
A 3-day detailed workshop plan on “**Geostatistics and Artificial Intelligence Applications in Mining Geology: Discovery to Production**”, tailored for professionals, researchers, and students in mining, geology, and data analytics.

Workshop Objectives

By the end of this workshop, participants will:

- Understand geostatistical principles for mineral exploration and ore body modeling.
- Learn how AI and ML models enhance geological interpretation and resource estimation.
- Apply predictive analytics for grade control, production forecasting, and process optimization.
- Integrate AI tools with traditional mining datasets (drillholes, assays, block models, hyperspectral data).

Target Audience

- Geologists, Mining Engineers, Geometallurgists
- Data Scientists and AI Engineers in mining
- Research Scholars in Earth and Mining Sciences
- Exploration and Production Managers

Day 1: Fundamentals of Geostatistics in Mining

Theme: Data Foundations and Spatial Modeling

- *Session 1:* Introduction to Geostatistics and Mining Value Chain
- *Session 2:* Sampling, Data Cleaning, and Exploratory Data Analysis (EDA)
- *Session 3:* Variogram Modeling and Spatial Correlation
- *Session 4:* Kriging and Block Modeling for Ore Body Estimation
- *Hands-on:* Variogram modeling using Python (GeoStatsPy, PyKriging)
- *Case Study:* Ore grade interpolation using kriging

Day 2: Artificial Intelligence and Machine Learning for Geological Modeling

Theme: AI-Driven Discovery and Interpretation

- *Session 1:* Introduction to Machine Learning in Geoscience
- *Session 2:* Feature Engineering from Drillhole and Geochemical Data
- *Session 3:* Predictive Modeling (Random Forest, XGBoost, Neural Networks)
- *Session 4:* Integrating Remote Sensing, Hyperspectral, and Geophysical Data with AI
- *Hands-on:* Building a mineral prospectivity model using Python + Scikit-learn
- *Case Study:* Predicting mineralized zones using ML classification

Day 3: From Resource Modeling to Production Optimization

Theme: Digital Twins and AI in Mine Operations

- *Session 1:* AI in Resource Estimation and Reserve Classification
- *Session 2:* Real-time Data Analytics in Production and Grade Control
- *Session 3:* Process Optimization using Reinforcement Learning and Predictive Maintenance
- *Session 4:* Building a Digital Twin for Mine Production Monitoring
- *Hands-on:* AI workflow for production forecasting and anomaly detection
- *Capstone Project:*
Teams build a mini “AI-Driven Geological Model” integrating geostatistics + ML.

Tools & Software Used

- **Python Libraries:** GeoStatsPy, PyKrige, Scikit-learn, TensorFlow/PyTorch, Pandas, Matplotlib
 - **GIS & Mining Software:** QGIS / Leapfrog / Micromine (demonstrations)
 - **Data Sources:** Synthetic and public-domain geological datasets
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Expected Outcomes

Participants will:

- Gain practical experience in using AI for geological and production data.
- Understand workflows linking exploration → modeling → production optimization.
- Receive a digital certificate and a sample AI-Geostatistics project portfolio.

A 3-day detailed workshop plan on “**Geostatistics and Artificial Intelligence Applications in Geometallurgy**”, designed for professionals, researchers, and students working in mining, mineral processing, and data science.

Objectives

By the end of the workshop, participants will:

- Understand fundamental and advanced geostatistical methods for ore body modeling.
 - Learn how AI and ML can enhance geometallurgical data interpretation and process optimization.
 - Gain hands-on experience with data-driven workflows for prediction and uncertainty quantification.
 - Develop skills to build predictive models for recovery, grade, and ore variability.
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Target Audience

- Mining engineers and geologists
- Metallurgists and process engineers
- Data scientists in the mining sector
- Researchers and postgraduate students

Instructor: Mr Suresh Tripathi is a founder of Geosun Pty Ltd an Australian company registered in year 2000 to provide AI corporate training, data center solutions and data pipeline end-to-end cloud platform. He has nearly 25+ years of work experience in digital data analytics integrated with AI and tech platforms. His education qualifications include master degree in Statistics from India, master degree in Geostatistics from Australia and master degree in Geoscience from Australia. He completed his AI certificate courses from Stanford Business School from California and High Impact Leadership from Cambridge University, UK. He has worked in Australia and US focusing his career on data strategy, tech platforms, and developing in-house training. He has worked with range of industries in Australia and US that include Deloitte, Flybuys, Ambulance Victoria, CFA (Emergencies Services), Avexa, Covance, Avance Clinical (Pharmaceuticals), Intelligen, Commonwealth Bank, Hackett Group (US), Health and Safety Sphera Solutions(US), Vic Government (Environment, water and energy), Waste Management (US), Outfront Media (US), Adani Mining (Australia) and Fura Gems Industries (Dubai).

Fee: Rs 50,000 per participant plus GST payable to GeosunAI Tech Cloud Pvt Ltd. RTGS/Cheque/ PhonePe via below link form.

Bank: Punjab National Bank

Account Name: NB, GeosunAI Tech Cloud Pvt Ltd

Account No.: 1228102100001295