Project 1: Semantic Word Comparator

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1 List and description of project files

The project contains the following files:

1. `retrieve_city_info.py`

2. `neighbors_of_city.py`

3. `cities_at_k_of_start.py`

4. `geneva_example.py`

1.1 `retrieve_city_info.py`

This function takes a city as input and will retrieve the attributes of the city which are necessary to compute the neighbor criteria of `neighbors_of_city`. The five attributes are:

1. Province of the city;

2. Coordinates of the city;

3. River the city is on;

4. Lake the city is on;

5. Sea the city is on.

The province will always be defined for each city, whereas the four other attributes might not. In that case, they will be given a `None` value.

1.2 `neighbors_of_city.py`

This function takes a city as input and two parameters d and s. It finds all cities that are neighbors with the input city. Two cities are neighbors if:

1. they are in the same province OR

2. they are on the same river OR

3. they are on the same lake OR

4. they are at distance less than d OR

5. they are on the same sea but at distance less than s

For the last two criteria, the distance used is the Taxicab distance

$$|\text{longitude}_{city_1} - \text{longitude}_{city_2}| + |\text{latitude}_{city_1} - \text{latitude}_{city_2}|$$

1.3 `cities_at_k_of_start.py`

This file contains the last two functions `cities_at_d` and `cities_at_k_of_start` which together do a breadth-first search starting from the initial input city to find all cities which are at distance k. The main function is `cities_at_k_of_start` which will iterate k times `cities_at_d`.

1.4 `geneva_example.py`

This file contains the code for the output example that is given hereafter. It calls the three functions we created to see what they output.

File - geneva_example

```
 1 "/Users/lucia/Documents/Travail/Business Analytics Master/
   Algorithmics and data management/Project-2/venv/bin/python
   " /Users/lucia/Documents/Travail/Business Analytics Master/
   Algorithmics and data management/Project-2/geneva_example.
   py
 2
 3 information about Geneva necessary to compute neighbor
   criteria:
 4 {'province': 'GE', 'long_lat': (6.9, 46.12), 'river': '
   Rhone', 'lake': 'Lac Leman', 'sea': None}
 5
 6 neighbors of Geneva:
 7 {('Sion', 'CH'), ('Lausanne', 'CH'), ('Bern', 'CH'), ('
   Villeurbanne', 'F'), ('Aosta', 'I'), ('Turin', 'I'), ('
   Besancon', 'F')}
 8
 9 outcome of the final function:
10 {('Aachen', 'D'),
11  ('Amsterdam', 'NL'),
12  ('Ancona', 'I'),
13  ('Antwerp', 'B'),
14  ('Bergisch Gladbach', 'D'),
15  ('Bielefeld', 'D'),
16  ('Bochum', 'D'),
17  ('Bottrop', 'D'),
18  ('Brugge', 'B'),
19  ('Charleroi', 'B'),
20  ('Darmstadt', 'D'),
21  ('Dordrecht', 'NL'),
22  ('Dortmund', 'D'),
23  ('Essen', 'D'),
24  ('Frankfurt am Main', 'D'),
25  ('Freiburg im Breisgau', 'D'),
26  ('Geleen', 'NL'),
27  ('Gelsenkirchen', 'D'),
28  ('Ghent', 'B'),
29  ('Hagen', 'D'),
30  ('Hamm', 'D'),
31  ('Heerlen', 'NL'),
32  ('Heidelberg', 'D'),
33  ('Heilbronn', 'D'),
34  ('Herne', 'D'),
35  ('Innsbruck', 'A'),
36  ('Kassel', 'D'),
37  ('Leiden', 'NL'),
38  ('Lille', 'F'),
39  ('Livorno', 'I'),
40  ('Maastricht', 'NL'),
```

```
41  ('Moers', 'D'),
42  ('Monchengladbach', 'D'),
43  ('Mulheim an der Ruhr', 'D'),
44  ('Munster', 'D'),
45  ('Nimes', 'F'),
46  ('Oberhausen', 'D'),
47  ('Offenbach am Main', 'D'),
48  ('Paderborn', 'D'),
49  ('Padova', 'I'),
50  ('Perpignan', 'F'),
51  ('Perugia', 'I'),
52  ('Pforzheim', 'D'),
53  ('Pisa', 'I'),
54  ('Prato', 'I'),
55  ('Recklinghausen', 'D'),
56  ('Remscheid', 'D'),
57  ('Reutlingen', 'D'),
58  ('Sassari', 'I'),
59  ('Siegen', 'D'),
60  ('Solingen', 'D'),
61  ('Trieste', 'I'),
62  ('Tunis', 'TN'),
63  ('Ulm', 'D'),
64  ('Verona', 'I'),
65  ('Vicenza', 'I'),
66  ('Witten', 'D'),
67  ('Wuppertal', 'D'),
68  ('Wurzburg', 'D'),
69  ('s Gravenhage', 'NL')}
70
71 Process finished with exit code 0
72
```

2   Collaboration

For this project, I had some discussions and exchanges of ideas with Francisco Arrieta, Emily Schmidt and Manuela Giansante.