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USING PCA COMBINED SVM IN THE CLASSIFICATION OF EUTROPHICATION IN DEZ RESERVOIR (IRAN)

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Abstract

Eutrophication is water pollution initiated by high amounts of plant nutrients. With the excess influx of nutrients from human activities, the eutrophication process begins and causes a breeding ground for algae. The amount of nutrients present in any given cycle will be higher than the levels present in previous cycles. Therefore, it is very important to manage water quality in lakes and dams to prevent and to slow or to reverse the eutrophication process. This can be ensured by using effective and comprehensive tools for prediction and modeling of eutrophication in a water resource. In this study, Support Vector Machines (SVM) were first used for eutrophication classification in the third largest dam (Dez) in the world. The technique of Principal Component Analysis (PCA), as an input pre-processing method, was used to reduce the number of input variables in the model. The technique was found to be effective in reducing the number of input variables from 20 to 4 (TP, TN, DO, temperature). Subsequently, the model support vector machine classifier was developed using these four variables. The results showed the important role of preprocessing variables by PCA. An accuracy of 98% was achieved by the SVM classification method, which demonstrated the potential effect of eutrophication classification, and consequently showed its ability for pattern recognition of this phenomenon. Modeling with SVM technique can be attractive with high accuracy, especially for monitoring the quality of water in reservoirs. Additionally, the method can be used as a tool to develop new management approaches.

Keywords: data classification, Dez reservoir, eutrophication, modeling, principle component analysis, support vector machines

Received: July, 2014; Revised final: July, 2015; Accepted: September, 2015

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