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Fault surface tracing automation using computer vision algorithms

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Abstract. This article presents the results of adapting the U-net convolutional neural network to solving the problem of tracing fault surfaces on 3D seismic cubes. Fault mapping is one of the stages of interpretation of the results of using the seismic methods of field geophysical work. The interpretation results are used to build structural frameworks of geological models, plan field development strategies, assess the hydrodynamic connectivity of reservoirs, plan well locations, their number, etc. The developed neural network algorithm, which uses computer vision algorithms, can significantly increase the speed of faults detection and reduce risk of skipping faults in interpretation process. The problems of using a neural network trained on a synthetic data set for solving practical problems are also considered. Methods for increasing reliability of seismic interpretation are proposed. In particular, by calculating and subsequent processing with neural network an additional volume of the coherence attribute. As a result of the study, a positive conclusion on the applicability of convolutional neural networks for solving problems of tracing fault surfaces is given.

Keywords:

neural network, machine learning, computer vision, convolution neural network, automation, fault mapping, seismic interpretation

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