Title: A computational intelligence approach to solve the inverse problem of electrical DC resistivity sounding

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Abstract: Electrical methods have been widely used in geophysical surveying to obtain high-resolution information about subsurface conditions, since the last few decades. Resistivity is an important parameter in judging the ground properties, especially detecting buried objects of anomalous conductivity. Electrical DC (i.e. Direct Current) resistivity sounding is the commonly used technique to obtain the apparent 2-D resistivity of the region under investigation. Acquiring the true resistivity from collected data remains a complex task due to nonlinearity particularly due to contrasts distributed in the region. In this work, a radial basis function neural network (RBFNN) metamodelling approach is proposed to solve the 2-D resistivity inverse problem. The model was trained with synthetic data samples obtained for a homogeneous medium of 100O.m. The neural network was then tested on another set of synthetic data. The results show the ability of the proposed approach to estimate the true resistivity from the 2-D apparent resistivity sounding data with high correlation. The proposed technique, when executed, appears to be computationally-efficient, as it requires less processing time and produces less error than conventional method.