The prediction of blue water footprint at Semambu water treatment plant by means of Artificial Neural Networks (ANN) and Support Vector Machine (SVM) models

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ABSTRACT

The prediction of the blue water footprint in water services such as in water treatment plants (WTPs) is non-trivial to water resource management. Currently, the sustainability of water resources is of great concern globally, particularly in addressing the 6th goal of the United Nation's Sustainable Development Goals (UN SDGs). This study focuses on the blue water footprint (WF_{blue}) assessment and prediction of WTP located at the Kuantan River Basin, Malaysia. The intake water of WTP is directly obtained from the mainstream river within the basin known as the Kuantan River. The predictability of the WF_{blue} was evaluated by means of Artificial Neural Networks (ANN) and Support Vector Machine (SVM). Different hyperparameters of both the ANN and SVM models were investigated to ascertain the best prediction models attainable by evaluating both the mean squared error (MSE) as well as the coefficient of determination, R. It was demonstrated from the study that the optimised ANN model is able to yield a better prediction performance in comparison to the optimised SVM model. Therefore, it could be concluded that the application of ANN to predict the future trend is pertinent and should be incorporated in water footprint studies as it is vital for water resources regulators to anticipate the condition of WF_{blue} in the future and to line up the appropriate actions especially in controlling the influencing parameters namely, water intake, rainfall and evaporation.

KEYWORDS

Blue water footprint; Artificial neural networks; Support vector machine; Hyperparameter optimization; Water resource management; Water footprint

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