

Deep learning for 3D fault detection within virtual reality visualization seismic volumes

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Summary

An important key for seismic structural interpretation and reservoir characterization is the delineating faults that are considered as seismic reflection discontinuities in conventional methods. Fault detection considers as a binary image segmentation problem of labeling a seismic image with ones on faults and zeros on nonfaults using a supervised fully convolutional neural network. The network will train by creating 3D synthetic seismic images and corresponding binary fault labeling images. The network learns to calculate features that are important for fault detection after training with a synthetic data set. We apply this method to the Australian data set, and the results indicate that the neural network can predict faults from 3D seismic images. Visualize effectively and analyze efficiently of 3D seismic data is challenging because of its large volumetric format and highly complex nature. 3D virtual reality (VR) visualization is an important link in seismic data processing and interpretation, and the development of 3d visualization software for seismic data is very necessary. In this paper, the seismic information extended reality analytics (SIERA) presents a visualizing seismic data in an extended reality environment as highly customizable 3D data visualizations, which provides an effective way to interact with seismic data and machine learning results better than conventional analytic tools.