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Modeling and analysis of the groundwater hardness variations process using machine learning procedure

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ABSTRACT

This paper focuses on applying artificial neural network (ANN) models to predict total hardness from groundwater. The input parameters of the neural network are electrical conductivity (EC) and pH, which are considered fast, measurable water quality factors. ANN-based Levenberg–Marquardt (trainlm) training algorithm has demonstrated exceptional ability to predict all data; in parallel, the excellent prediction was displayed by a different test dataset with *R* of 0.986 and 0.98079, respectively. The mean square error and mean absolute error for all datasets were considered to be 0.0011 and 0.0265, respectively; besides, their values for the other test dataset were acquired 0.0008 and 0.0243. Sensitivity analysis represented that EC plays a catch-all role in ANN models with the relative importance of 71%, while in contrast with the less important for pH by 29%.

Keywords: Artificial neural network; Total hardness; Modeling; Water quality

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