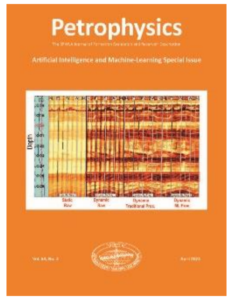


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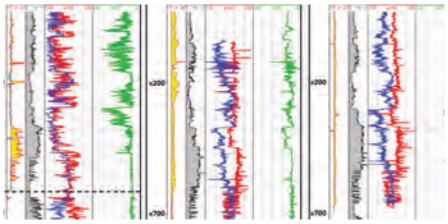
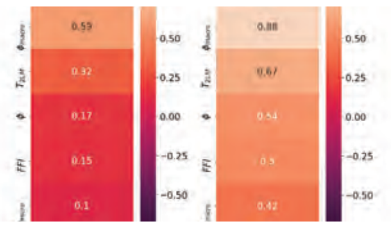
# APRIL 2023 PAPER SUMMARIES

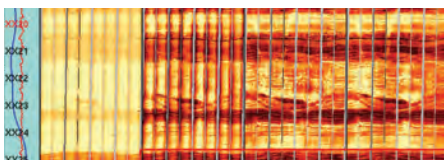


**Akkurt et al.**
This paper describes an unsupervised and automated machine-learning workflow encompassing quality-control, outlier detection, and reconstruction (editing) of well logs. A unique feature of the workflow is the use of prediction intervals as a proxy for assessing uncertainty in the answers. Benchmarking of the machine-learning results against those from a team of petrophysicists shows that the workflow generates high-quality answers that compare favorably to those done manually by experts.

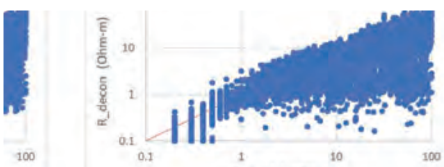


**Chen et al.**
A physics-guided symbolic regression method for petrophysical interpretation model development is described. Unlike most other machine-learning techniques that predict numerical numbers of a target parameter, symbolic regression method delivers a mathematical equation, which allows users to judge if the prediction makes physics sense. Examples are provided to illustrate the details of the model development workflow.

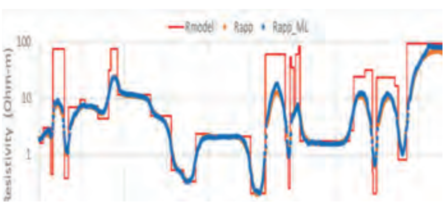
**Gonzalez et al.**
In this paper, high-resolution core images, well logs, and routine core analysis data are used for image-based rock classification and enhanced formation evaluation. Image-based rock classification is accomplished using supervised and unsupervised learning algorithms. Results suggests that feature selection and image resolution are critical for reliable rock classification and formation evaluation efforts.



**Guner et al.**
A supervised machine-learning method to remove artifacts and noise from borehole images is described. The proposed method has an advantage in reproducibility, is better suited to real-time implementation, and is more robust towards noise compared to traditional signal-processing based methods.



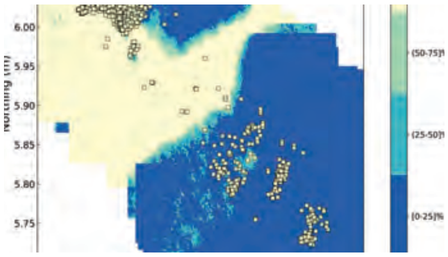

**Hagiwara 1**
We built a deconvolution model for induction log data using machine learning (ML). Unlike iterative forward modeling inversion methods, the deconvolution model is extremely fast. Unlike linear deconvolution models in the past, ML-based deconvolution finds accurate layer resistivity and layer boundaries.




**Hagiwara 2**
We built a convolution model using machine learning (ML) to calculate induction log responses for one-dimensional (1D) earth models. Compared to analytical forward modeling, the convolution model is extremely fast. ML-based convolution finds accurate induction tool responses from an earth model with layer resistivity and layer boundaries.

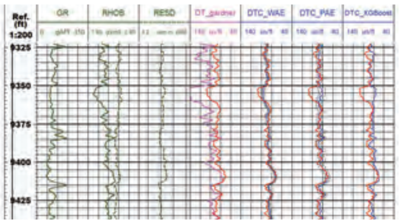

**Maldonado-Cruz et al.**
The authors propose a methodology that incorporates the uncertainty model goodness metric into the generation of precise and accurate uncertainty models for compressional and shear traveltime logs. Specifically, the authors use a gradient boosting algorithm based on decision trees in conjunction with the uncertainty model goodness metric to generate virtual ensembles for well-log imputation. The resulting uncertainty distributions are evaluated using diagnostic tools and metrics to assess their accuracy and precision.

# APRIL 2023 PAPER SUMMARIES



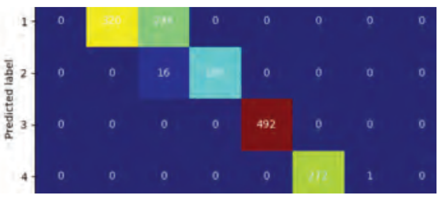

**Salazar et al.**

The proposed workflow presents a new approach that smoothly combines data analytics, geostatistics, and optimization techniques for analyzing 2D spatial data sets, addressing data paucity and spatial autocorrelation. The workflow reduces workforce time and subjective errors at all modeling steps while meeting the minimum acceptance criteria. Demonstrations on the Duvernay Formation in Canada show valuable insights to support decision making in data paucity with improved uncertainty analysis and plots.



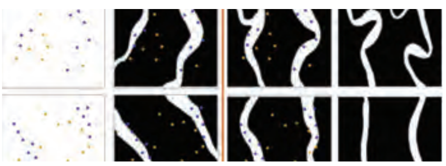

**Simoes et al.**

This study aims to compare the performance of multiple machine-learning (ML) methods when predicting one of the following curves: density, neutron porosity, and compressional slowness curves. The authors selected three promising ML models that can handle multiple missing inputs and that provide good-quality predictions in different scenarios of interest. The authors tested them in two field data sets and provided qualitative and quantitative comparisons.




**Sinnathamby et al.**

Sinnathamby et al. propose a new unsupervised clustering algorithm based on the concept of dynamic programming, in which the underlying physical processes and geological constraints can be directly integrated. The proposed algorithm is quite general and can be easily tailored to the task at hand, taking into account any prior knowledge of the physics of the underlying process.



**Wu et al.**

This paper presents an exemplar-guided sedimentary facies modeling method that can generate realistic, diverse, and flexible geological realizations. Two real river data sets are collected, and the effectiveness and generality of the proposed method are verified.