GeoAI in GIS: Unlocking AI-Powered Insights for Spatial Analysis

Exploring the Future of Geospatial Technology

Abstract

GeoAI is revolutionizing the way we analyze spatial data by integrating deep learning, machine learning, and automation into GIS workflows. This session delves into practical GeoAI workflows that leverage imagery, vector, and tabular data, showcasing real-world applications of AI-powered spatial analysis.

Over three hours, we will explore GIS as an AI-enabled system. We will demonstrate how deep learning can be applied to imagery analysis across multiple sources—including satellite, aerial, and drone imagery—enabling applications such as land use classification, object detection, and environmental monitoring. The focus will be on workflows, illustrating how AI-driven techniques can enhance land cover analysis, track landscape changes, and support environmental applications such as land quarry activity classification and agricultural field detection and monitoring. Additionally, we will introduce machine learning techniques for predictive modeling, spatial clustering, and AutoML to streamline complex analyses. The session will conclude with an exploration of AI Assistants in GIS and how they enhance spatial data exploration, enabling more intuitive interactions with geospatial data.

Join us to discover how cutting-edge GeoAI techniques are transforming GIS and how you can apply them to your own research.

Agenda

Part 1: GIS as an AI-Enabled System

- The rise of GeoAI: Why AI is transforming spatial analysis
- Overview of AI capabilities across the GIS ecosystem
- Key AI-powered tools & integrations (Deep Learning, Machine Learning, AutoML, Python/R)

Part 2: GeoAI Workflows – From Data to Insights

(a) Imagery & Raster Deep Learning

- AI-driven land cover analysis: From classification to change detection
- Deep learning models for remote sensing: pre-trained models, fine-tuning, and custom training
- Case study: Land quarry activity classification using aerial and satellite imagery
- Case study: Agricultural field detection and monitoring

(b) Vector & Tabular Data ML Workflows

- Predictive modeling in GIS: Regression, clustering, and spatial forecasting
- AutoML for geospatial workflows: Automating feature selection and model tuning
- Case study: Mapping environmental change using machine learning

Part 3: AI Assistants in GIS – The Future of GeoAI

- How AI Assistants are enhancing GIS workflows
- Exploring AI-powered text-to-map and predictive query capabilities
- Live demo & discussion: The future of AI integration in GIS

Format: This session is primarily a tutorial, not hands-on. However, there will be a take-away in the form of links to additional resources and tools.