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Machine Learning for Geoscience Applications

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Summary

With roots in Artificial Intelligence (AI), machine learning has evolved over several decades with contributions from various scientific disciplines. In the nineties, remarkable techniques such as probabilistic graphical models, kernel, boosting, and random forest methods emerged and since the mid-2000s, with availability of large datasets and improvements in computational power led to advances in neural network based methods with various deep learning architectures. The latter has resulted in some remarkable innovations in the recent years, and led to wide and visible successes for a spectrum of scientific and commercial applications. With these modern methods, it is now feasible to solve problems with significant underlying complexity; and that too with remarkable accuracy and flexibility. Oil and gas industry acquires large and complex datasets for exploration and field development purposes. However, these datasets are not being optimally used to extract useful information. We believe that with the recent advances in machine learning and computational power, advanced machine learning methods can be used to not only extract useful information from these complex datasets but also reduce the man power costs to process and makes sense of these datasets. Recognizing this potential, over the past several years, we have been actively researching and developing numerous modern machine-learning applications in various domains, including the geosciences. Through examples, our focus will be on the potential of machine learning to address complex geoscientific problems such as well log processing, interpretation, correlation and seismic interpretation.