COMP_SCI 371

HW 3

Due 2/6/2019 1:59 p.m.

In this assignment, we are going to explore Linked Data to see how we can answer some complex queries. We will start with some simple queries, and we will work our way up to queries that merge data sources.

For context, we will consider a scenario in which we are trying to track Carmel San Francisco, a person on the run. To identify Carmel's whereabouts, we will query some data sources to get necessary information.

To get started, we will use SPARQL to query Wikidata, a large collaboratively edited knowledge base. We can easily query the data store by going to https://query.wikidata.org. There you will find a query editor. Enter your queries here, click the blue button on the left, and the query will be executed. The results (if any) will be displayed at the bottom of the screen. You may use the Query Helper (hidden behind the information symbol to the left of the query window) to assist in building your queries.

You may use https://www.wikidata.org/wiki to view wikidata resources. If using other data sources, you may view those documents through the appropriate portals, as well. You might also find it helpful to add human readable labels to your queries. You may do so by including the following in your WHERE clause:

```
SERVICE wikibase:label {
      bd:serviceParam wikibase:language "[AUTO_LANGUAGE],en".
}
```

Then you can add label variables to your SELECT clause. For example, if you have a variable ?foo, then you can add the variable ?fooLabel.

For each of the queries below, follow the instructions. You will have one or more questions to answer for each query. In your submission, provide an answer to each question. Additionally, provide a SPARQL query that can be used to get this answer. The query should be specific, yielding only one response that contains the answer to the question(s). **Please submit a .txt file with your answers, so that we can easily copy-paste to test your queries.**

Query 1.

To begin the search for Carmel San Francisco, we need to find a university.

Reports indicate that Carmel was last seen at a land-grant school. However, there are no signs that the school is a state university, indicating that Carmel is at a private university. What city is Carmel in?

Query 2.

Latest intel has determined that Carmel San Francicso is on the move. Carmel is now in a city, but it is unclear where the city is located. To further complicate the matter, there is conflicting evidence as to whether Carmel is in Asia or Europe. Perhaps they are in both! Is there a city that is in both Asia and Europe?

Hint 1: For this query, you need to find a location that is on the continent of Europe and on the continent of Asia. There are many locations that may be on both continents, but we need to determine which are cities. Since not all cities are listed directly as a city, you may need to find locations that are instances of subclasses of city/town.

Hint 2: Your query might find cities that no longer exist, in countries that no longer exist. We can constrain the query to include only those that are in a country where the association with that country has started in the last 100 years (36500 days). In other words, the country relation between the city and the country has a start time associated to the relation (i.e., when the association began), and we want start times in the past 100 years. To do this, try adding the following to the WHERE clause of your query (you may need to change the ?city variable, depending on the query you already have).

```
?city p:P17 ?country .
?country pq:P580 ?date .
BIND (NOW() - ?date as ?distance) .
FILTER (0 <= ?distance && ?distance <= 36500) .
```

Query 3.

The detectives searching for Carmel San Francisco have recovered a few items belonging to Carmel from a fire in Denmark: a map of southern Sweden, a ticket to a hockey game, and a picture of a bridge. The train ticket suggests Carmel is going to Sweden. The hockey ticket is red, but no information about the team (or location) remains on the ticket. The picture of the bridge looks familiar to one of the detectives, who thinks it is a bridge that connects Denmark and Sweden.

What city is Carmel traveling to? What is the name of the hockey team Carmel was going to see?

Hint 1: For this final query, you may need to include more knowledge. Wikidata has a lot of knowledge about locations and other geopolitical data, for example, but it does not have a lot of cultural knowledge. For this, you can merge in Dbpedia. In your WHERE clause, you will need to include a SERVICE clause like the following:

```
SERVICE <http://dbpedia.org/sparql> {
    ?subject a ?type .
 }
```

Hint 2: You will likely also want to add prefixes for dbpedia namespaces to your query. You may want to explore http://dbpedia.org/resource/, http://dbpedia.org/ontology/, and/or http://dbpedia.org/property/

Hint 3: Depending on how your formulate your query, you may find the owl:sameAs predicate useful.