Barbara Metzler, PhD

Postdoctoral Research Associate, Alan Turing Institute

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Research interests

Interested in people, data and foundation models - currently thinking about foundation models in GeoAI. I recently obtained my PhD in Applied AI from Imperial College London, with experience in working with various unstructured data sources, including satellite images and text data. Always eager to learn, I am dedicated to driving impactful (and equitable) results through creative problem solving and a keen eye for detail.

Education and Qualifications

2019 – 2023	**PhD** Deep Learning, Earth Observation and Inequalities in Cities IMPERIAL COLLEGE LONDON, UK

- Thesis: Characterizing urban environments in Sub-Saharan Africa with satellite imagery and unsupervised deep learning. (embargoed until publication of the last resulting paper)
- Developed unsupervised deep learning models to characterize built and natural environments from high-resolution satellite imagery and published findings in paper .
- Collaborated with the Global Environmental Health Research Group and Pathways to Equitable Healthy Cities project to study urban health inequalities in Sub-Saharan Africa.
- Supervised by Prof. Majid Ezzati, Dr. Viktoriia Sharmanska and Dr. Wenjia Bai .

2018 – 2019	**MSc** Health Data Analytics and Machine Learning (first class honours) IMPERIAL COLLEGE LONDON, UK

- Thesis: Measuring social and health inequalities using machine learning and object detection with StreetView imagery.

2014 –2017	**BASc** Physics (first class honours) UNIVERSITY COLLEGE LONDON, UK

- Double-Bachelor: Bachelor of Arts and Sciences with a major in Physics and a minor in English Literature.

Work Experience and Academic Appointments

2023 - March 2025	**Postdoctoral Research Associate** Science of Cities and Regions ALAN TURING INSTITUTE, LONDON, UK

- Predicting environmental and social inequalities across England using geospatial foundation models and Sentinel-2 satellite images. Created multi-task satellite embeddings for England .
- Developed scientific experiments and implemented code for Demoland and EuroFab projects.
- Collaborating with interdisciplinary teams to translate data insights into urban policy recommendations.
- Mentored and supervised junior researchers, fostering teamwork and knowledge sharing.

2020 – 2023	**General Teaching Assistant** IMPERIAL COLLEGE LONDON, UK

- Taught two MSc modules: Machine Learning and Population Health Analytics.
- Developed teaching material, i.e. lectures and Jupyter notebooks for machine and deep learning tutorials.

2019	**Data Science Study Group** Alan Turing Institute and WWF LONDON, UK

- Applied natural language processing (NLP) and machine learning techniques to detect news articles that report emerging threats to WWF world heritage sites and key protected areas. Details in project report.

2018 - 2019	**Imperial College Data Science Society Elite Team** IMPERIAL COLLEGE LONDON, UK

- Competitive data science projects together with industry partners for selected scholars.
- Applied the Google BERT model to news datasets to analyze sentiment for a FinTech company.

2017 – 2018	**Research Data Analyst** INDOO.RS (ESRI), VIENNA, AUSTRIA

- Developed algorithms for advanced trajectory analytics such as Simultaneous Localization and Mapping (SLAM), network analysis and clustering. Published paper on the geometric constraint model.

Awards, Honours and Distinctions

2024	**Participation scholarship**	Computer Vision for Earth Observation summer school

Summer school organised by IEEE Geoscience and Remote Sensing Society (GRSS) and Image Analysis and Data Fusion (IADF)

2024	**Fee-waiver bursary**	GISRUK 2024
2019-2023	**President's PhD scholarship**	Imperial College London, UK

PhD stipend awarded to students consistently scoring in top 5- 10%

2019	**Best dissertation award (MSc thesis)**	Imperial College London, UK
2018	**FEMtech scholarship**	Austrian Research Promotion Agency (FFG), Vienna, Austria

Scholarship for women in STEM careers awarded by the Austrian ministry.

Key Skills

Programming Languages

- Python (7+ years experience): Advanced proficiency in data science, ML and deep learning libraries (pandas, numpy, SciPy, NetworkX, scikit-learn, PyTorch, TensorFlow, Pillow, OpenCV etc.)
- R, C++: Intermediate proficiency
- SQL: Intermediate proficiency
- HTML/CSS: Intermediate (CodeFirst Girls Web Development Certificate) JavaScript: Basic

Geospatial Analysis

- Tools: ArcGIS, QGIS, GDAL, Google Earth Engine
- Python Libraries: GeoPandas, shapely, rasterio, PySAL, rasterstats

Other Technical Skills

- Operating Systems: Linux, Windows, macOS, Raspbian
- Version Control: Git
- Parallel and distributed computing, high-performance computing

Languages

- German (Native), English (Fluent, CAE C2 - Certificate in Advanced English), French (Advanced, DELF B1 - Diplôme d'Études en Langue Française), Mandarin (Conversational)

Selected publications

2024	**AB Metzler**, M Fleischmann and D Arribas-Bel. Is a (satellite) image worth a thousand data points? Comparing machine learning approaches for predicting social and environmental inequalities across England. In review

2024	**AB Metzler**, R Nathvani, W Bai et. al.. High-resolution satellite imagery reveals phenotypes of urban development in Sub-Saharan Africa. In review

2023	**AB Metzler**, R Nathvani, V Sharmanska et. al.. Phenotyping urban built and natural environments with high-resolution satellite images and unsupervised deep learning. Science of The Total Environment (STOTEN)

doi.org/10.1016/j.scitotenv.2023.164794

2022	R Nathvani, SN Clark, E Muller, A S Alli, J E Bennett, J Nimo, J B Moses, S Baah, **AB Metzler** et. al.. Characterization of urban environment and activity across space and time using street images and deep learning in Accra. Nature, Scientific Reports

doi.org/10.1038/s41598-022-24474-1

2018	T Burgess, **B Metzler**, A Ettlinger, et al.. Geometric Constraint Model and Mobility Graphs for Building Utilization Intelligence. International Conference on Indoor Positioning and Indoor Navigation (IPIN)

hdl.handle.net/20.500.12708/43870