

Geophysics for Data Scientists

Domain Experts and Data Scientists

In discussions at EAGE Digital conferences, it was emphasized that not only the Subject Matter Experts (SME's) had to become familiar with the terminology and methods used by the Data Scientists, but also the Data Scientists must understand what geology and geophysics is about. That doesn't mean they need to know the ins-and-outs of these subjects but at least know the terminology and the overall context for which they need to provide the Machine / Deep learning tools. Therefore, this course will be a first step in providing the necessary geophysical background.

The Course

As it is assumed that the Data Scientists are familiar with mathematics and statistics, the course will be based on geophysical topics. A general overview of seismic and non-seismic acquisition, processing and interpretation will be followed by various uses of Machine / Deep learning for Geophysical Applications. We will predict lithology and pore fluids as well as Facies along a well-bore to learn the Deep Learning workflows and algorithms needed in geophysics. Use will be made of open-source software: TensorFlow and Keras. Power-point presentations and videos will introduce various aspects, but the emphasis is on computer-based exercises. The exercises deal with pre-conditioning the datasets and applying several methods to classify / cluster the data: Multilayer Perceptron, Support Vector, Nearest Neighbour, AdaBoost, Trees. Non-linear Regression is used to predict porosity. Use will be made of Google Colab and Scikit-Learn. It runs on the Cloud and allows use of a GPU. It is "the way" to learn using a whole range of open-source Deep Learning algorithms for geophysical applications. The course consists of many exercises as I am a strong believer in the paradigm: Tell me and I will forget, show me and I might remember, involve me (through exercises) and I will truly learn.

Learning

At the end of the course participants will have a clear idea of what goes on in Geophysics and how Artificial Intelligence will impact the future of Geosciences. Interactive quizzes using "Mentimeter" are used to enhance the learning. The course can be adapted to comply with the needs of participants.

Intended Audience

Data Scientists who will be cooperating with geoscientists to develop AI methods for exploration and development of hydrocarbons or mineral resources. Also, application for geothermal and CO₂ storage are discussed.

Pre-requisites

A good understanding of mathematics, statistics and to some degree of physics.