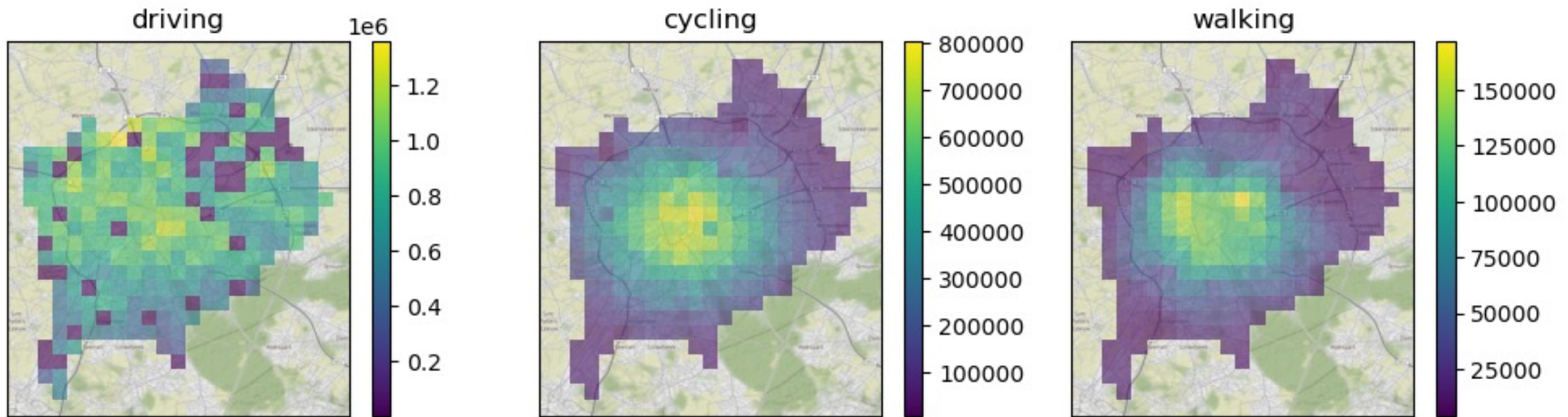


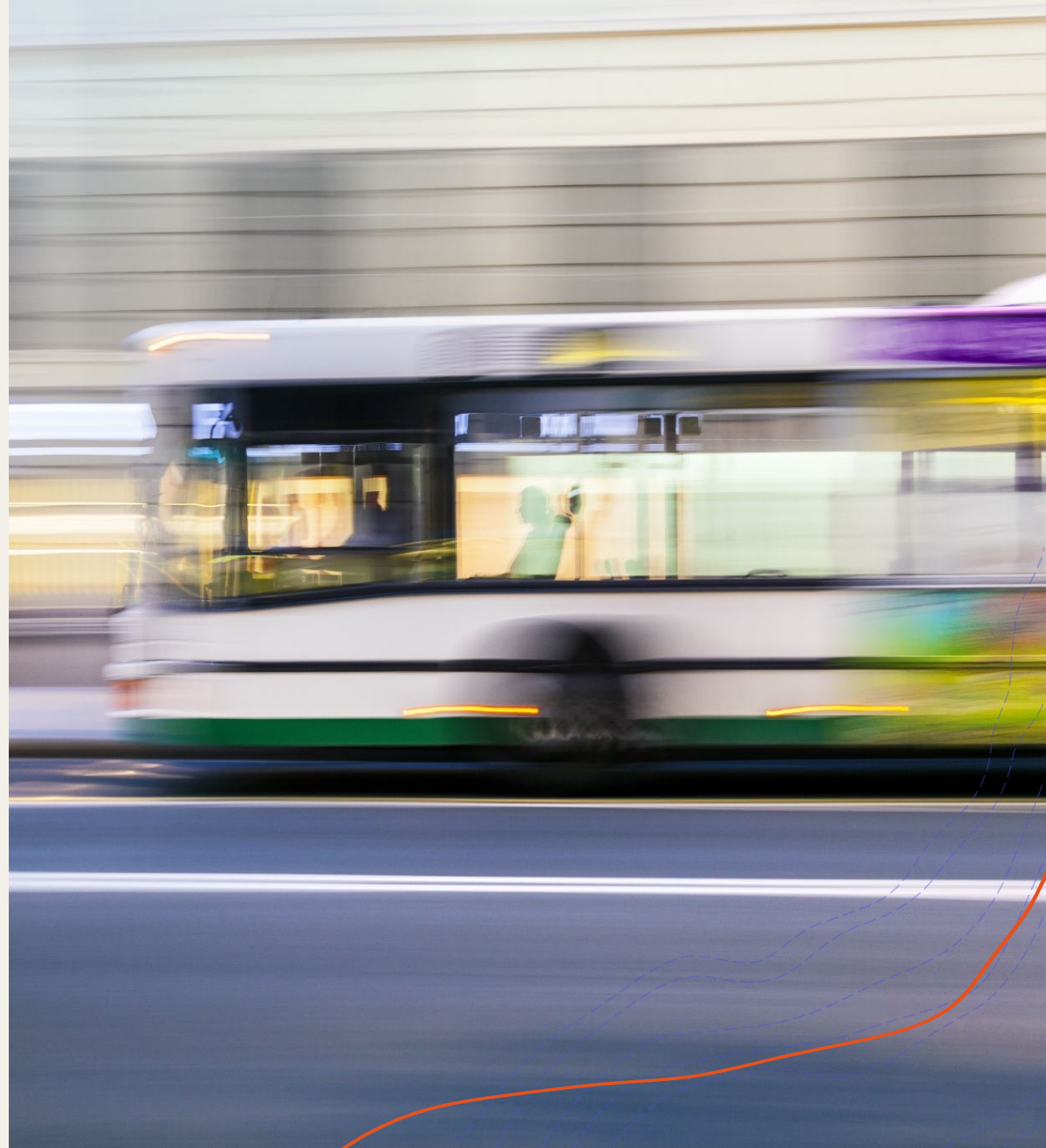
Database of Urban Transport Times

+ Qualitative comparison and analysis of transport inequality within and between cities.



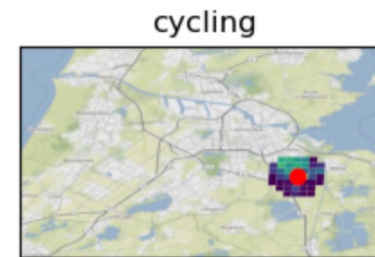
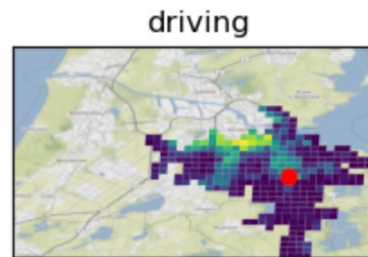
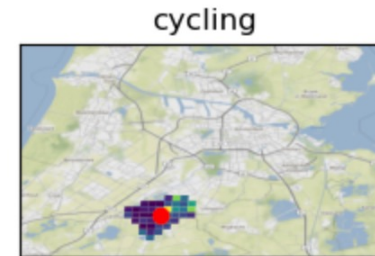
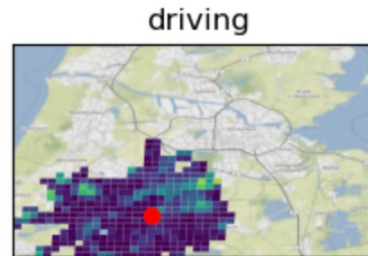
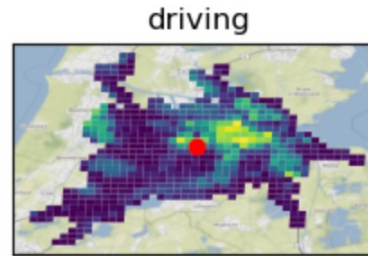
Accessibility Inequality

- + Mobility by car, bike, walking and transit.
- + Which areas of the city might be less mobile?
 - + Using population density as a proxy variables for opportunities, more=better
- + Hypothesis: Areas in city center might be more attractive for cycling



Lots of Isochrones as a measure

- + Meaning: Iso (equal) chrone (time)
- + Polygons of reachable areas by modality using max time.
- + Here right: isochrones and population density for 3 points



Cities Queried

- + Vienna
- + Graz
- + Brussels
- + Berlin
- + Hamburg
- + Copenhagen
- + Aarhus
- + Paris
- + Marseille
- + London
- + Birmingham
- + York
- + Luxembourg
- + Amsterdam
- + Utrecht + 5 more Dutch
- + Stockholm
- + Gothenburg
- + Helsinki
- + Oslo
- + Warsaw
- + Barcelona
- + Madrid
- + Lisbon
- + Bern
- + 32 more scheduled..

+ Sources

- + GHS population and urban center grid
 - + from Global Human Settlement Layer
- + GraphHopper:
 - + driving, walking, cycling & transit
- + Bing Maps (academic):
 - + driving (calibration for Graphhopper)

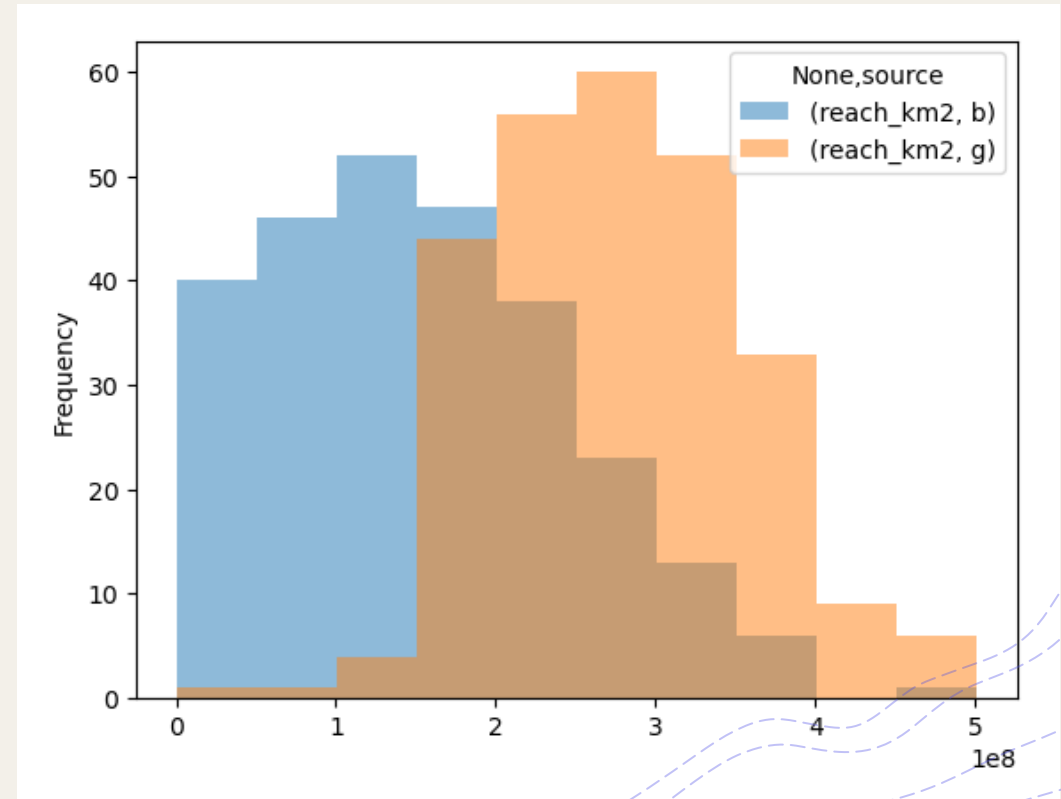
* Transit is not reliable enough from either source currently, working on GTFS-based GraphHopper, requires some small fixes.

For Each City:

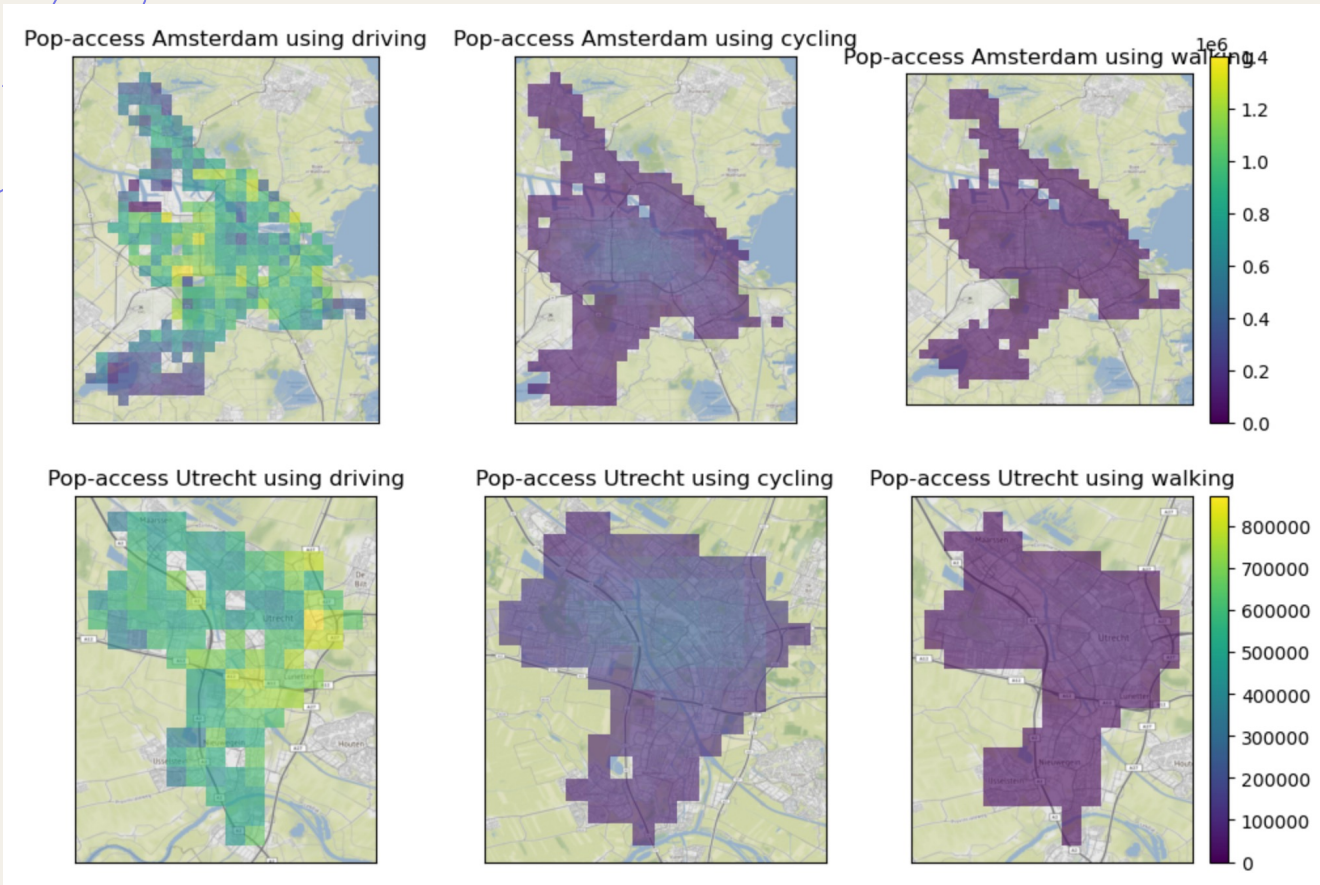
- + Create raster with points
- + Query Bing for isochrones for car
- + Create OSM & TransitLand GTFS extracts for Graphhopper
 - + Generate direction graph in GraphHopper docker
- + Fetch all records for all modes per city for 5-15-...-55 minutes
- + Calculate overlapping grids with isochrones
 - + More than **150.000** isochrones collected (!)
- + Export as DataPackage

Graphhopper vs Here Maps (Brussels)

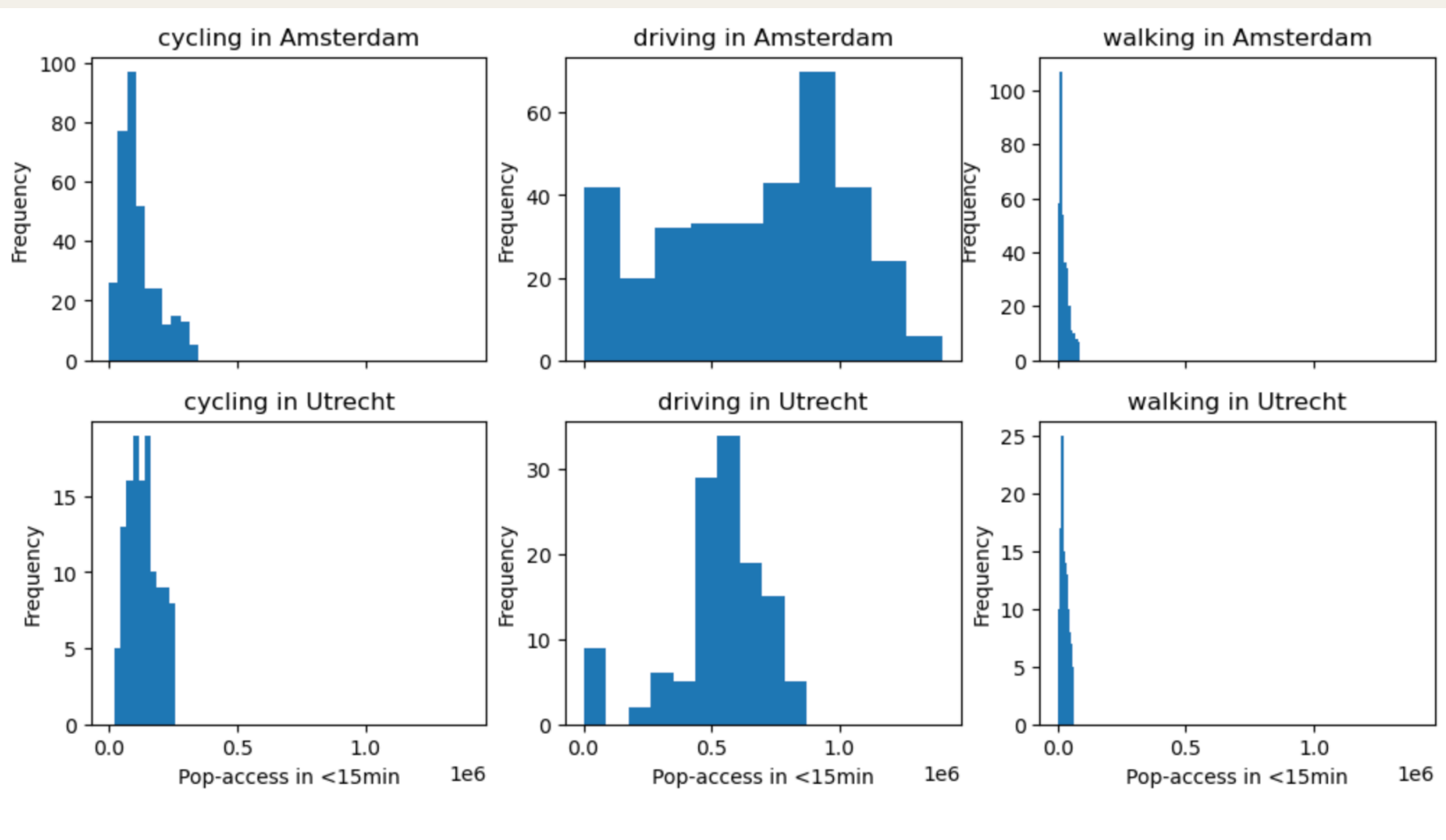
- + Graphhopper very optimistic with speeds, average speed should be brought down in settings. Requires full refetch!



Population Access: Amsterdam & Utrecht

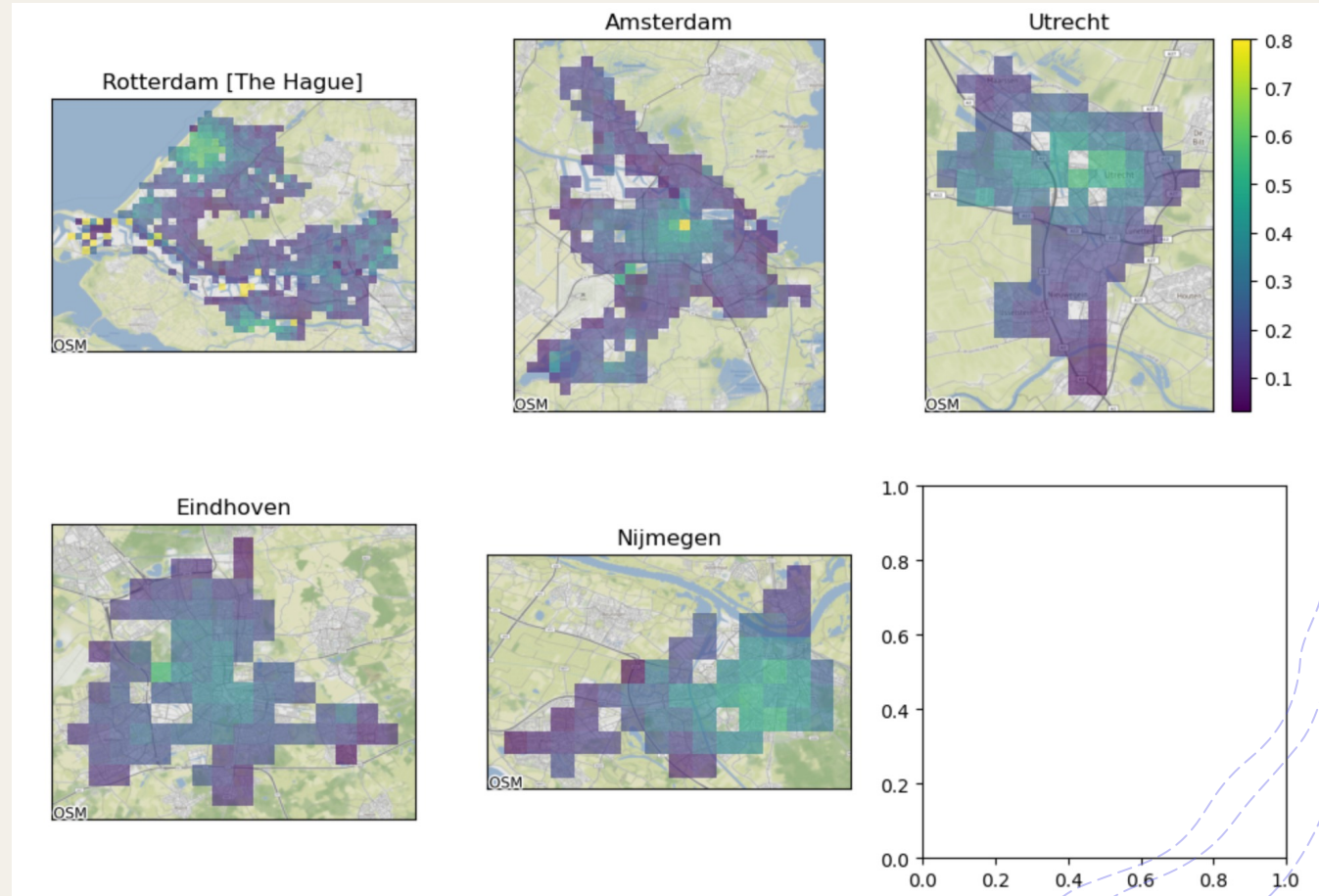


Example results: Amsterdam & Utrecht



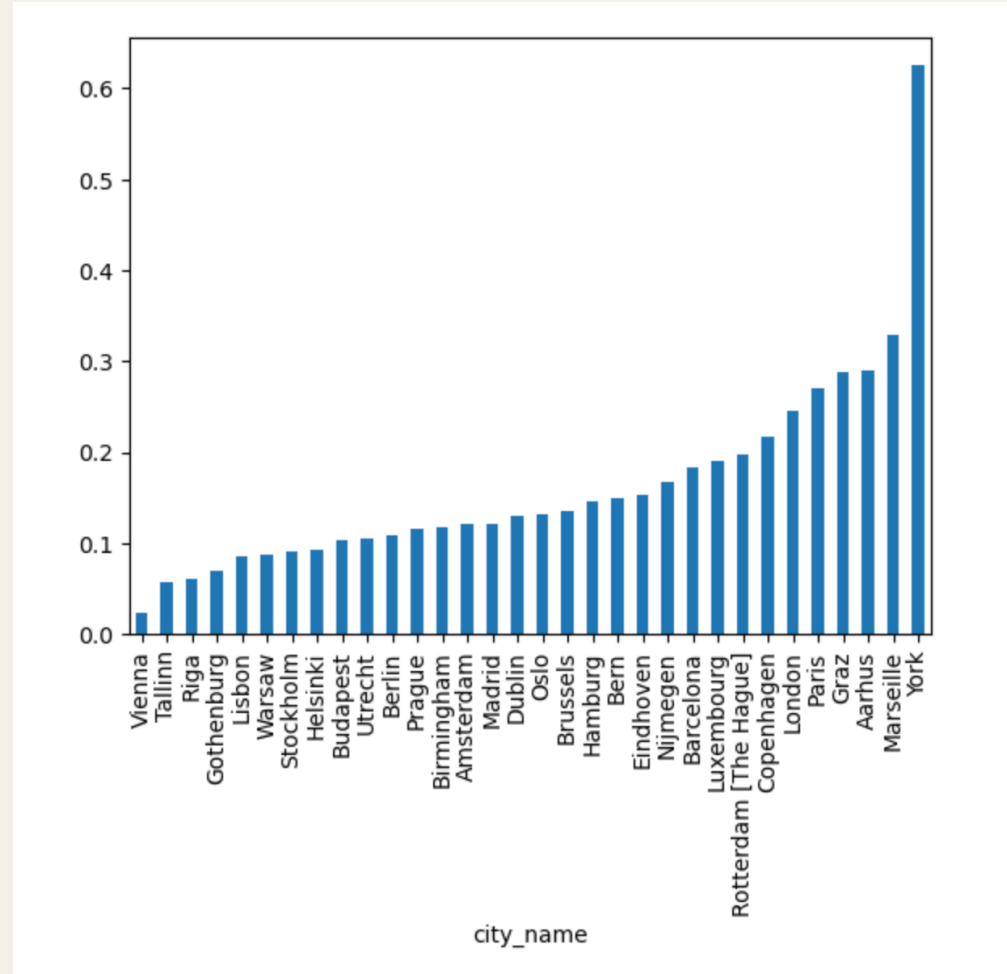
Example results in the Netherlands

- + A higher score means cycling reaches the same fraction of population as driving in does.
- + Excluding parking times, which averages more than 5 minutes.



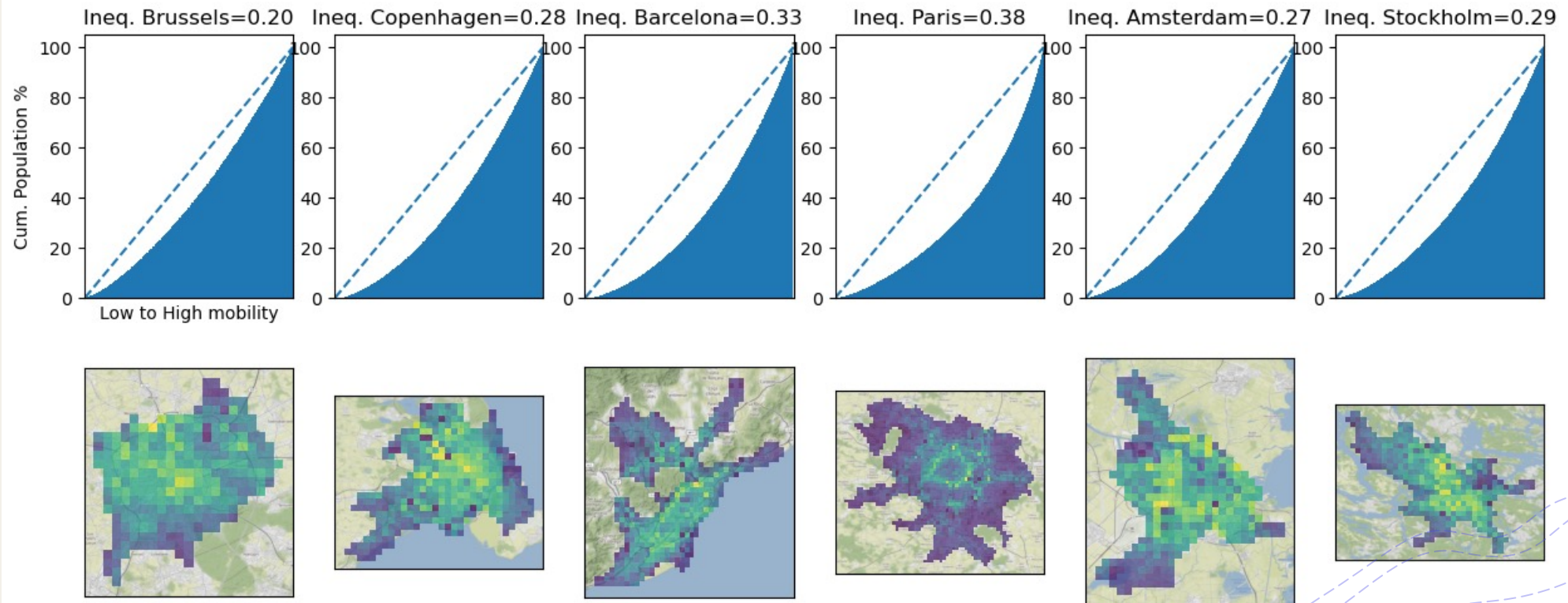
Example results in Europe

+ Reachable 0.5 by bike



Gini Index

- + Preliminary Examples, lower=better (not corrected for population density)
- + Ideas to compare cities or neighborhoods?



To-Do Generation

+ Analysis:

- + Average size of 15-minute isochrone

- + Average speed

 - + Time to reach edge of isochrone

 - + Can represent "Urban Form" factor as well, optimisation for bikes/cars

+ Generate characteristics from urban layout, more than just density.

Discussion

- + No correction of mobility vs population density. Good/bad?
- + What other methods/numbers can we derive from this?