Abstract

The Application of Machine Learning Technology to Elastic Log Prediction & Earth Model Generation - A Deep Dive into the Underlying Computer Science

The presentation will commence with a brief introduction to Quantico and its Machine Learning heritage.

Two case studies will be presented that showcase the application of Machine Learning tools with specific relevance to practitioners of Quantitative Interpretation.

Case Study #1 will feature a Machine Learning workflow that ingests Gamma Ray (and Resistivity if available) and drilling dynamics data to simulate a full elastic log suite of compressional and shear sonics and density. Included will be insights into recently harnessed tools for automating key elements of the workflow, including MISO (multi-input, single-output) vs MIMO (multi-input, multi-output) models, BSIS (Backward stepwise Input Selection), and Ensemble Selection via Genetic Algorithm (GA) Optimization.

Case Study #2 will use a Machine Learning approach that integrates well logs and seismic data to generate high-resolution (typically 3m-7m) earth models that are populated with elastic, petrophysical, geomechanical and drilling properties. The presentation will include guidance (tips and tricks) on choice of NN architectures, activation functions, loss functions, back propagation training schemes, the use of hyperparameter optimization schemes to manage these choices and finally, the assessment of confidence in the final simulation.

Presenter Bio's

Gareth Taylor – Business Development

With more than 40-years' experience in the E&P service sector Gareth first entered the industry as a seismic data processing geophysicist with Digicon Geophysical in the UK. This was followed by several managerial roles with CogniSeis Development and the co-founding of Rock Solid Images in 1998. Gareth joined Quantico in 2019.

T. Altay Sansal – Senior Geophysicist

With a B.Sc. in Geophysical Engineering from Ankara University and an M.Sc. in Geophysics from the University of Houston, Altay has a strong technical background in both geophysics and data science. He gained significant QI project experience during his employment with Geotrace, Geokinetics and ultimately, SAExploration. Altay joined Quantico in 2019 and is responsible for QI project work and is a member of Quantico's Sprint team that drives the in-house development of Machine Learning tools.