

عنوان مقاله:

Use of artificial intelligence techniques to predict distribution of heavy metals in groundwater of Lakan lead-zinc mine in Iran

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خلاصه مقاله:

Determining the distribution of heavy metals in groundwater is important in developing appropriate management strategies at mine sites. In this paper, the application of artificial intelligence (AI) methods to data analysis, namely artificial neural network (ANN), hybrid ANN with biogeography-based optimization (ANN-BBO), and multi-output adaptive neural fuzzy inference system (MANFIS) to estimate the distribution of heavy metals in groundwater of Lakan lead-zinc mine is demonstrated. For this purpose, the contamination groundwater resources were determined using the existing groundwater quality monitoring data, and several models were trained and tested using the collected data to determine the optimum model that used three inputs and four outputs. A comparison between the predicted and measured data indicated that the MANFIS model had the most potential to estimate the distribution of heavy metals in groundwater with a high degree of accuracy and robustness.

کلمات کلیدی:

Groundwater, ANN, MANFIS, Heavy Metals, Biogeography-Based Optimization Algorithm

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