

Map functionalities : We open flask which opens the france map and we can then visualize the different bicycle stations location on the map, around Montpellier, Rennes and Lyon. when we over on the locations we can see the names of the said stations. If we click on the

station it will show the number of available places to dock your bike which would be pretty useful for a user looking to park his bike.

Problems

We tried to link the flask app with the ontology to be able to make sparql requests. Unfortunately, we didn't manage to do that. Every requests we made responded with no output at all.

Triples are in the rdf.

```
In [130]: import rdflib
          g = rdflib.Graph()
          g.parse('station/rennes.rdf')

Out[130]: <Graph identifier=N4f0c660caa6646b4bc134614856ba6d6 (<class 'rdflib.graph.Graph'>)>

In [131]: [i for i in g]
```

```
 rdflib.term.Literal('-1.702077', datatype=rdflib.term.URIRef('http://www.w3.org/2001/XMLSchema#double'))),
(rdflib.term.BNode('N5af63511263e4150b7dc6ba77f2444f9'),
 rdflib.term.URIRef('http://www.owl-ontologies.com/unnamed.owlavailable_place'),
 rdflib.term.Literal('8', datatype=rdflib.term.URIRef('http://www.w3.org/2001/XMLSchema#integer'))),
(rdflib.term.BNode('N351bf5b9f38e49f18de1f8a9fd7e32eb'),
 rdflib.term.URIRef('http://www.owl-ontologies.com/unnamed.owlcoordonnees'),
 rdflib.term.Literal('-1.693069', datatype=rdflib.term.URIRef('http://www.w3.org/2001/XMLSchema#double'))),
(rdflib.term.BNode('N5af63511263e4150b7dc6ba77f2444f9'),
 rdflib.term.URIRef('http://www.owl-ontologies.com/unnamed.owlcapacity'),
 rdflib.term.Literal('20', datatype=rdflib.term.URIRef('http://www.w3.org/2001/XMLSchema#integer'))),
(rdflib.term.BNode('N2410db6a38474a02bdc2ea855e4e1fda'),
 rdflib.term.URIRef('http://www.owl-ontologies.com/unnamed.owlavailable_place'),
 rdflib.term.Literal('24', datatype=rdflib.term.URIRef('http://www.w3.org/2001/XMLSchema#integer'))),
(rdflib.term.BNode('Neb74bad866174a259ec915f03a641022'),
 rdflib.term.URIRef('http://www.owl-ontologies.com/unnamed.owlrecords'),
 rdflib.term.URIRef('http://www.owl-ontologies.com/a226d7f1b153bc8736f2e19a35456f03c3596a5d')),
(rdflib.term.BNode('Ne9208f97a48b4e2aad79111d3afbeec5'),
 rdflib.term.URIRef('http://www.owl-ontologies.com/unnamed.owlstatus'),
 rdflib.term.Literal('En fonctionnement', datatype=rdflib.term.URIRef('http://www.w3.org/2001/XMLSchema#string')))
,
```

There is no row in response to the sparql query.

```
rdflib.term.URIRef('http://www.owl-ontologies.com/unnamed.owlfields'),

In [124]: knows_query = """
          SELECT ?name ?lat
          WHERE{
              ?subject <http://www.owl-ontologies.com/unnamed.owlName> ?name .
              ?subject <http://www.owl-ontologies.com/unnamed.owllatitude> ?lat .
          }"""

In [125]: qres = result.query(knows_query)
          qres

Out[125]: <rdflib.plugins.sparql.processor.SPARQLResult at 0x7f8fe8a12f28>

In [126]: for row in qres:
              print(row.name)

In [145]: knows_query = """
          PREFIX foaf: <http://xmlns.com/foaf/0.1/>

          SELECT ?name ?lat
          WHERE{
              ?subject <http://www.owl-ontologies.com/unnamed.owlName> ?name .
              ?subject <http://www.owl-ontologies.com/unnamed.owllatitude> ?lat .
          }"""

In [141]:

Out[141]: <rdflib.plugins.sparql.processor.SPARQLResult at 0x7f8fba27b8d0>

In [146]: for row in g.query(knows_query):
              print(row['name'])

In [ ]:
```

If it worked, we could have implemented that to the the flask code to request datas, and add them to the tmp array to display them on the map.