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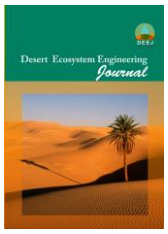

Comparison of Shannon Entropy Data Mining Techniques and Random Forest Algorithm to Preparing Underground Water Potential Map of Jahrom

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Extended Abstract

Introduction: Iran's plateau, especially in different regions of Iran, is composed of different climates, while in its southern areas summer temperatures reach 50 degrees above zero, the Caspian Mediterranean region is running wet weather. One of the most important indicators of climate difference is the issue of water. Today, water supply is one of the most important concerns to realize the goals of sustainable development and challenges are in most countries in the world (Zabihi et al., 2015). For this reason, the identification of areas with groundwater potential is one of the important tools for conservation, management and exploitation of groundwater resources (Zabihi et al., 2016). In an exploratory study, Mehran groundwater potential assessment was conducted with the entropy model and random forest log algorithm (Rahmati, et al. 2016).

Materials and Methods: Jahrom is one of the cities of Fars, located in the southern part of this province with an area of 5,768 km^2. The maximum and minimum altitudes of the study area are 3166 and 766, respectively. These altitudes are part of the Zagros folding, and for most of the mountains, they are located in the southern part of the Southern Zagros Mountains, and its branches are surrounded by the city. In the present study, 13 variables including geological layers, slope, tilt direction, elevation, distance from fault, fault density, distance from the waterway, water congestion, land use, topography humidity index Surface curvature, curvature of the waterways, slope length using the experiences of experts and researchers in the surveys have been used in the study area. At first, a digital elevation model with a spatial resolution of 10 meters from the mapping organization of the country was prepared and the slope, height and gradient layers were directly extracted from the ArcGIS software. The map of distance and density of the region fault was prepared using ArcGIS software using 1: 100000 Geological maps of Iran Geological Survey and Mining Exploration. Water dependent factors such as TWI were calculated directly from the digital elevation model in software (SAGA-GIS, ArcGIS) according to Equation 1 (Moore et al., 1991; Jafari et al., 2014). In the entropy model, variables with the maximum effect on the occurrence of an event are determined. (Bodarik et al., 2010; Constantin et al., 2011; Pourghasemi et al., 2012).

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Results: In order to evaluate the produced models, the relative recognition function curve (ROC) has been used (Pourghasemi et al., 2012; Porruthi et al., 2014). The ROC curve is a graphical representation of the equilibrium between the negative and positive error rates for any possible cutoffs (Pourghasemi et al., 2013). The relative performance index is a curve whose vertical and horizontal components are calculated from the comparison matrix with the definition of the threshold between zero and one. Shannon's entropy model shows that the AUC was 83.9%, which is better than classical forestry algorithm model, whose AUC is equal to 76.20%, and this level is very good.

Discussion and conclusion: Considering the experimental springs located in the potential springs of the spring, it reveals the fact that with the increase in the potential spring levels of the spring, there has been a significant increase in the density of springs in these areas, while experimental springs have not played a role in the modeling. Many of the pilot springs are located in a medium and high potential area, and springs located in an inappropriate and low potential class are insignificant (Zandi et al., 1394). Validation of the maps obtained by assessing the ROC for the zoning of groundwater potential susceptibility confirms that Shannon entropy model with a 0.839 percent estimation compared to the random forest log algorithm with an estimated 762 percent accuracy has a better accuracy.

Keywords: Groundwater, Shannon Entropy, Geographic Information System, Random forest.