Abstract

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Low-cost in-situ sensors are use to monitor and manage quality of the water by taking regular measurements from different water-quality variables at high frequencies. The data generated by these sensors are prone to errors due to mis-calibration, bio-fouling, weakening battery charge or any other technical failures. We propose a novel statistical framework based on Generalised Additive Models (GAM), to detect anomalies in these water-quality variables. Proposed method involve building a GAM to the water-quality variable measured in downstream, using related lagged predictors from the upstream sensor. The lag time between sensors is estimated using cross-correlation methods. Residuals from the fitted model are then used to detect anomalies following Peak Over Threshold method based on Extreme Value Theory. We also show that utilising the information from the upstream sensor minimises the false negative rate than just using predictors from the same sensor location.