

Machine learning model life cycle management

Nirupama Nagarajappa

Suncor Energy Inc

Summary

Machine learning (ML) models have unique requirements for maintenance compared to traditional models. The performance of these models degrades over time due to several reasons including change in data or concept drift. As a result, the models are retrained on new data.

Each ML model is built for purpose using customized features derived from specific datasets, that is best suited to solve a given problem. While most models are predictive models, prescriptive models have shown higher value across several domains such as driving customer behavior, optimizing production etc. However, prescriptive models can be more expensive to maintain.

Model maintenance complexity increases due to several reasons. The interpretation of model outcomes depends on the use, where certain output controls may be required to ensure feasible predictions. For models to continue to be useful, the model outcomes must meet a certain criterion either based on metrics such as precision, recall and percent error or a visual QC. Over time and based on the data, the criteria need to be modified. In the case where the current model is performing sub optimally, then it either needs to be retuned or alternate models need to be utilized. Also, to solve a given problem such as a particular noise attenuation, one might have the option to choose from a multitude of models. Furthermore, as the number of models (running into 100s of 1000s of models) and their variations increase, the maintenance challenges increase proportionately.

Performance monitoring and efficient delivery over the life cycle of the models are key to saving time and realize full value from ML models. In this presentation, I discuss methods to monitor performance and maintain the models efficiently, demonstrating with examples. The approach is applicable to a multitude of model types and is scalable across the processing value chain for geophysical data starting from acquisition to interpretation.