# A decision support tool for technical processes optimization in drinking water treatment

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### ABSTRACT

In water treatment, the technical processes study aims generally to deal with problems that natural processes are unable or only inadequate to perform. The technical systems aim for a good control of process and therefore a good stability. This is the case of coagulation process in drinking water treatment by removing suspended particles. It requires a good knowledge of raw water characteristics to ensure adequate choice of the coagulant rate. Without the adequate coagulant, this method is not effective. The good coagulation control is therefore essential to guarantee the reliability of the water treatment and the final quality of water produced. This paper presents a neural approach in combination with a fuzzy methodology to study the impact of raw water characteristics on the coagulation process control. Using the concepts of evolutionary algorithms, we developed a decision support tool using fault detection, data validation-reconstruction, and predictive control methods to predict the optimum *coagulant dosage* to be used in a drinking water treatment plant. Simulation results using experimental data stemming from four treatment plants show the reliability of this system to optimize one of critical processes in drinking water treatment.

*Keywords:* Coagulation process; Artificial neural networks; Fuzzy logic; Fault detection; Data validation; Data reconstruction

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