Pollution source positioning in a water supply network based on expensive optimization

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ABSTRACT

In recent years, several drinking water pollution accidents that severely affected social stability and security have occurred. A pollution accident can be effectively prevented by deploying sensors in urban water supply pipes to monitor water quality in real time. However, it is a challenge to back calculate a pollution source from information detected by a water quality sensor. In this paper, characteristics of pollution source positioning are analyzed in detail; pollution source positioning is converted into an expensive optimization problem to find a solution. Additionally, based on the characteristics of the water supply network, a Gaussian agent model is created for each node in the supply network. A Gaussian agent model-based expensive optimization algorithm is proposed to solve the pollution source positioning problem in a water supply network. To verify the effectiveness of the proposed method, data from a water supply network are used for a lab simulation; the predicted results prove the effectiveness and efficiency of the proposed algorithm.

Keywords: Pollution source; Positioning; Expensive optimization algorithm; Gaussian agent model; Water supply network; Simulation–optimization