Dissertation Topic Outline Form

Please complete each question.

1 Name:

Minwei Zhao

2 What is your student number? [This is an 8 digit number, available through Portico]

Do not use thousands separators.

22032089

3 **MSc programme:**

Remote Sensing & Environmental Mapping

4 **Proposed dissertation title [100 characters max]:**

Explaining Environmental Health Outcomes (NHS prescription data) from Satellite Imagery

5 **Proposed field research location (if applicable):**

None

6 **Technical/methodological approaches you are likely to use:**

- [x] Advanced statistics
- [x] Analysis of existing (secondary) data (e.g. global datasets, climate records)
- [ ] Analysis of press and new media
- [ ] Archival/visual methodologies
- [ ] Discourse analysis
- [ ] Ecological field surveying
- [x] Focus groups
- [x] GIS
- [ ] Lab-based ecology (i.e. microscope work)
- [ ] Lab-based water and sediment analyses (e.g. chemistry, grain size)
- [x] Modelling
- [ ] Participant observation/ethnographic methods
- [ ] Policy review
- [x] Remote sensing
- [ ] Semi-structured interviews
- [ ] Social surveys
- [ ] Unix/Linux computing

7 **Summary of specific equipment or laboratory requirements (if applicable) [100 characters max]:**

No specific equipment required; computational resources for data analysis suffice.

8 **Proposed dissertation abstract [300 words max]. Specifically, please outline your main aim and objectives:**

This research employs high-resolution Sentinel-2 satellite imagery and comprehensive NHS prescription data to model environmental health outcomes across England. Utilizing remote sensing (RS) and Geographic Information Systems (GIS), the study will analyze spatial and temporal patterns in health-related prescriptions at the Lower Layer Super Output Area (LSOA) level. Advanced statistical models and machine learning algorithms, including Spatial Lag Models and mainstream XAI methods such as SHapley Additive exPlanations (SHAP) and Local Interpretable Model-Agnostic Explanations (LIME), are applied to decipher the complex interactions between environmental factors—like air quality and greenery—and health outcomes indicated by medication prescriptions. These XAI techniques will be employed to enhance the interpretability and trustworthiness of the machine learning models by providing transparent and understandable predictions, contributing to a detailed understanding of the determinants of health. By integrating diverse, multi-sourced datasets, including sociodemographic variables from the UK census, the research aims to uncover how environmental conditions impact health across communities, emphasizing the spatial prevalence of prescriptions and the environmental influences on public health during the pandemic years.

9 **Is this project linked to a specific member of staff?**

(●) Yes ( ) No

10 **If yes, who?**

Dr. Stephen Law

11 **If the project has been listed by a particular member of staff, have you spoken to them about the project and received their permission to select it?**

(●) Yes ( ) No ( ) No answer

12 **Is this project linked to a specific external organisation?**

(●) Yes ( ) No ( ) No answer

13 **If yes, who?**

Nokia Bell Labs Responsible AI Team

14 **Suggested supervisor:**

Dr. Stephen Law

NB: We cannot guarantee that you will be assigned your suggested supervisor.

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