Application of the radial basis function neural network to the prediction of log properties from seismic attributes

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The use of the radial basis function neural network (RBFN) for the seismic-guided estimation of log properties was first discussed by Ronen et al. (1994). They applied the RBFN to averaged intervals from log data and the corresponding averaged intervals from the 3D seismic data volumes which were tied by these logs. In more recent work (Hampson et al, 2000), neural networks were used to predict log properties from the complete 3D seismic volume, using each log sample over the zone of interest in the training phase. In this latter approach, the generalized regression neural network (GRNN) was used for the prediction of log properties. In this paper, we extend the RBFN method to the computation of log properties from the full 3D seismic volume, and show the relationship between the RBFN and GRNN methods. Although both methods are based on the application of Gaussian weighting functions to distances measured in multiple seismic attribute space, they are quite distinct and can produce different results if care is not taken in the training procedure. We compare the methods using both model and real seismic datasets and discuss the strengths and weaknesses of each approach. We also discuss the relationship between these two distance-based methods and the better known multi-layer perceptron neural network (MLPN).

References

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