DEEP CONVOLUTIONAL AUTOENCODERS FOR SEISMIC FACIES IDENTIFICATION

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ABSTRACT

One of the final tasks to complete when processing seismic data is to determine the stratigraphy present in the dataset and classify it appropriately. P wave Impedance and Vp/Vs models created following a partial stack inversion routine provide us with a convenient way to visualize the data as well as aiding in the non-trivial classification of facies . A Bayesian approach to facies classification was utilized in which facies were determined for the Marco Polo dataset from the Gulf of Mexico with inputs from the P Impedance and Vp/Vs inverted models. The resulting facies map was used in tandem with the P Impedance and Vp/Vs models to then develop a deep convolution autoencoder featuring dropout layers (DCAED). Machine learning methods have been used to successfully classify large facies or continuous facies boundaries in the sedimentary setting. Often, smaller features in input data are not well preserved in autoencoders so DCAED is tasked specifically at preserving said features. The facies map is altered in such a way that the desired targets, the oil sand unit and the brine sand unit, are given a value of one with all other facies being set to a value of zero. DCAED can take P Impedance and Vp/Vs models and output a probabilistic facies map to help aid in the task of classification as the network correlates trends in changing impedance and Vp/Vs to changes in the facies present.