Mateo Neira

Senior Data Scientist

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Senior Data Scientist with 7+ years of experience applying machine learning and geospatial analytics to urban systems and intelligent design tools. Proven track record of leading AI/ML R&D initiatives across urban design, 3D spatial data, and sustainability modelling. Expertise in mathematical modelling, Bayesian methods, graph-based and generative models, spatial statistics, and emerging LLM-based techniques. Adept at bridging technical development and cross-disciplinary collaboration across design, engineering, and analytics teams.

Skills

Machine learning & AI: Supervised and Unsupervised Learning, Bayesian probabilistic models, Gradient Boosting, Graph Neural Networks (GNN), Deep Learning, Hyperparameter Tuning, Reinforcement Learning, LLMs.
Tech stack: PyTorch, PyMC, Scikit-learn, Weights & Biases, Azure AI Foundry, OpenAI APIs, Hugging Face, Transformers.

Data Analysis and Modelling: Statistical inference, time-series modelling, spatial interaction models, Monte Carlo simulations, dimensionality reduction.
Tech stack: Python (Pandas, NumPy, SciPy, Statsmodels), SQL (PostgreSQL/PostGIS), Jupyter, PineCone.

Programming, Development and Cloud Platforms: Scientific programming, API development, cloud-native ML deployment, DevOps best practices.
Tech stack: Python, Rust (via PyO3/Maturin), JavaScript, Git, Docker, Azure, ArcGIS Pro, ArcPy.

Experience

Senior Data Scientist | Associate Partner, Foster + Partners — April 2023 - Present

- Leading the Urban Analytics R&D team, integrating machine learning into GIS/3D workflows to support scenario-based urban design and sustainability planning.
- Designed, developed, and deployed an interpretable Bayesian Dirichlet regression model to predict modal splits with uncertainty estimates.
- Implemented trip generation models to estimate urban mobility flows accurately, optimised for scenarios with limited data availability, enabling precise urban mobility planning for data-scarce regions.
- Developed a scalable urban CO2 emissions estimation model, tailored for large-scale urban areas.
- Development of AI strategy for urban design. Research, development, and deployment of LLM based workflows.
- Mentored data scientists, built cross-functional workflows between design, software, and analytics.

Data Scientist | Associate Partner, Foster + Partners — Nov 2017 - April 2023

- Built a modular Python library and API for urban analytics, adopted firm-wide.
- Implemented and deployed a moving window algorithm for geospatial analysis, increasing the spatial resolution of outputs by a factor of 7.
- Automated ingestion and cleaning of global OSM and raster datasets, reducing preprocessing time by 90%.
- Designed exploratory dashboards combining urban form metrics and socio-economic indices for strategic masterplans.
- Led the development of procedural models for 3D geometry generation, enabling scalable, parametric masterplanning at city-scale.

Data Science Consultant, Unicef — April 2020 - April 2021

- Built dynamic time series models to analyze mobility patterns and COVID-19-related excess mortality in Ecuador.
- Applied dimensionality reduction (t-SNE) and time-series clustering to identify regional risk patterns.

Spatial Data Researcher, SignalBox — June 2017 - November 2017

- Developed context-aware location services via supervised learning on geospatial embeddings and mobility

traces.

- End-to-end Development, training and deployment of machine learning algorithms for context-aware location services.

Education

University College London & the Alan Turing Institute, PhD in Network Science — Completed on Sept 2024

University College London, MSc in Smart Cities and Urban Analytics — Class of 2017

Universidad de Cuenca, BSc in Architecture and Urbanism — Class of 2015

Other

Publications: Co-authored two papers on representational learning techniques (Auto-encoders, graph neural networks, and transformers) for geographical data. Co-authored a paper on measuring urban segregation using random walks on multilayered networks:

- Law, S. and Neira, M., 2019, November. *An unsupervised approach to geographical knowledge discovery using street level and street network images*. In Proceedings of the 3rd ACM SIGSPATIAL International Workshop on AI for Geographic Knowledge Discovery (pp. 56-65).
- Neira, M., Molinero, C., Marshall, S. and Arcaute, E., 2024. *Urban segregation on multilayered transport networks: a random walk approach.* Scientific Reports, 14(1), p.8370.
- Neira, M. and Murcio, R., 2022. *Graph representation learning for street networks.* arXiv preprint arXiv:2211.04984.
- Neira, M., Marin, V. and Arcaute, E., 2025. *Multiscalarity in Socio-Spatial Segregation: An Information-Theoretic Framework.* arXiv preprint arXiv:2505.14937.
- Renninger, A., Neira, M. and Arcaute, E., 2024. *The role of central places in exposure segregation.* arXiv preprint arXiv:2408.04373.