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MATHEMATICAL GEOSCIENCES SPECIAL ISSUE

How are big data, AI and machine learning algorithms challenging geostatistical and Bayesian formalisms?

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This Special Issue of Mathematical Geosciences is dedicated to how artificial intelligence (AI) and machine learning (ML) could be leveraged within a geostatistical framework. By using AI and ML techniques in a way that honor the geostatistical formalism, researchers and professionals can harness the power of data-driven methodologies to gain deeper insights into spatial patterns, make more accurate predictions, and improve decision-making in various geospatial applications. The issue will comprise follow-up papers and a transcription from the panel debate at IAMG23, the 22nd Annual Conference of the International Association for Mathematical Geosciences, held in Trondheim (Norway) on August 10th, 2023.

The debate explored the transformative impact of ML and AI on geostatistical practices. Reflecting on the developments in the 2 dozen years since IAMG 1999 in Trondheim, the panelists commented on opportunities and challenges of using AI and ML in a geostatistical context, and the role of geoscientists versus computer scientists in driving these advancements.

Discussions emphasized the historical integration of machine learning in geoscience, the significance of combining domain knowledge with mathematical algorithms, and the practical application of AI in geoscientific problem-solving, highlighting the need to quantify uncertainty through Bayesian approaches.

The aim of the Special Issue is to present a visionary perspective on quantifying uncertainty through collaborative advancements of integrating Machine Learning (ML) and AI into geostatistical practices through Bayesian methods, sensitivity analysis, ensemble techniques or simulations. While the main focus will on new research methods, good case studies showing added value of leveraging AI and ML approaches in the geosciences are also appreciated.

Timelines:

Full manuscripts should respect the journal's guidelines for authors and be submitted online using the Editorial Manager system.

- Paper submission before: **February 20th, 2024**
- Return of reviews to authors before: **April 23rd, 2024**
- Submission of final papers deadline: **June 23rd, 2024**
- Publication: Late 2024

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Submitted manuscripts must fully comply with the journal's Instructions for Authors in preparing manuscripts.

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