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Unsupervised seismic facies analysis using Time-Frequency attribute and self-organizing maps in southern Pars Oil Field

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Summery
Unsupervised seismic facies analysis provides an effective way to estimate reservoir properties by combining different seismic attributes through pattern recognition algorithms. In many cases important information is carried by singularities that are not necessarily associated to certain amplitude patterns. We use Hölder exponent as a seismic attribute which captures the locations and strengths of irregularities in the data. It is demonstrated that Hölder exponent is a natural attribute for delineating stratigraphy boundaries due to its excellent abilities in detecting detailed geologic features from seismic data. We use wavelet transforms and Hölder exponent to identify seismic trace singularities in each geologically oriented segment, and then we build the seismic facies map using the clustering ability of the SOM. We tested method using real seismic data from Southern Pars oil Field. The results confirm that we can estimate the appropriate number of seismic facies through the clustering of the SOM. We also showed that we can improve the seismic facies analysis by using trace singularities detected by the wavelet transform and Hölder exponent technique.

Key words
Seismic Facies Analysis; Time-Frequency Analysis; Hölder exponent; SOM