



Company / Organisation Name:	NOKIA Bell Labs
Team / Department:	Responsible AI Team, AI Research Lab
Address:	21 JJ Thomson Avenue, CB3 0FA, Cambridge UK

Provisional title for project:

Explaining Environmental Health Outcomes from Satellite Imagery

Short description of the problem that would be addressed by the project:

The critical role of the environment in shaping public and population health outcomes has become increasingly apparent, particularly following the 2022 heatwaves in the UK, which led to a notable rise in excess deaths among certain groups like the elderly and those with respiratory issues. Earth Observation, including satellite data, offers a wealth of information about our environment's condition and quality. However, the complexities in processing and understanding this data mean it is not fully leveraged in public health studies.

Our project extends our recent MedSat dataset, presented at NeurIPS Datasets and Benchmarks 2023, which spans the years 2019 and 2020 for all of England. MedSat encapsulates health outcomes based on medical prescriptions in 33K small English areas (LSOAs), focusing on conditions such as diabetes, hypertension, anxiety, depression, asthma, and opioid use. It also includes over 100 sociodemographic indicators, primarily from the latest UK census, and an annual average composite image from the Sentinel-2 satellite for each area. Our aim is to use MedSat to uncover new connections and insights into how environmental factors as retrieved from multi-spectral remote sensed imagery correlate with health outcomes. This will be achieved by 1) deploying regressor models to predict prescription outcomes in LSOAs based on satellite imagery features, and 2) utilizing and assessing various established explainability models (such as GradCAM, Occlusion, TCAV) for further insights. The instructors will provide existing code and frameworks to help with feature extraction from satellite data. This project is conducted in collaboration with Dr Stephen Law from UCL Geography.

Short description of the data sources that would be used in the project, and how they would be used

MedSat: A unique public health dataset for England featuring medical prescriptions and satellite composite images.

Would any work by the student need to be carried out on site at the Company (with the exception of supervisory Meetings)?

Not necessary

Any issues of data confidentiality and IPR that would need to be resolved

No

Essential skills

Machine Learning, GIS, computer vision

Desirable skills

Explainability or Interpretability in Machine Learning

Preferred degree programmes (if any)

Urban Geography, Remote Sensing, Environmental Science, Public Health

Preferred selection method

Interview

Support and training offered by the company

The work will be advised by Sanja Šćepanović and Daniele Quercia of Nokia Bell Lab with support from Dr Stephen Law of UCL Geography.

Financial assistance offered by the company

Yes

Any other comments

No