

Estimating the un-sampled pH value via neighbouring points using multi-layer neural network - genetic algorithm

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ABSTRACT

This study shows a new method to estimate unsampled pH value by utilizing neighboring pH, which according to recent literature, has not been done yet. In investigating this method, three algorithms are used: Neural Network-Genetic Algorithm (MLNN-GA), MLNN with backpropagation (MLNN-BP), and averaging method. MLNNGA and MLNN-BP are inputted with four pH values from distant adjacent locations on a similar basin. MLNN-GA and MLNN-BP utilize GA and backpropagation respectively to update the weight. GA optimizer is used in MLNN-GA where the result of each learning weight will be the initial weight of the next learning process. All three methods are compared based on RMSE, MSE and MAPE. MLNN-GA yielded the lowest average RMSE =0.026265, average MSE =0.000886 and average MAPE =0.003985 compared to MLNN-BP (average RMSE =0.042644, average MSE =0.002648, average MAPE =0.006862) and averaging method (average RMSE =0.136629, average MSE = 0.026128, average MAPE =0.150400). Noticeably, estimating unsampled pH value utilizing neighboring pH by using MLNNGA shows a better performance than MLNN-BP and averaging method.

KEYWORDS

Fitness function; Genetic algorithm; Multi-layer neural network; pH estimation; Root mean square error

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