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Seismic attributes values comparison for different compression tolerances of VDS files

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Introduction

VDS files are part of their Volume Data Store (VDS) technology, designed specifically for handling seismic data in the oil and gas industry. These files are highly adaptable and scalable, enabling efficient storage, compression, and visualization of seismic datasets.

This technology compresses raw and processed seismic data, preserving signal quality while reducing storage requirements. This is particularly useful for large-scale datasets.

The format supports lossless and adaptive compression, allowing for efficient data streaming and random-access patterns. The objective of this work is to compare the values of seismic attributes in different tolerances of VDS files.

Method

For this case study, three applications were used: one for conversion from SEGY to VDS, a python script to read the VDS files, do the seismic attributes calculations and a BI and analytics platform to display the 2D, 3D views to compare the differences between seismic attributes of various VDS files with different compression tolerances.

The original SEGY file has 4,9 Gb of size. All VDS converted were done through a Wavelet Transform with an overall compression tolerance of 0.01, 1, 5, 10 and 100. With compression tolerance of 0.01, the file has 4.7 Gb; the tolerance 1 file has 2,3 Gb; the tolerance 5 one has 1,4 Gb; the tolerance 10 VDS has 1,1 Gb and the tolerance 100 VDS file has 216 MB.

Results and Conclusions

The first step was to determine an amplitude comparison between tolerances. The lower frequencies in all tolerances, but 100, presented similar values of amplitudes. The higher frequencies, however, presented higher deviations to what was expected in the original SEGY file.

For Attributes calculations, the seismic envelope, instantaneous phase, instantaneous frequency and RMS amplitude were compared and displayed different degrees of deviations, especially in lower frequencies.

Since the amplitudes in the VDS files displayed little divergence to the original SEGY values, the differences in attributes are tied to the lower frequencies. It would be possible to use a low-pass filter to treat the lower values, if the filtering can be used in the interpreter's workflow.

VDS are a reliable format to be applied to a variety of workflows, and in the attributes considered, it showed great qualitative comparison. But further treatment is required depending on the workflow intended