



Correlation between Electrical Resistivity and Soil-Water Content based Artificial Intelligent Techniques

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By using a artificial intelligent approaches, the purpose of this study is to compare water content of soils obtained from electrical resistivity in order to better results from conventional techniques system. The input variables for this system are the electrical resistivity reading, the water content laboratory measurements. The output variable is water content of soils. In this study, 148 data sets are clustered into 120 training sets and 28 testing sets for constructing the fuzzy system and validating the ability of system prediction, respectively. Soil is a heterogeneous medium consisted of liquid, solid, and gaseous phases. The solid and liquid phases play an essential role in soil spontaneous electrical phenomena and in behavior of electrical fields, artificially created in soil. For our aim, study area is selected in Istanbul (Yesilkoy, Florya, Basinkoy) and Golcuk. In this area, it is measured the electrical resistivity by VES (Vertical Electrical Sounding) in many points of these locations by field resistivity equipment. For geotechnical purposes, on the soil samples from borings, it was applied soil mechanics laboratory procedures and is determined the soil water contents from these samples. Relationships between soil water content and electrical parameters were obtained by curvilinear models. The ranges of our samples are changed between 1-50 ohm.m (for resistivity) and 20-60 (% for water content). A artificial intelligent system (artificial neural networks, Fuzzy logic applications: Mamdani and Sugeno approaches) based on some comparisons about correlation between electrical resistivity and soil-water content, for Istanbul and Golcuk Soils in Turkey was constructed for identifying water content with electrical resistivity of soils.