Environment- mobility interaction using social media and remote sensing data

Would you choose a greener route to the University when the other routing conditions are the same? Human space-time behaviours adapt to changes in our environment. However, environmental effects on human activities are commonly ignored in mobility modelling, which is a key component in assessing air pollution exposure. Geo-coded social media data are can provide us a huge amount of information about space-time activities of citizens. High-resolution environmental variables are also becoming more available with advancements in remote sensing techniques and the trend of open science. These data can be used for understanding the relationships between human space-time activities and our environment and contribute to more precise modelling of human space-time activity and subsequently exposure assessment. The development is also important for studying the unintended consequences of net-zero actions rolled out in Europe. Through future scenario planning, we aim at understanding the socio-economic impacts of electric vehicles, clean air zone and traffic rerouting.

Tasks:

1) Process geocoded social-media data (e.g. twitter, facebook) and extract information (i.e. the activity and environment information).
2) Process remote sensing imagery (e.g. sentinel 2, worldview 3) and extract environment information (e.g. NDVI, building density). Existing data products can also be used.
3) Process meteorological data (e.g. precipitation, temperature)
4) Finding relationships between mobility and our environment.
5) Using the relationship to develop an agent-based model for mobility modelling and exposure assessment.
6) Scenario planning of electric cars, traffic-rerouting, clean air zone, and understand the changes in air pollution exposure.

Keywords: remote sensing, social media, regression analysis, agent-based modeling, exposure assessment, air pollution, health

Additional information:

The study area you can define yourself for your region of interest. If you do not have a preference, it would be good to choose Netherlands, or Germany, or several cities from these two countries. You will get more data if you choose a bigger study area.

Twitter data are available but you need to register an account and get permission. See below.

https://www.earthdatascience.org/courses/use-data-open-source-python/intro-to-apis/twitter-data-in-python/

https://cran.r-project.org/web/packages/rtweet/vignettes/auth.html

Example codes and data

https://www.kaggle.com/kazanova/sentiment140/code

Reading material:

Social-media data for urban sustainability

https://static1.squarespace.com/static/552ec5f5e4b07754ed72c4d2/t/5be1dae270a6adf7bb5a6609/1541528292607/ilieva+and+mcphearson_+nature+sustainabilty+2018.pdf