

## **Abstract**

Measurement of some important characteristics of the soil may be difficult or time-consuming and expensive. Therefore, researchers are looking for ways and relations that make estimate such soil properties (the easy index properties) from features that simply are obtained (the complex index properties). This study was done by artificial intelligence and aimed to estimate the exchangeable sodium percentage (ESP) using the easy index properties of soil. Sampling in 130 points of Mohammad Abad in Sistan was done in such a way to cover the different distributed characteristics of soil. In any selected point, a sample from zero to 30 cm depth of soil removed and transported to the laboratory. The samples were then air-dried and pulverized, from 2 mm sieve passed, followed by soil physical and chemical properties such as soil texture, pH, EC, cations amounts of calcium, magnesium, sodium, lime, carbonate, bicarbonate and organic matter in this section of the particle size were measured. For statistical analysis, SPSS software and software to create a neural network model (2011) MATLAB was used. Networks used in Neural Network Model, MLP network with various activities and functions that would be effective and appropriate number of neurons of the hidden layer is chosen by trial and error. The results indicate the low estimation of regression functions of ESP was using readily available soil properties ( $3.28 \geq \text{RMSE}$  and  $0.8 \leq R^2$ ). The results show that ability and performance regression model was better than the MLP networks, in the meantime, version 2 MLP with the number of inputs and control the number of neurons in the middle layer, and high performance capabilities ( $R^2=0.96$ ,  $\text{RMSE}=1.7$ ) showed. However, you can also MLP1 model to predict the recommended ESP ( $R^2=0.9$  and  $\text{RMSE}=2.2$ ) to obtain input parameters in the network because MLP2 need to spend more time and money, while measuring and access features of PH and EC soils as inputs in the model is easier MLP1.

**Keywords:** Soil salinity and sodicity, ESP, SAR, PTFs, Artificial Intelligence



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