AUTOMATIC CHANNEL DETECTION USING DEEP LEARNING

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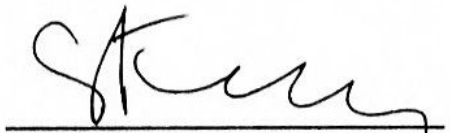
ABSTRACT

Picking 3D channel geobodies in seismic volumes is an important objective in seismic interpretation for hydrocarbon exploration. Manual detection of channel geobodies is a time-consuming and subjective process. The interpreter can calculate different seismic attributes such as coherence to aid for manual detection of channel geobodies in seismic volumes. However, these attributes still do not directly identify 3D channel geobodies.

Machine learning and deep learning are data-driven techniques that have been getting more attention recently in different application fields, such as medical imaging and computer vision. With large volumes of available data in different types and a development of powerful computational resources, geophysics is a promising field for applying machine learning and deep learning. Many seismic interpretation steps are analogous to different problems in computer vision that have been solved successfully using deep learning. Channel detection in seismic volumes is analogous to segmentation problems for images. Applying deep learning to seismic interpretations, specifically to automatic channel detection in 3D seismic volumes, can make the process faster and the workflow less subjective. Decision-making based on interpretations is uncertain; so uncertainties in interpretation results are very important. Deep learning with different algorithms can also help interpreters quantify this uncertainty.

I implement an encoder-decoder convolutional neural network for automatic channel geobodies detection in 3D seismic volumes. The outputs are a probability volume of channel and an uncertainty volume of model at every pixel of the 3D seismic volume.



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