Contribution ID: **996** Type: **Poster Presentation**

A Novel Approach for Advancing Lithology Classification Through Machine Learning and Deep Learning Models

Tuesday, 14 May 2024 09:25 (1h 30m)

Manual interpretation of geophysical logging data can be a tedious and time consuming task in the case of the non-linear behavior of well-logging signals. In this study, we introduced three novel algorithms including GrowNet, Deep-Insight and blender in the classification of rock facies. To compare the performance of these models, we used algorithms such as XGBoost, Random Forest and Support Vector Machine. The data employed is from the South and North Viking Graben, comprising twelve lithological rock facies. Deep-insight was used to convert tabular data into images and these generated images were employed as inputs for a convolutional neural network. It demonstrated better performance in lithology classification compared to traditional models such as Decision Tree and Logistic Regression. The GrowNet and blender models for lithology classification successfully increased the penalty score and accuracy compared to the FORCE2020 competition. This study highlights the value of a hybrid approach, integrating the SMOTE and NearMiss algorithms in order to balance the data. Addressing missing data is crucial for dependable analysis; employing regression models, rather than simplistic techniques such as mean imputation, enhances accuracy. Additionally, knowledge-based feature augmentation techniques are selectively applied based on the availability of relevant features, thereby enhancing the effectiveness of the overall model learning process. To more efficiently evaluate and compare the performance of the models in a multi-class classification, we introduced the class prediction error plot instead of using confusion matrix.

Acceptance of the Terms & Conditions

Click here to agree

Student Awards

I would like to submit this presentation into both awards

Country

Iran

Porous Media & Biology Focused Abstracts

References

Conference Proceedings

I am interested in having my paper published in the proceedings.

Primary authors: Dr HOSSEINI-NASAB, Seyed Mojtaba (School of Chemical, Oil and Gas Engineering); Mr MOUSSAVI, Seyed Hamid Reza (Iran University of Science & Technology, School of Chemical, Petroleum and Gas Engineering, Tehran, Iran)

Presenter: Dr HOSSEINI-NASAB, Seyed Mojtaba (School of Chemical, Oil and Gas Engineering)

Session Classification: Poster

Track Classification: (MS15) Machine Learning and Big Data in Porous Media