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A neural network approach to online determination of total organic carbon in water resources

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In this study a modified ANN (artificial neural network) supporting instrumental analysis was implemented for the online detection and monitoring of TOC (total organic carbon) in water resources as a simple, fast and very cost effective method. Detection and monitoring of natural occurring TOC in water as the main source of DBPs (disinfection byproducts) is of especial importance for environmental regulators and drinking water suppliers [1]. In this way, neural net assisted spectrophotometry was chosen as a modified surrogate for TOC assessment in comparison with high cost TOC analyzers or the laborious wet chemistry standard method [2]. As an innovative method, a neural net model coupled with UV spectrophotometer was constructed, calibrated and verified to fulfill the requirements of the TOC assessment method proposal. Neural network training and calibration phases were performed using one year data set of chemical and hydrological data along with the corresponding UV data of a selected drinking water reservoir. Further model verification and adjustment were performed using equivalent data set of the following year. Results showed a minimum of 0.92 for r^2 of the adjusted model fitting curve versus observed data. Further analysis indicated that the proposed method was capable of the assessment of TOC with less than 5% of error in natural water resources using proposed ANN-UV.

References:

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