3b. Feature Matching

The feature matching takes the reference data and attempts to identify corresponding features in the OSM data set. Feature matching is a necessary precondition to compare single features rather than feature characteristics on study area a grid cell level, as well as for merging two data sets.

Method

Matching features in two road data sets with each their way of digitizing features and a potential one-to-many relationship between edges (for example in the case where one data set only maps road center lines, while the other map the geometries of each bike lane) is not a trivial task.

The method used here converts all network edges to smaller segments of a uniform length before looking for a potential match between the reference and the OSM data. The matching is done on the basis of the buffered distance between objects, the angle, and the undirected Hausdorff distance, and is based on the works of Koukoletsos et al. (2012) and Will (2014).

Based on the matching results, the following values are computed:

- The number and length of matched and unmatched edges, in total and per grid cell
- A comparison of the attributes of the matched edges: Is their classification of cycling infrastructure as protected or unprotected the same?

Interpretation

It is important to visually explore the feature matching results, since the success rate of the matching influences how the analysis of number of matches should be interpreted.

If the features in the two data sets have been digitized differently - e.g. if one data set has digitized bike tracks as mostly straight lines, while the other includes more winding tracks, the matching will fail. This is also the case if they are placed too far from each other. If it can be confirmed visually that the same features do exist in both data sets, a lack of matches indicates that the geometries in the two data sets are too different. If however it can be confirmed that most real corresponding features have been identified, a lack of matches in an area indicates errors of commission or omission.

Sections

- Match features
  - Run and plot feature matching
  - Matched and unmatched features
  - Feature matching summary
- Analyze feature matching results
  - Matched features by infrastructure type
  - Feature matching success
- Summary

Match features

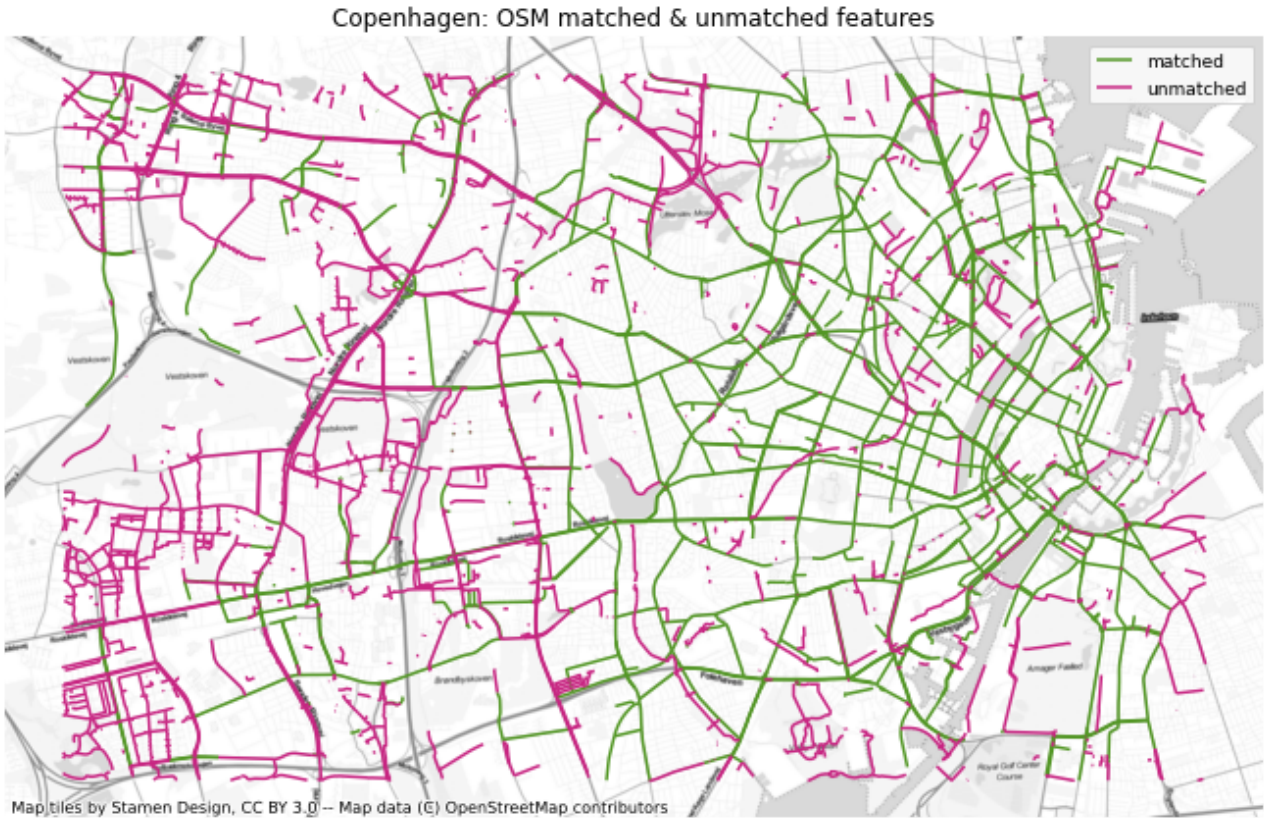
Run and plot feature matching

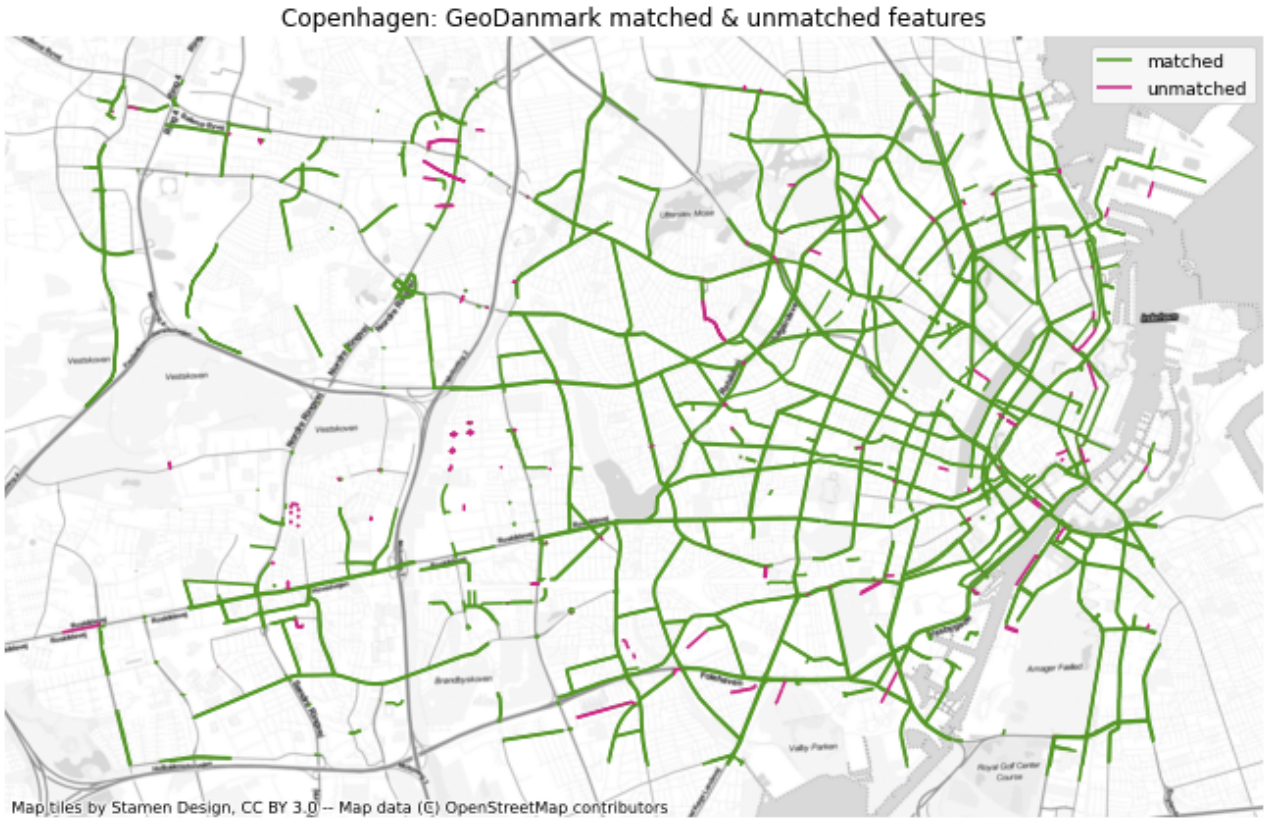
```
Segments created successfully!
```

```
Segment matching has already been performed. Loading existing segment matches, matched with a bu
ffer distance of 15 meters, a Hausdorff distance of 17 meters, and a max angle of 30 degrees.
```

```
Interactive map saved at results/COMPARE/cph_geodk/maps_interactive/segment_matches_15_17_30_com
pare.html
```

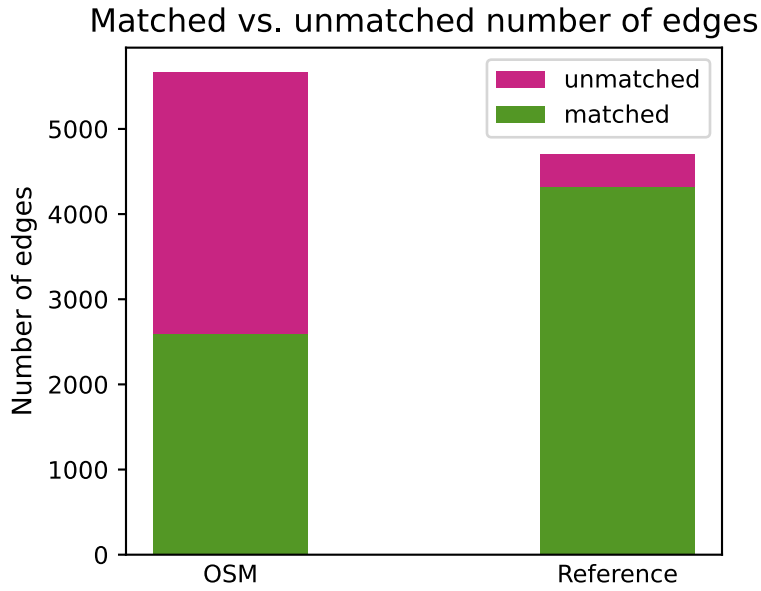
Matched and unmatched features

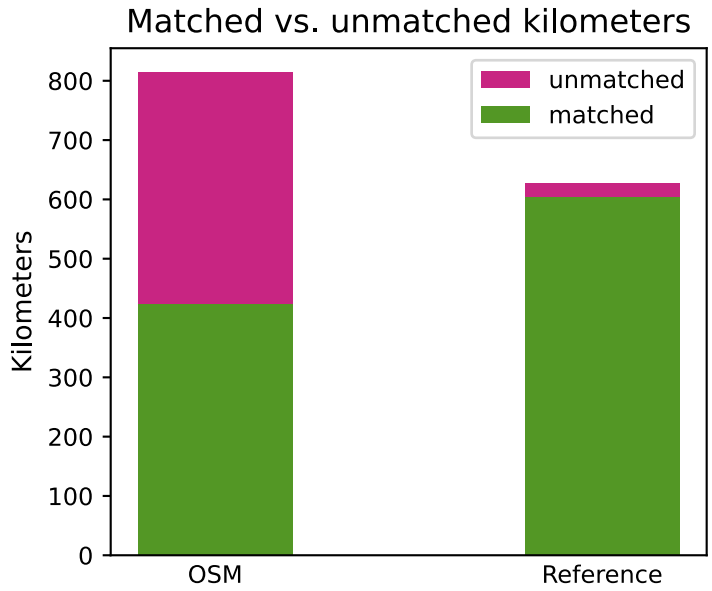




Feature matching summary

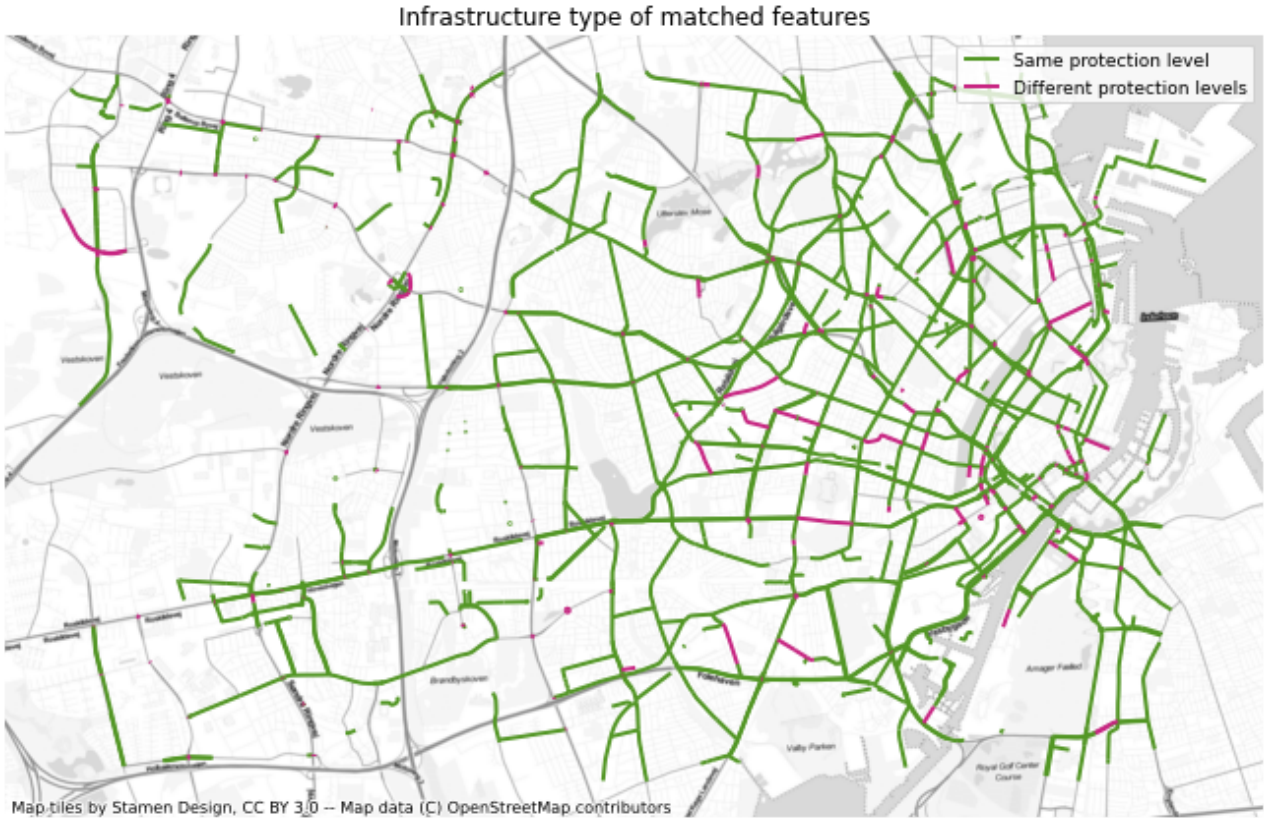
```
Edge count: 2588 of 5671 OSM edges (45.64%) were matched with a reference edge.
Edge count: 4313 out of 4705 reference edges (91.67%) were matched with an OSM edge.
Length: 422.50 km out of 814.18 km of OSM edges (51.89%) were matched with a reference edge.
Length: 603.15 km out of 626.48 km of reference edges (96.28%) were matched with an OSM edge.
```





Analyze feature matching results

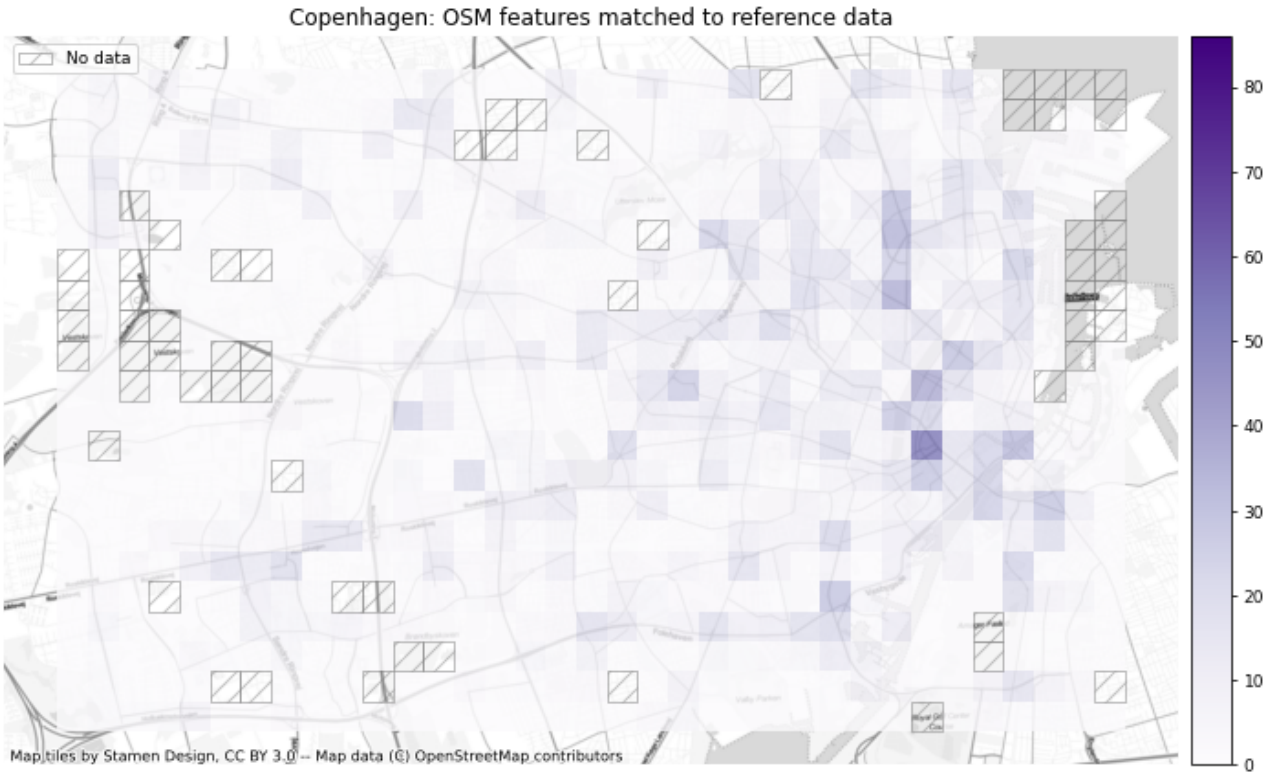
Matched features by infrastructure type



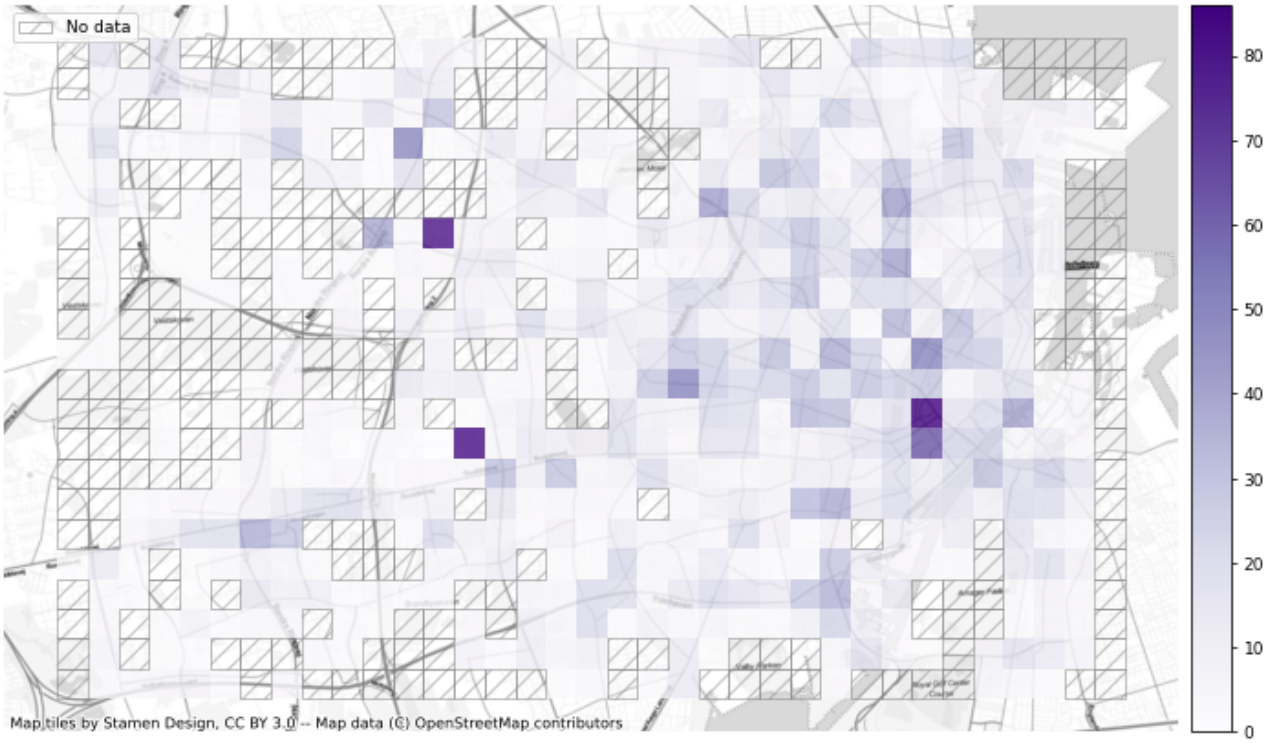
Feature matching success

In the plots below, the count, percent, and length of matched and unmatched features in each data set are summarized.

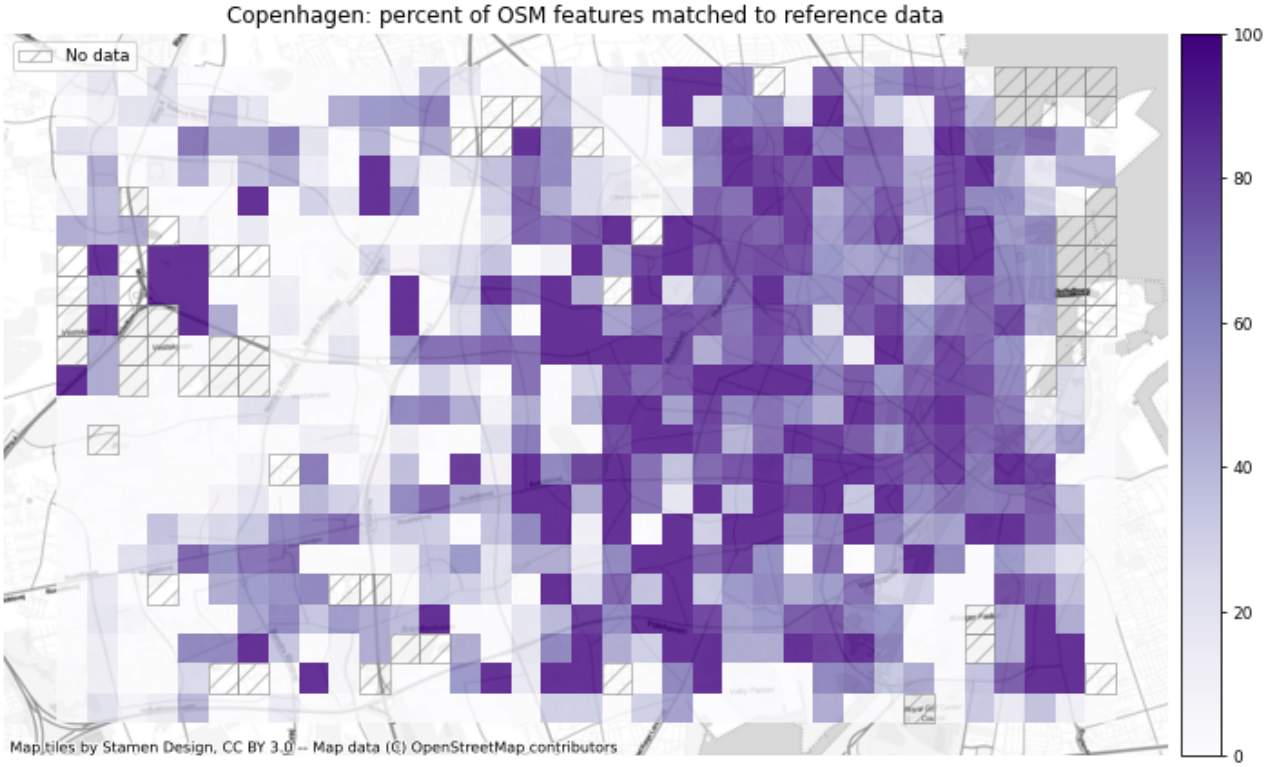
Warning
The number of matched features in one data set in a grid cell does not necessarily reflect the number of matched features in the other data set, since an edge can be matched to a corresponding edge in another cell. Moreover, the local count refers to edges intersected with the grid cell. For example, a long bike lane crossing 3 cells will thus be counted as matched in 3 different cells. This does not change the relative distribution of matched/unmatched features, but it does entail that the overall summary of matched/unmatched features above uses a different total count of edges than the plots below.



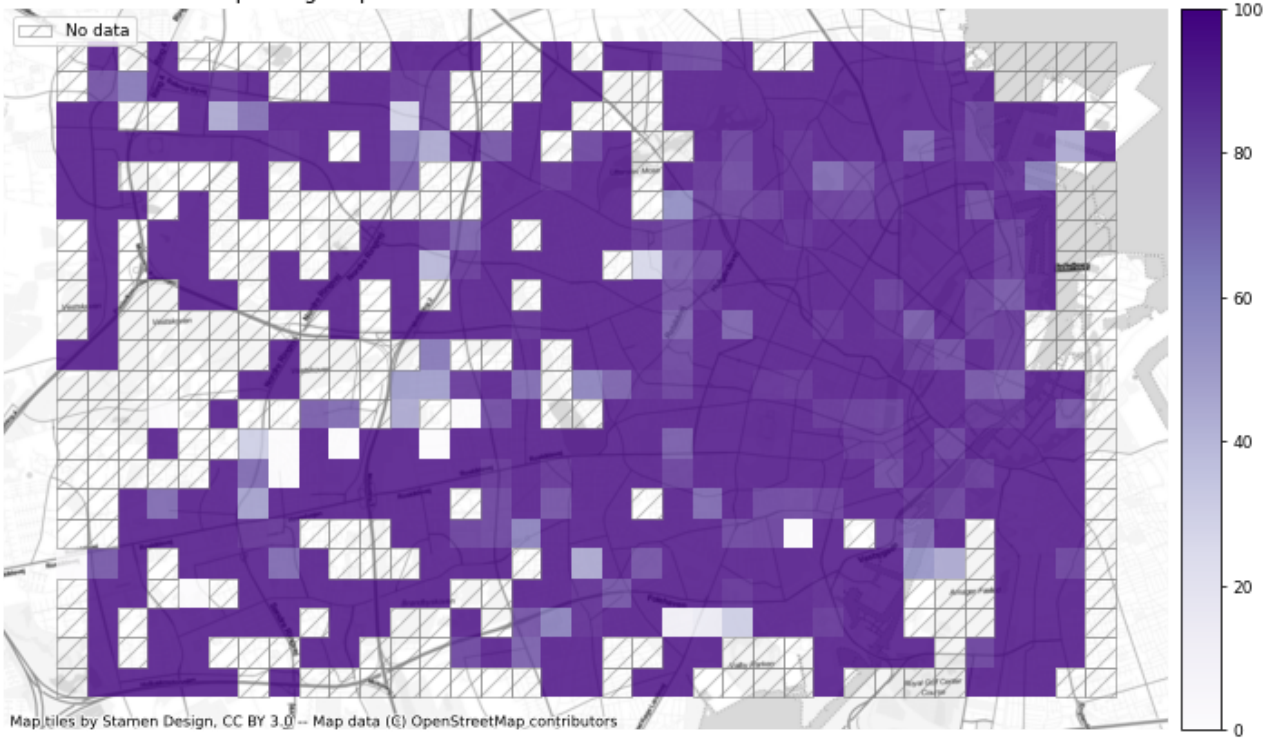
Copenhagen: GeoDanmark features matched to OSM data



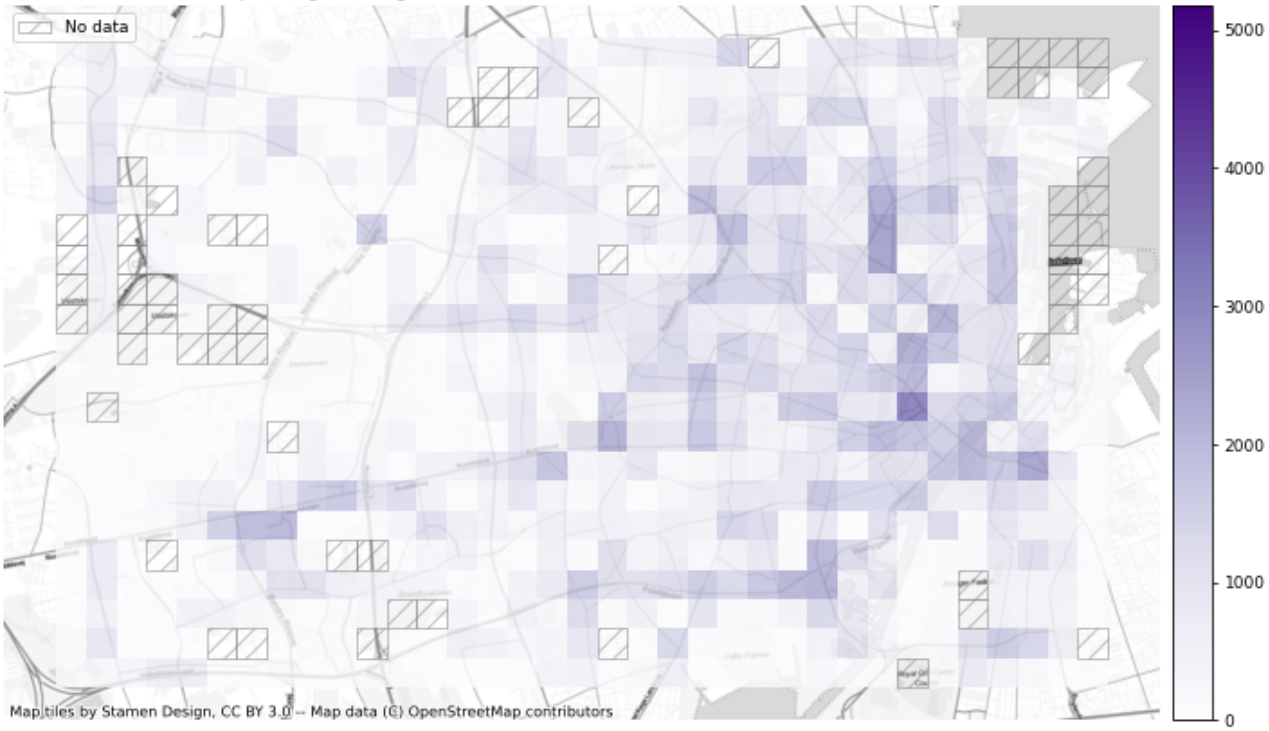
Copenhagen: percent of OSM features matched to reference data



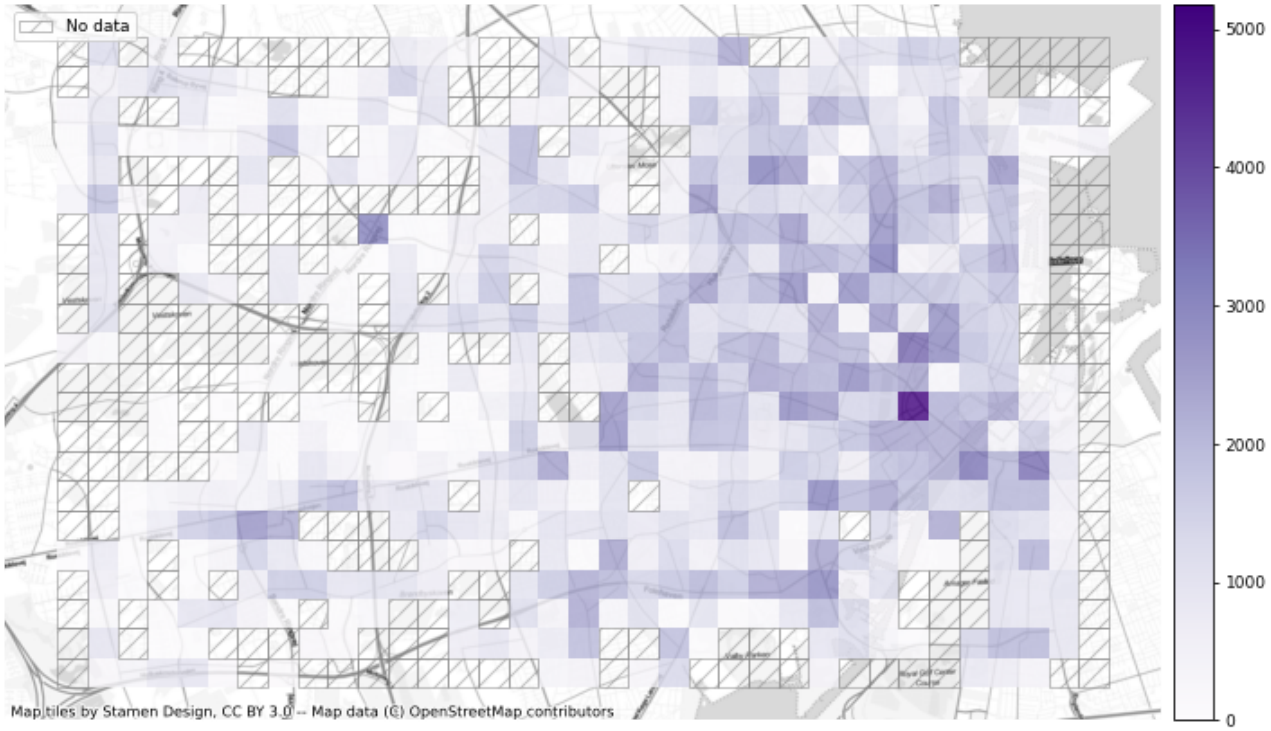
Copenhagen: percent of GeoDanmark features matched to OSM data



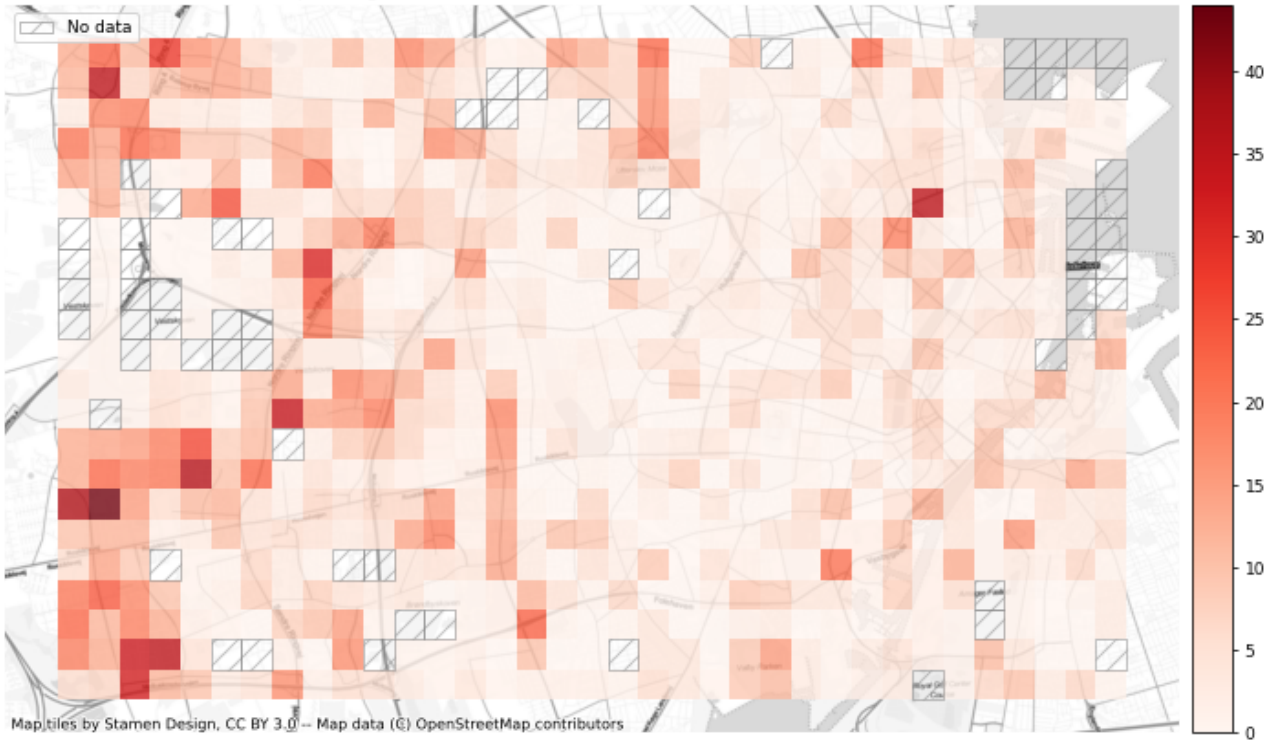
Copenhagen: length of OSM features matched to reference data (m)



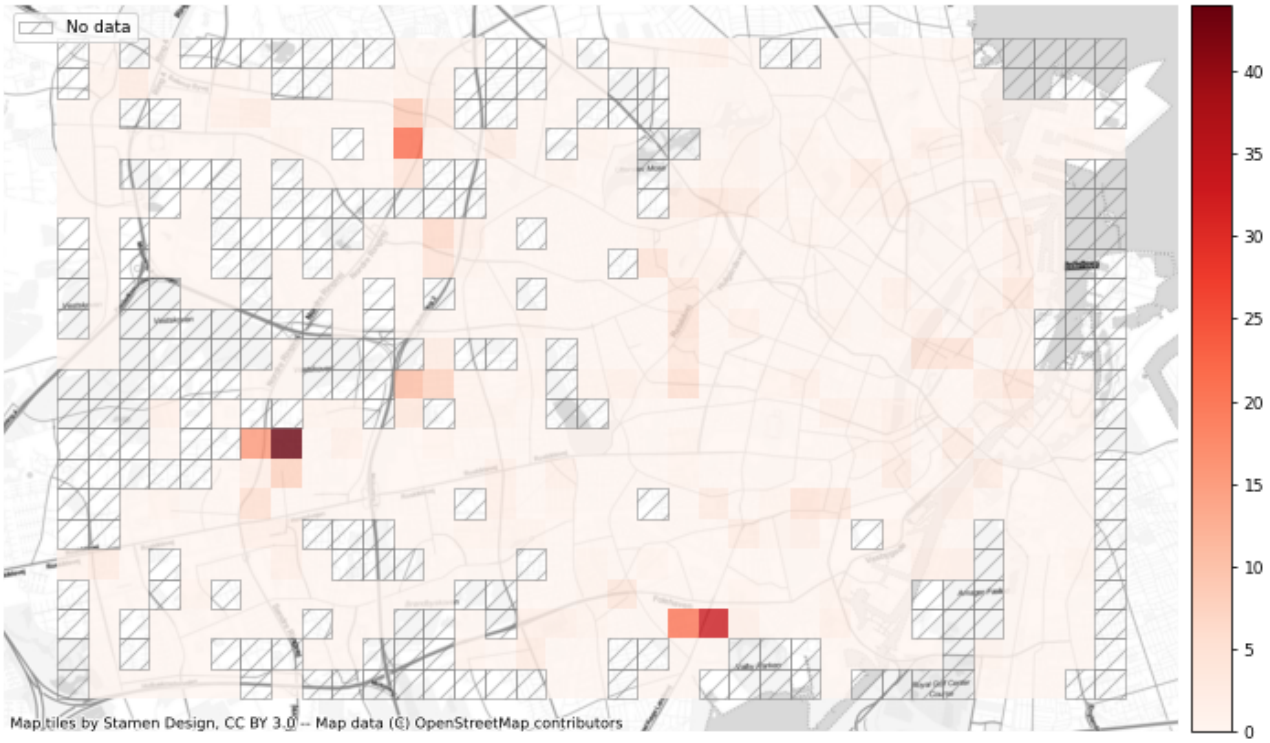
Copenhagen: length of GeoDanmark features matched to OSM data (m)



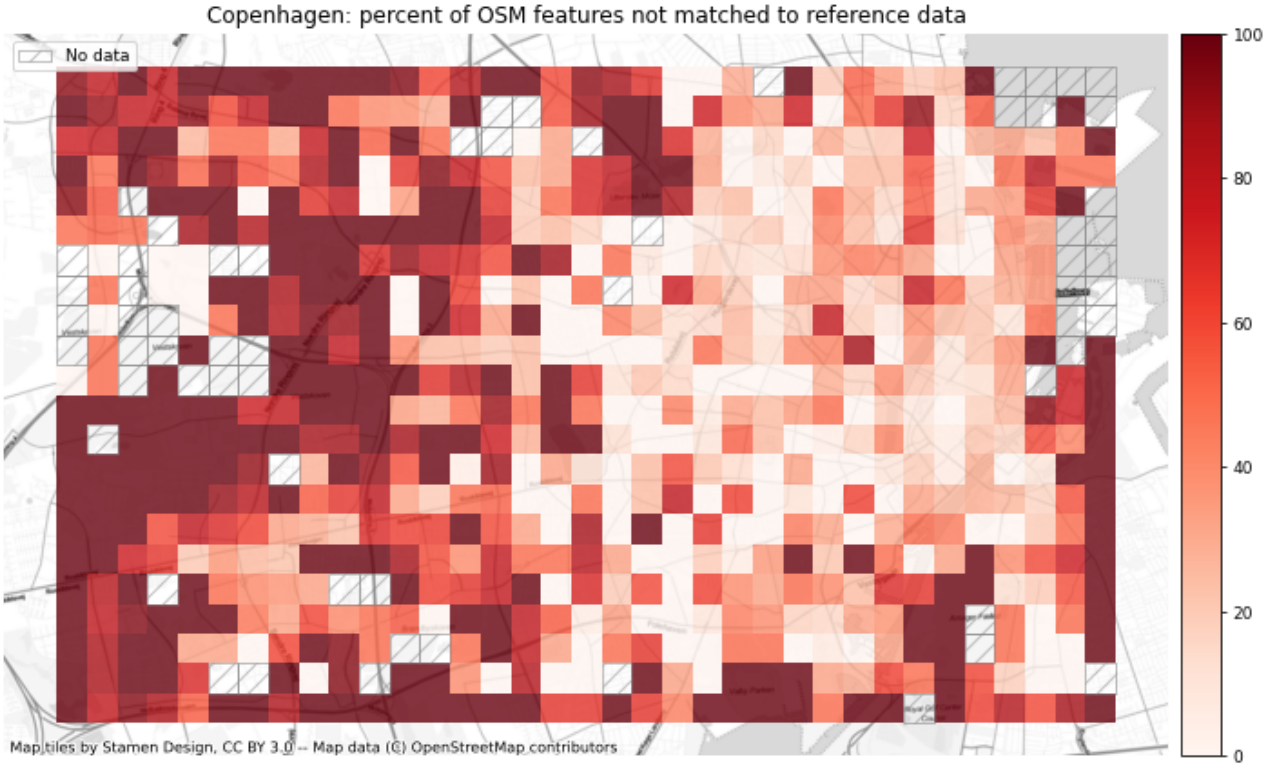
Copenhagen: OSM features not matched to reference data



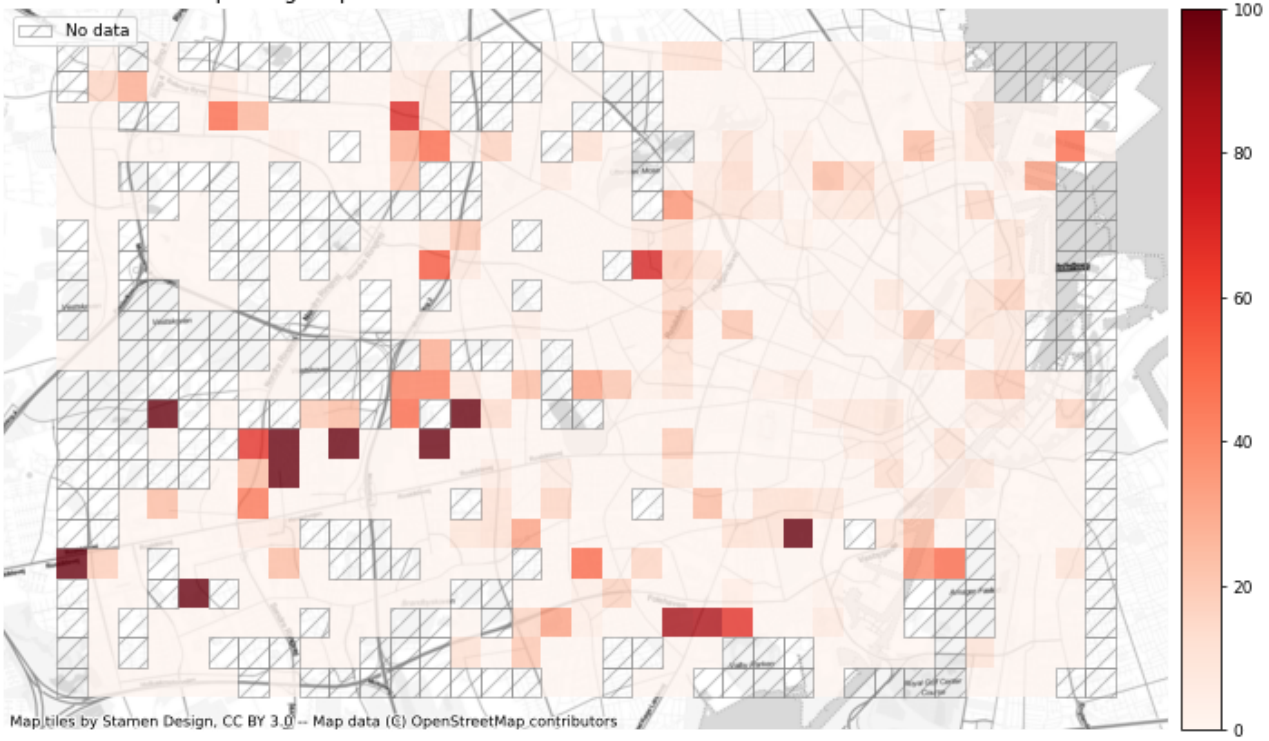
Copenhagen: GeoDanmark features not matched to OSM data



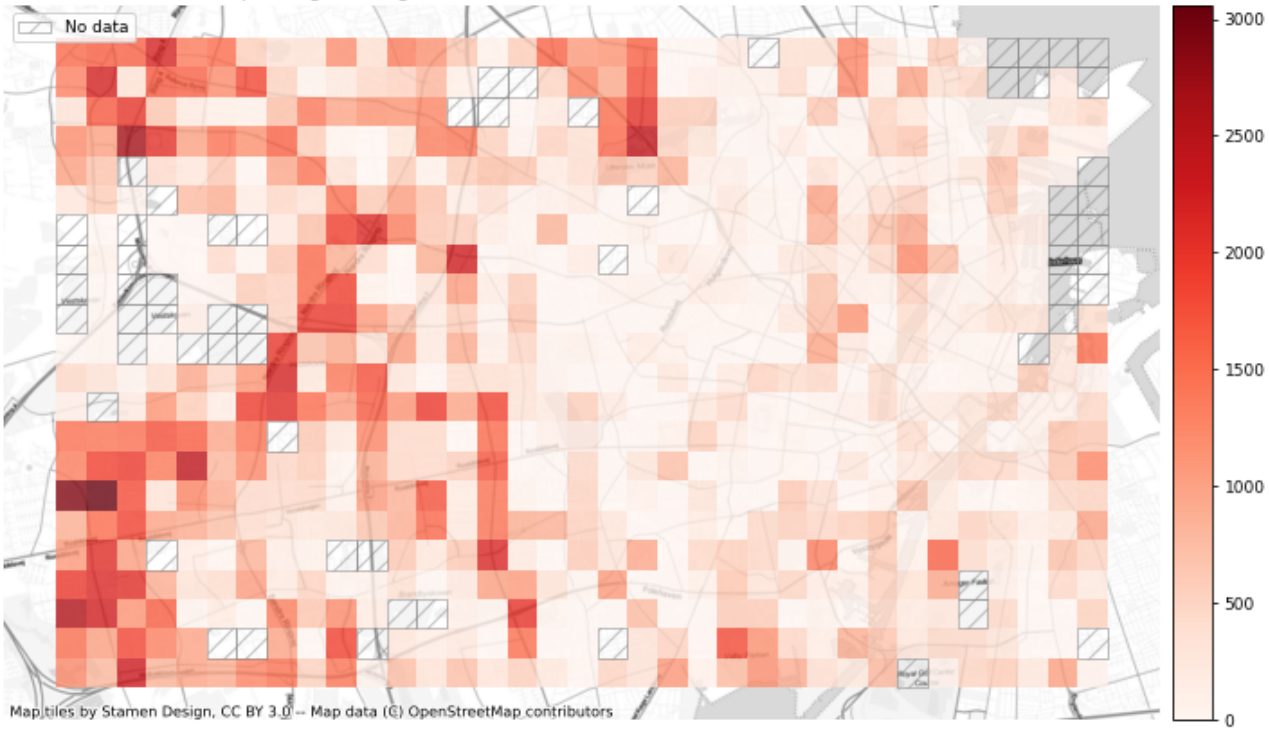
Copenhagen: percent of OSM features not matched to reference data

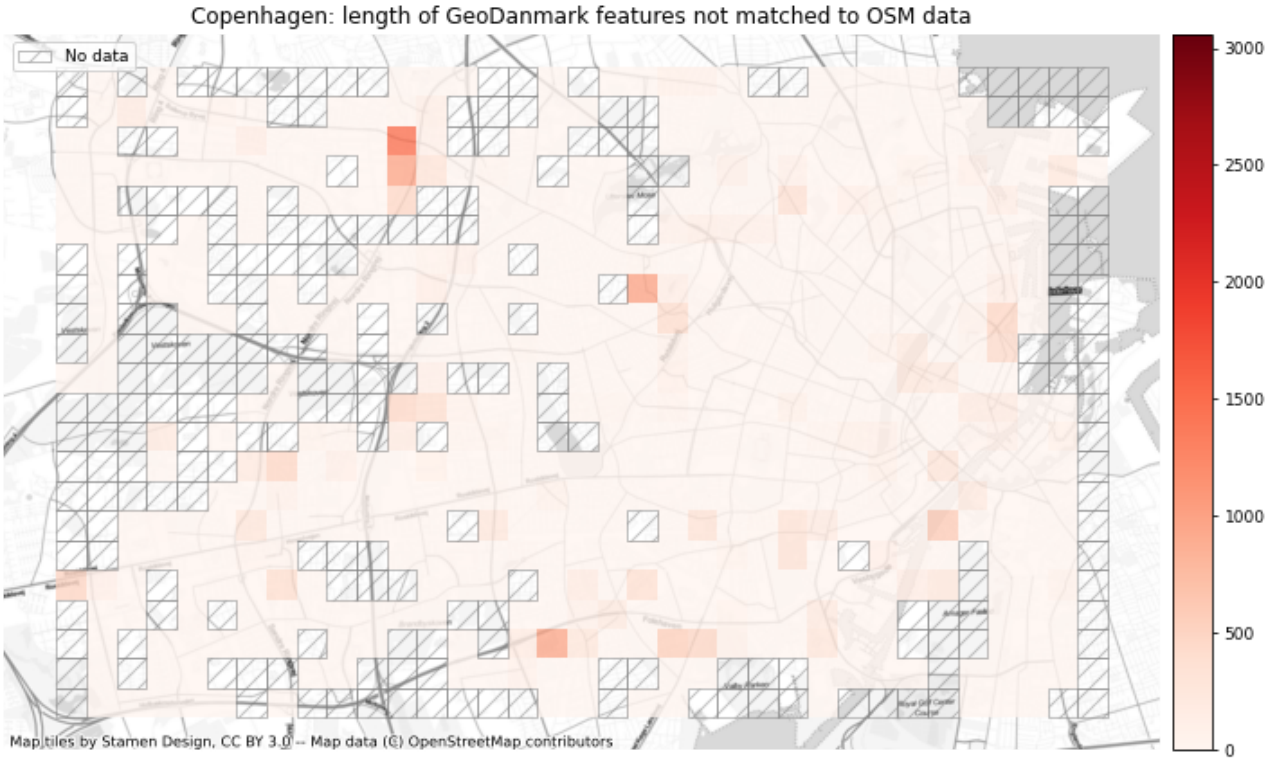


Copenhagen: percent of GeoDanmark features not matched to OSM data



Copenhagen: length of OSM features not matched to reference data





Summary

Feature Matching Results		
	OSM	GeoDanmark
Count of matched edges	2,588	4,313
Percent matched edges	46%	92%
Length of matched edges (km)	423	603
Percent of matched network length	52	96
Local min of % matched edges	4%	12%
Local max of % matched edges	100%	100%
Local average of % matched edges	62%	95%