1a. Initialize OSM data

This notebook:

- Loads the polygon defining the study area and then creates a grid overlay for the study area.
- Downloads street network data for the study area using OSMnx.
- Creates a network only with bicycle infrastructure (with queries defined in `config.yml`).
- Creates additional attributes in the data to be used in the analysis.

Sections

Load data for study area and create analysis grid

This step:

- Loads settings for the analysis from the configuration file `config.yml`.
- Reads data for the study area.
- Creates a grid overlay of the study area, with grid cell size as defined in `config.yml`.

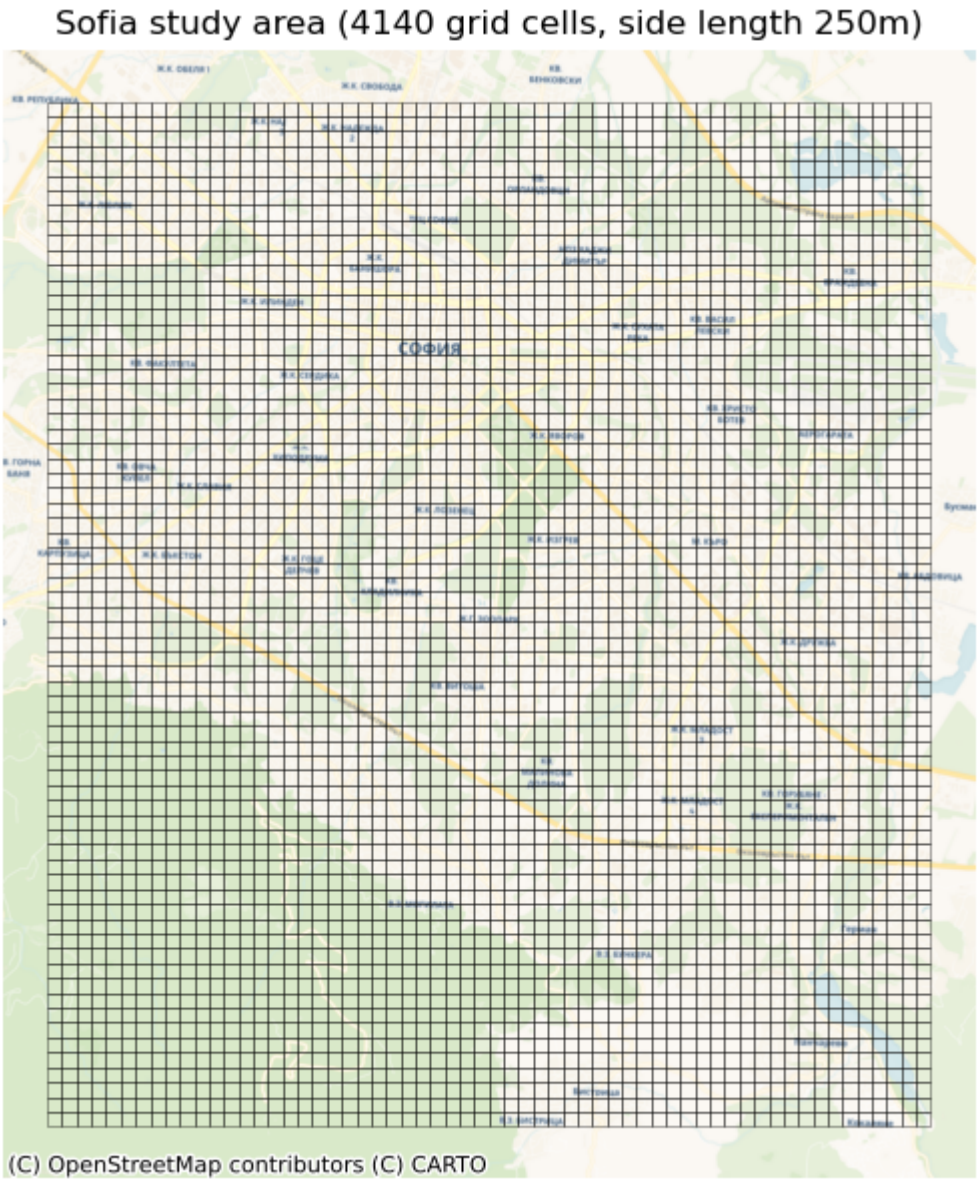
Load data for study area

The study area is defined by the user-provided polygon. It will be used for the computation of **global** results, i.e. quality metrics based on all data in the study area.

```
The size of the study area is 256.25 km2.
```

Create analysis grid

```
The grid contains 4140 square cells with a side length of 250 m and an area of 0.06 km2.
This grid will be used for local (grid cell level) analysis:
```



Download and preprocess OSM data

This step:

- Downloads data from OpenStreetMap using OSMnx.
- Projects the data to the chosen CRS.
- Creates a subnetwork consisting only of bicycle infrastructure.
- Classifies all edges in the bicycle network based on whether they are protected or unprotected bicycle infrastructure, how they have been digitized, and whether they allow for bidirectional travel or not.
- Simplifies the network.
- Creates copies of all edge and node data sets indexed by their intersecting grid cell.

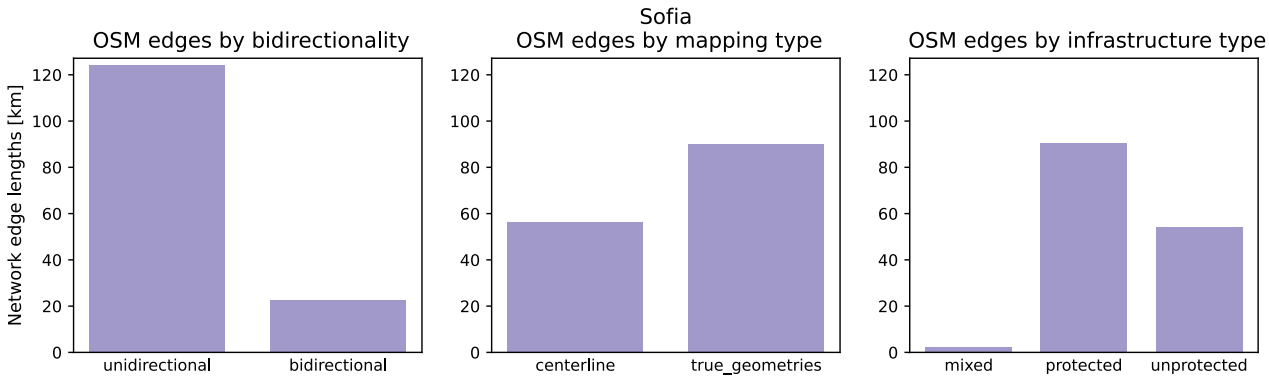
OSM data model

In OSM, street network data are stored using *nodes* (points) and *ways* (lines). In BikeDNA, OSM data are converted to a network structure consisting of *nodes* and *edges* (we use the terminology used in OSMnx). Edges represents the actual infrastructure, such as bike lanes and paths, while nodes represents the start and end points for the edges, as well as all intersections. For further details, read more about the OSM data model and the network data model.

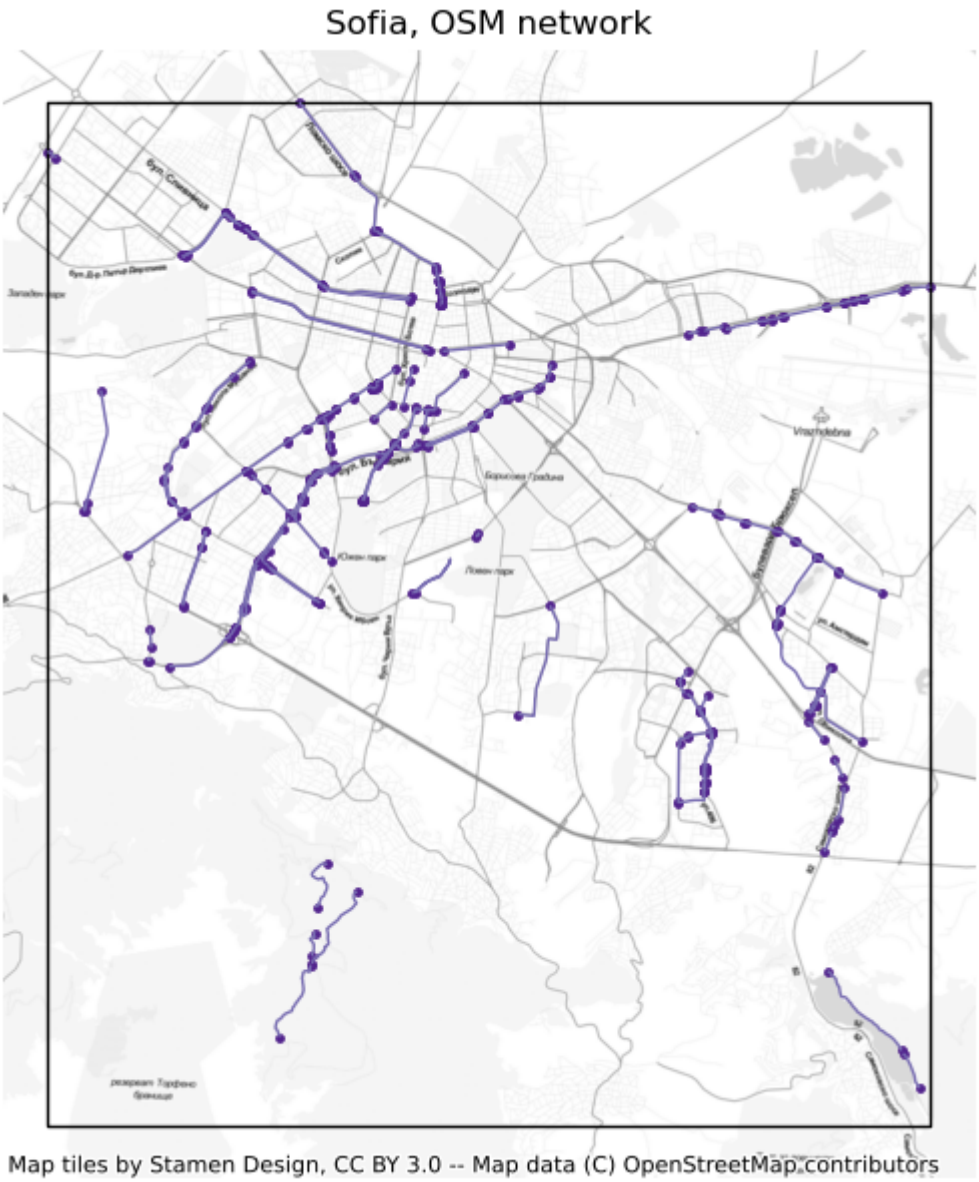
```
No update necessary. Returning original bicycle graph.
Edges where 'bicycle_bidirectional' is False: 4294 out of 5043 (85.15%)
Edges where 'bicycle_bidirectional' is True: 749 out of 5043 (14.85%)


Edges where the geometry type is 'true_geometries': 3248 out of 5043 (64.41%)
Edges where the geometry type is 'centerline': 1795 out of 5043 (35.59%)


Edges where the protection level is 'protected': 2983 out of 5043 (59.15%)
Edges where the protection level is 'unprotected': 1709 out of 5043 (33.89%)
Edges where the protection level is 'mixed': 351 out of 5043 (6.96%)
```




```
The network covers an area of 197.05 km2.
The length of the OSM network with bicycle infrastructure is 105.97 km.
```


Sofia, OSM network
Map tiles by Stamen Design, CC BY 3.0 -- Map data (C) OpenStreetMap contributors