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COMPARISION OF NEUTRAL NETWORK WITH LINEAR REGRESSION IN PREDICTING SOIL SALINITY BY RS DATA

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ABSTRUCT
Surface soil EC can be proposed as a useful dynamic factor for soil agriculture. The studied area is located in east of Isfahan city between 32˚ 26′ 6″and 32˚ 43′ 13″northern latitudes and 51˚ 42′ 48″ and 52˚ 42′ 29″ eastern longitudes. The area is located at the lowest part of Zayandehrood basin that reach to Gavkhoonee playa.The ground water table varies from 1 to 10 meter in the region. Salinity has developed from natural causes such as topographic, climatic and hydrologic factors, as well as human activities, such as irrigation mismanagement. Playa of Gavkhooni occupy the lowest parts of the basin, have concave topography and are composed of clay and salt solutions. In this study, the predictive capabilities of artificial neural networks (ANNs) through multilayer perceptron (MLP) with Back-Propagation (BP) learning rule (Haykin, 1994) and feed-forward back-propagating ANN structure in comparison with Multiple Linear Regression (MLR) methods was used to develop EC of the soils (Kaul *et al*., 2005) from bands 1, 2, 3, 4, 5, 5, 6-1, 7, PC1, NDVI and P3/P4 of ETM^+ images of may 2002. The selected area of about 2000 ha was sampled most randomly in the bare lands and nonagricultural soils. 110 soil samples (0-10 cm) were collected on March and April 2009 and from them, 25 samples were set apart for evaluating of accuracy. Some soil chemical properties including EC were determined. The results showed that the ANN model was more feasible in predicting the soil EC than the MLR model. Coefficient of determination (R^2), root mean square error (RMSE), and mean estimation error (MEA) were determined for both two mentioned methods. R^2 was 0.22 for MLR, but about 0.75 for ANN model. In MLR analysis, the RMSE was 49.47 and in ANN it was 0.05. The magnitudes of MAE were 0.90 and .008 for MLR and ANN medels respectively. Furthermore, the ANN models was more accurate in predicting the soil EC as compared to the conventional regression model.
Keywords: ETM^+ data; MLR; ANNs; EC.

Haykin, S. (1994). Neural Networks: A Comprehensive Foundation. Macmillan, New York, NY.
Kaul, M.; Hill, R. & Walthall, C. (2005). Artificial neural networks for corn and soybean yield prediction. Agricultural Systems, 85, 1-18.