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Long-Term Water Quality Prediction Using Integrated Water Quality Indices and Advanced Deep Learning Models: A Case Study of Chaohu Lake, China, 2019–2022

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Abstract

The rapid development of urban industrialization has had many negative effects on the quality of water sources around cities. Long-term prediction of water quality can be of great help to the conservation of water environment. This case tries to use several popular deep learning models, such as RNN, LSTM, MLP, and Transformer-based models to predict the long-term integrated water quality index in the Chaohu Lake area. The dataset is derived from daily monitoring data from four monitoring sites within Chaohu Lake from 2019 to 2022, and the long-term prediction performance of the model is evaluated using MAE and MSE as evaluation metrics. The experimental results showed that all models selected in this case achieved good results within the study area, but Informer performed more prominently (MSE = 0.2455, MAE = 0.2449) as the length of the prediction series increased. Our results demonstrate the effectiveness of popular deep learning models in the field of WQI prediction, especially the significant advantage of transformer-based models represented by Informer in long-term water quality prediction, which will further provide an effective modern tool for water quality monitoring and management. © 2022 by the authors.

Author keywords

Chaohu Lake; deep learning algorithms; surface water quality; water quality index (WQI)

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