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Abstract

Seismic processing workflows aim to reduce noise while maintaining structural resolution in order to improve the overall seismic data resolution. Current workflows tend to be hardware intensive and are slow to run. Therefore, leveraging IR4.0 technologies such as Convolutional Neural Network, CNN, models along with High-Performance Computing is needed to reduce turnaround time for seismic processing.

The massive size for seismic surveys and their need for high computational power are some of the factors that affect seismic processing throughput. In order to be able to increase the seismic processing throughput with seismic de-noising and resolution enhancement, this paper will showcase an innovative approach of utilizing CNN models to predict noisy and low resolution sections in seismic data. By taking such approach, the runtime will be instantaneous in comparison to the current methods of running seismic attributes, and both the de-noising and resolution enhancement performance will be improved significantly.

The CNN model approach for improving resolution in seismic sections is able to learn the low resolution and noise distributions for any input dataset. By learning those distributions, the CNN model avoids overfitting for a specific training dataset and will be generalized to work on various seismic sections. Pairing such generalized model with IR4.0 hardware technologies results in having a fast seismic image enhancement attribute that produce better results than current methods. The CNN based seismic attribute will allow geoscientists to produce seismic sections with reduced noise and improved resolution in fraction of the required runtime for current algorithms utilized in the industry.

Conventional ways of seismic noise attenuation and image enhancement require extremely powerful hardware in order to keep their runtime relatively low for acceptable seismic processing throughput. However, utilizing the latest advancements in IR4.0 technologies in the form of CNN-based seismic attribute produces better performance in terms of improved data resolution and runtime.