ADVANCING THE SEISMIC INTERPRETATION WORKFLOW WITH ML

Machine Learning (ML) technologies are advancing seismic interpretation workflows, providing benefits such as increased structural interpretation efficiency and accuracy. In this case, we demonstrate how these technologies can help us scan through large volumes of data and interpret faults at different scales and geological settings, and dynamically update the interpretations.

The approach (figure 1) we apply for ML based seismic interpretation is stepwise, and easy to apply on different data types to interpret a wide range of geological features such as faults, geobodies, or zones. One of the key advantages of this workflow is leveraging pre-trained models that have been exposed to diverse and numerous datasets (from the Gulf of Mexico to New Zealand) allowing to kick-start the workflow with automated object interpretation. Pre-trained models can also handle several types and qualities of datasets. Enhancing the quality of interpreted objects from pre-trained models is one of the most time-consuming parts of any seismic interpretation workflow since it demands human interaction and labelling. Our proposed approach includes several automated functionalities to accelerate the otherwise manual labelling or label QC task. The workflow enables users to carry out several iterations of training and QC to get the best interpretation results with the corresponding uncertainty. The last step of the workflow is to extract the interpreted geological features. In case of fault interpretation, the fault probability volumes (the output of the second step of the workflow - figure 1) are used to extract fault planes. The workflow allows the user to move from fault interpretation over the entire seismic volume to individual faults. The fault plane extraction step is fully automated and makes it possible to use fault geometric attributes (e.g., fault dip) in the extraction process.

These are fault surfaces that are ready to be imported as an input to the reservoir models and can be updated regularly as new data and concepts arise.

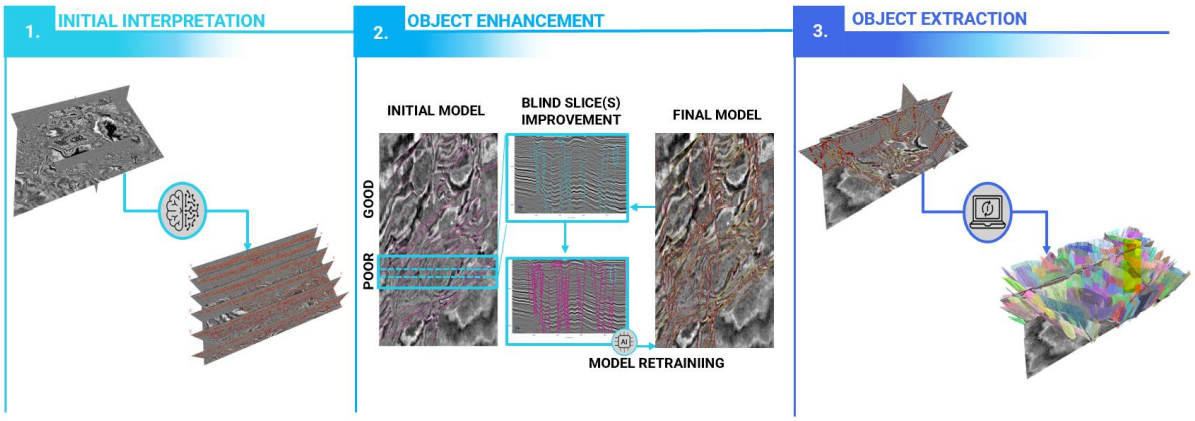

Figure 1: Automatic Seismic Interpretation workflow