

School of Environmental Sciences

GEOGRAPHIC DATA SCIENCE SCHOOL

8-12 SEPTEMBER 2025



Geographic Data Science Lab

Exploring the Geography in Geographic Data Science







Geographic Data Science School 2025

Join us in vibrant Liverpool for 5 days of intensive and collaborative training across many facets of geographic and spatial data science.



The GDS School will consist of nine half-day sessions, combining theoretical instruction with practical, in-lab activities as outlined below.

Introduction to Spatial Data Session

This introductory session offers an overview of spatial data and its role in geographic data science. Participants will learn what spatial data is, how it is represented, and why it matters. The session sets the foundation for the other sessions by introducing key concepts and data types.

Map Design Session

The session will cover principles of design applied to cartography, emphasising the importance of choosing appropriate data layers and symbols to enhance readability. Initially, it will provide an overview on projections, shapes, and representation of geographic features. Then, it will address aesthetic







considerations pertaining colour scheme and classification methods choices, as well as the usage of size to represent complex geographical phenomena. Overall, the session will equips learners with both theoretical principles and practical skills to produce clear, informative, and visually engaging static and dynamic maps.

Making Sense of Places Session

Creating Small Area Indices: The session will cover how to create multidimensional indicators about small areas, like the Index of Multiple Deprivation or Access to Healthy Assets and Hazards. We will discuss the principles behind composite indicators, selecting and transforming variables, weighting methods, and how to aggregate data to meaningful geographic units. Through real-world examples and guided exercises, participants will learn the key steps involved in building robust, transparent indices that support local analysis and decision-making.

Geodemographics Session

This session provides an introduction to geodemographic classification and its applications across both public sector like ONS national residential classification and industrial practices including consumer segmentation. The guided practical task equips participants with an understanding on how to access and analysis small area data, conduct segmentation clustering and produce a composite geodemographic classification and spatially visualise the result to better understand neighbourhood characteristics and socio-spatial patterns.









Using Raster Data Session

This session explores the expanding role of raster data in social science research, focusing on how satellite-derived imagery and elevation models are transforming our ability to analyse complex spatial phenomena. With the surge in availability of high-resolution Earth observation data, raster formats have become essential for understanding dynamic processes in both urban and rural environments. We will delve into the characteristics and uses of grayscale, multispectral, colour, and elevation rasters, illustrated through impactful real-world examples. These include the use of nighttime lights to estimate economic activity, multispectral satellite imagery for mapping poverty and inequality, and digital elevation models for disaster risk assessment and urban planning. By the end of the session, participants will appreciate how raster data—once primarily the domain of environmental sciences—is now a powerful asset for social science research, enabling insights into issues like climate vulnerability, urbanization, and socio-economic change, particularly in data-poor regions.

Sentiment Analysis Session

This session will introduce sentiment analysis. It will offer practical training in the use of natural language processing techniques to quantitatively identify and analyse emotions, opinions and attitudes hidden in large text datasets. We will cover from traditional dictionary-based algorithms to state-of-theart large language models (LLMs) to quantify sentiment and gain actionable insights.

Supervised Machine Learning Session

This session provides an introduction to machine learning, covering supervised, unsupervised, and semi-supervised approaches. The focus will be on supervised learning tasks, specifically classification and regression analysis. Participants will gain hands-on experience using real-world data with advanced algorithms and techniques for training, testing, and crossvalidation, as well as visualising and interpreting the results of the analysis.







Remote Sensing for Social Scientists Session

This session will introduce the use of (satellite) imagery in the context of social science, public health and policy making. We will demystify what is a fairly obscure type of data, explore its possibilities and limitations, and learn how to think about social science questions through an "imagery lens".

Network Analysis Session

This session introduces the key concepts and methods used to analyse spatial networks, with a particular focus on urban street systems. You will learn how to extract and work with real-world network data, exploring the structure and organisation of streets, intersections, and paths. The session covers how to calculate and interpret common network measures such as centrality and connectivity, and how these relate to accessibility within urban areas. You will also create visualisations that reveal spatial patterns and highlight the functional role of different parts of the network. By the end of the session, you will have practical experience in analysing spatial networks and a deeper understanding of how they influence movement and spatial interaction in cities.









Candidate Background and Requirements

Applicants should have some graduate training in quantitative geography or relative discipline (economics, computer science, engineering, etc.).

Basic working knowledge of Python or other appropriate coding languages is strongly recommended.

The Course material will be provided. Students are required to bring their laptop; PCs will not be provided.

Timeline

- 27 May Call for applications open
- 30 June Early Bird fee application deadline + payment*.
- 30 July Regular fee application deadline + payment*.
- 8-12 September Geographic Data Science School commences

* Provided that the candidate fits the school the requirements.

Fees

		EARLY BIRD	REGULAR FEE
In-person	Students	£550.00	£600.00
	Non-students	£650.00	£700.00
Online	Students	£450.00	£500.00
	Non-students	£550.00	£600.00

In-person fees include coffee-breaks, lunch breaks, social dinner.

Do you require an invitation letter for your visa?

If you require an invitation letter for your visa, please contact us at <u>GDSschool@liverpool.ac.uk</u>.

When contacting us, include the following details:

- (i) The attendee's full name;
- (ii) Passport number;
- (iii) Institution name and address, or any other information relevant to your visa letter.







IMPORTANT: Invitation letters are only issued to registered participants who have completed their conference registration (including payment). This invitation letter does not imply any financial support or commitment from the organisers.

The organisers cannot provide or sign EVE documents, guarantee letters, or other similar paperwork. Invitation letters are limited to details about the conference; they cannot be issued for accompanying individuals.

*Please note that registration fees are <u>non-refundable</u>, even if your visa application is denied.

About the GDSL

The Geographic Data Science School is brought to you by the Geographic Data Science Lab (GDSL). The Geographic Data Science Lab is a premier research centre working at the intersection of geography and data science. Multidisciplinary in nature, research in the lab spans across econometrics, spatial analysis and statistics, population science, machine learning, urban mobility, and computer science. The lab and its members are involved in doctoral training, public speaking series, open and accessible data and research; they engage in broader policy discussions with the community, contributing to academic and non-academic research-based best practices.







INSTRUCTORS

Carmen Cabrera

Carmen Cabrera is a Lecturer in Geographic Data Science. Her areas of expertise are geographic data science, human mobility, network analysis and mathematical modelling. Carmen's research focuses on developing quantitative frameworks to model and predict human mobility patterns across spatiotemporal scales and population groups, ranging from intraurban commutes to migratory movements. She is

particularly interested in establishing methodologies to facilitate the efficient and reliable use of new forms of digital trace data in the study of human movement.

Gabriele Filomena

Gabriele Filomena is a Lecturer in Geographic Data Science and Human Geography. Gabriele's research focuses on the cognition of urban and geographical spaces and its role in shaping people's interactions with urban environments. In particular, he develops agent-based simulations of urban mobility phenomena that incorporate cognitive dimensions inherent to travel behaviour, e.g., route choice behaviour, cognitive representations of urban space (cognitive maps), spatial learning, and social dynamics in wayfinding.

• Mark Green

Mark Green is Professor of Health Geography. Their research evaluates how new forms of data (e.g., loyalty card records, social media, geospatial datasets) can supplement traditional datasets (e.g., surveys, administrative data) to investigate the social and spatial drivers of health inequalities, as well as visualising and interpreting the results of the analysis.











Zi Ye

Zi Ye is a Lecturer in Geographic Information Sciences. She applies quantitative geospatial methods and theories to explore the compositional and contextual dimensions of socio-spatial structures and neighbourhood dynamics. Her research focuses on urban economics, retail location planning, and the transformative impacts of retail, tourism and transportation on urban landscapes.

Elisabetta Pietrostefani

Elisabetta Pietrostefani is a Lecturer in Geographic Data Science and the Deputy Lead of the Geographic Data Science Lab. Her research explores the use of new data sources (both imagery and digital trace) to better understand the impacts of disasters. By combining spatial data science with advanced survey methodologies, she investigates how urban populations' needs and priorities evolve in response to crises, aiming to inform more responsive and resilient urban planning.

Dani Arribas-Bel

Dani Arribas-Bel is interested in computers, cities, and data. He is Professor in Geographic Data Science at the University of Liverpool, and co-director of Imago, the Smart Data Research UK Imagery Data Service. His research combines modern computation with new forms of data to shed light on the spatial structure(s) of cities. Dani currently serves as co-editor of the journal "Environment and Planning B - Urban Analytics & City Science", where he co-founded the Urban Data/Code section.















Olga Gkountouna

Olga Gkountouna is a Lecturer of Geographic Data Science. Her expertise lies in the areas of data science, machine learning, and data privacy. Her research focuses on the application of machine learning/AI techniques on real-world data to model and predict traffic in urban mobility networks across various modes of transport. She also has a strong research background in the fields of data anonymization, privacypreserving data publishing, and time series analysis.

Francisco Rowe

Francisco Rowe is a Professor in Population Data Science, Lead of the Geographic Data Science Lab, and Co-Chair of the Mobile Phone Data Task Team at the UN Committee of Experts on Big Data and Data Science for Official Statistics (UN-CEBD). His research focuses on human mobility and migration; geographic data science; and spatial inequalities.

• Ron Mahabir

Ron Mahabir is a Lecturer in Urban Analytics. His research interests include spatial statistics, environmental modelling, and the application of machine learning and geocomputational methods to understand spatial patterns and processes. He focuses on developing reproducible and scalable approaches to analyse complex geospatial datasets, leveraging open data to investigate issues related to environmental change, urban dynamics, and sustainability. His work supports evidence-based policy by integrating advanced data science approaches with geographic thinking.















CITY OF LIVERPOOL

Liverpool is the United Kingdom's fifth-largest city, with a population of approximately 929,000 in the metropolitan area as of 2025. The city has transformed into a world-class travel destination, particularly since being named European Capital of Culture in 2008. Renowned for its welcoming character, Liverpool was ranked ninth among the friendliest cities in the UK by Condé Nast Traveller readers in 2024.

A walkable, accessible city

Liverpool's compact city centre is ideal for travellers. Major attractions, universities, train stations, hotels, shopping centres, cafes, bars, restaurants, and cultural sites are all within walking distance. A leisurely stroll from one end of the city centre to the other takes approximately 30 minutes. The revitalised waterfront and Royal Albert Dock, a central feature of the city, draw over five million visitors annually, offering picturesque views and a vibrant atmosphere.







Culture, music, and sporting excellence

Liverpool boasts the UK's largest collection of national museums and galleries outside London, including Tate Liverpool, Merseyside Maritime Museum, and The Beatles Story. As the birthplace of The Beatles, the city celebrates its musical heritage with tours and experiences highlighting iconic sites such as the former homes of John Lennon and Paul McCartney.

Liverpool's sporting reputation is equally impressive, being home to two Premier League football clubs: Liverpool FC and Everton FC. Liverpool FC were recently crowned Premier League champions, further strengthening their position as one of the most successful clubs in English football history.

With its lively arts scene, rich history, and diverse cultural offerings, Liverpool stands out as a top choice for visitors seeking an unforgettable travel experience in one of the UK's most dynamic cities.









Travel information

Liverpool is well-connected by air, rail, and road. Liverpool John Lennon Airport is located approximately 15 km (9 miles) from the city centre. Manchester Airport is about 35 miles away, with a typical driving time of around 55 minutes. Travelling to Liverpool by train is convenient, with frequent services arriving at Liverpool Lime Street station in the city centre. The journey from London Euston takes just over two hours on Avanti West Coast's direct services. Trains from Manchester to Liverpool can take as little as 35 minutes on the fastest services. Once in Liverpool, the Merseyrail network, with four stations in the city centre, offers excellent connections across the entire city region. The Liverpool City Region is also well-integrated with the UK's motorway network. For those arriving by coach, designated parking bays and pick-up/drop-off points are conveniently located throughout the city centre.

University of Liverpool

At the University of Liverpool, we're proud of our rich heritage, ambitious vision, and the diverse community that drives everything we do.

As one of the UK's leading research-intensive institutions, the University of Liverpool applies a forward-thinking approach to education, innovation and global impact.

University of Liverpool Campus Virtual Tour

Contact us

If you would like more information or if you have any queries, please contact us at GDSschool@liverpool.ac.uk







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