



Artificial Intelligence in Geosciences

Inaugural editorial

Welcome to the inaugural volume of Artificial Intelligence in Geosciences (AIIG), the first fully Open Access journal in the interdisciplinary area between the geosciences and artificial intelligence. This issue focuses on the applications of machine learning (ML) methods to earthquake detection, to surface seismic data interpretation, spatial prediction (or predictive modeling) in geosciences and ground motion.

Magrini et al., proposes a new ML algorithm to detect small, local earthquakes in areas characterized by sparsity of receivers. *Fouedjio* applies to an England's geochemical dataset a newly developed regression random forest approach. Deep variational autoencoders (VAE) are used by *Li et al.* to create synthetic seismic data and alleviate the problem of lacking labeled seismic data for supervised seismic facies analysis. *Zhou et al.* uses the mask propagation network (a multi-level convolutional neural network) to reconstruct fault instance segmentation on 3D seismic data. Finally, a data collection relating earthquake damage with seismic shaking was proposed by *Faenza et al.*, which can be used to recalibrate fragility curves as well as to train machine learning models.

Overall, the first issue reaches the goal of AIIG to serve as an international, interdisciplinary platform for sharing ideas and solutions related to artificial intelligence and their applications to geosciences. We aim to expand the range of topics covered in the next volumes to topics such as remote sensing, marine and planetary sciences, in particular counting on the increasing use of robots and smart sensors in geosciences.

Artificial intelligence (AI) is one of the fastest growing disciplines in information technology. Along with diversified data, AI-enabled technologies such as image processing, smart sensors, and intelligent inversion, are being tested by researchers in a wide variety of geosciences domains, such as geology, rock physics, seismicity, hydrology, ecology, marine geosciences, planetary science, environment, remote sensing and GIS, and related areas. Many aspects of machine learning are reaching maturity, such as deep learning. Others are well established like regression, clustering and support vector machines. Sensors, robotics and other tools that need AI to function independently from human intervention are in their infancy. Geoscientists will have to increasingly adapt to changes. We can expect many great and interesting new discoveries to emerge from these two combined fields.

Our journal aims to cover all the topics of artificial intelligence (AI) in geosciences, from robotics and sensors applied to Earth sciences, to the vast range of machine learning algorithms and implementations used to

process Earth Sciences data. Another interesting field that we welcome is cloud computing and high-performance computing (HPC) in the context of big data processing. Overall, we want to attract geoscientists who are transitioning into the big data world, as well as data scientists who analyses geo-related data.

To achieve these aims of the journal, AIIG will publish rigorously peer reviewed scientific studies, technical findings, reviews, short communications, as well as perspectives on the theory and practice of artificial intelligence (AI) in geosciences within the following research areas, but are not limited to:

- AI-based decision support systems
 - AI-based precision geosciences
 - Smart sensors and the Internet of Things
 - Geosciences robotics and automation equipment
 - Geosciences knowledge-based systems
 - Computational intelligence in geosciences
 - AI in geosciences optimization management
 - Intelligent interfaces and human-machine interaction
 - Machine vision and image/signal processing
- Machine learning and pattern recognition
 - Neural networks, fuzzy systems, neuro-fuzzy systems
 - Systems modeling and analysis
 - Expert systems in geosciences
 - Big Data and Cloud Computing in Geosciences
 - Automatic navigation and self-driving technology

In addition, we also welcome suggestions and proposals for special issues.

We will work closely with our editorial board and publishers, researchers, scientists, engineers and practitioners. Our excellent board member of editors, who are experts in a variety of fields related to the different aspects of Earth Sciences as well as artificial intelligence, quickly review or find competent available volunteer reviewers to guarantee the quality of our published papers. We promote every single paper on social media—Facebook, Twitter, and so on. Papers that successfully pass through the peer review process will be promoted everywhere in the first two years.

We believe AIIG has the potential to rapidly grow into an internationally impactful journal which provides multiple values to the benefit of the research communities and society at large.

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