# Supporting Information

# Successful prediction for coagulant dosage and effluent turbidity of coagulation process in drinking water treatment plant based on elman neural network and random forest models

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**Table. 1 Training Dataset Preview (first five rows)**

| Raw water turbidity (NTU) | OC (mg/L) | pH | Temperature (℃) | DO (mg/L) | Water flow ($m^3$/h) | Effluent turbidity (NTU) | Alum dosage (mg/L) |
|---|---|---|---|---|---|---|---|
| 31.13 | 2.40 | 7.67 | 12.29 | 9.73 | 2356.67 | 1.76 | 16.98 |
| 30.33 | 2.39 | 7.67 | 12.25 | 9.71 | 2337.78 | 1.75 | 17.14 |
| 29.84 | 2.38 | 7.67 | 12.24 | 9.68 | 2309.54 | 1.76 | 17.16 |
| 29.61 | 2.38 | 7.67 | 12.23 | 9.66 | 2285.42 | 1.77 | 17.15 |
| 29.40 | 2.39 | 7.68 | 12.50 | 9.68 | 2270.17 | 1.77 | 17.18 |

## Table. 2 Testing Dataset Preview (first five rows)

| Raw water turbidity (NTU) | OC (mg/L) | pH | Temperature (°C) | DO (mg/L) | Water flow ($m^3/h$) | Effluent turbidity (NTU) | Alum dosage (mg/L) |
|---|---|---|---|---|---|---|---|
| 46.00 | 3.31 | 7.77 | 16.43 | 8.40 | 1765.79 | 1.43 | 21.43 |
| 48.20 | 3.31 | 7.75 | 16.36 | 8.41 | 1775.31 | 1.44 | 21.54 |
| 52.63 | 3.32 | 7.72 | 15.94 | 8.56 | 1984.51 | 1.60 | 21.53 |
| 53.23 | 3.33 | 7.71 | 15.81 | 8.55 | 2027.72 | 1.56 | 21.52 |
| 55.15 | 3.35 | 7.71 | 15.72 | 8.52 | 2060.27 | 1.53 | 21.49 |

## Text. 1 Input characteristic description

DO, oxygen consumption (OC), pH, temperature, water flow, coagulant dosage, and influent turbidity were selected as water quality indicators for the prediction of effluent turbidity and coagulant dosage. These indicators are sufficient for the prediction of effluent turbidity and coagulant dosage. Among them, influent turbidity directly reflects the quality of raw water. The amount of DO in water is an indicator of the self-purification ability of the water body. The higher the DO, the more conducive to the purification of the water body. The temperature has a great influence on the microorganisms in the water. The higher the temperature, the easier it is for the microorganisms and algae in the water to grow. Meanwhile, high temperature also harms the saturated amount of dissolved oxygen in the water. Moreover, pH value can affect the removal effect of coagulant as well. In general, coagulants have the strongest turbidity removal ability under neutral conditions, followed by acidic conditions (Holt et al., 2002; Saritha et al., 2017). OC can indirectly reflect the degree of organic pollution of water, and it is a comprehensive index to evaluate the total amount of water pollution by organic matter. Besides, the amount of influent water and the turbidity are both proportional to coagulant dosage.

## Text. 2 Experimental environment

The development environment of all experiments is: windows 10, python 3.8.5. The main software packages that the python environment depends on include: tensorflow=2.3.0, scikit-learn=0.23.0.

**Fig. 1 Water treatment process with model predictive value.**

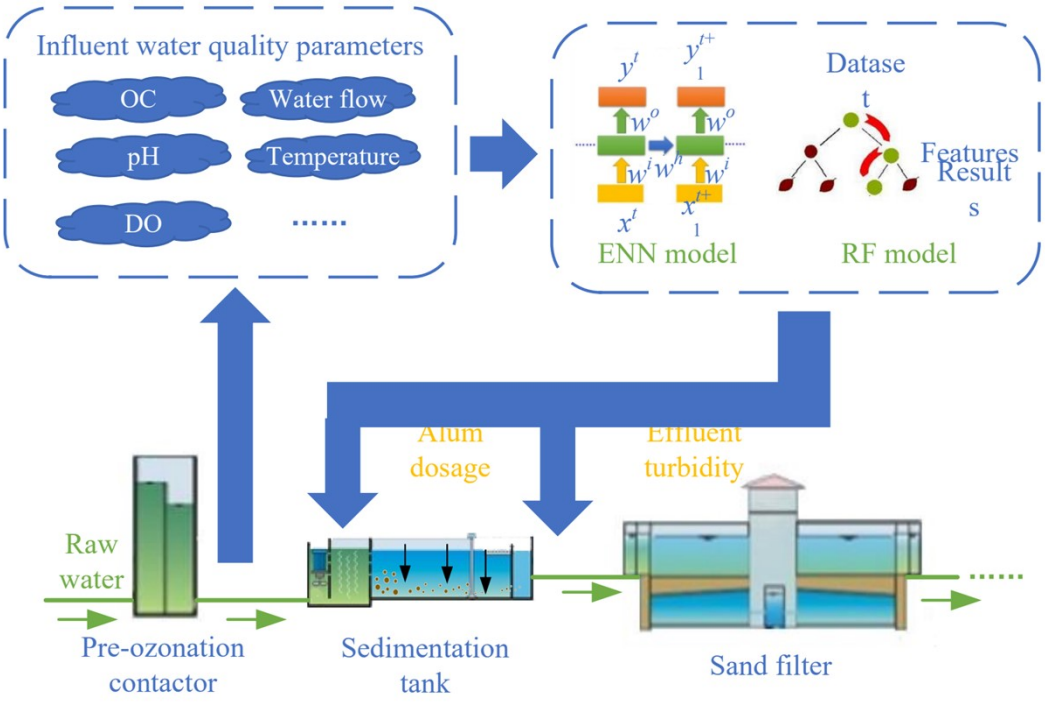


Fig. 1 Water treatment process with model predictive value.

## References

Holt PK, Barton GW, Wark M, Mitchell CA. A quantitative comparison between chemical dosing and electrocoagulation. Colloids and Surfaces A: Physicochemical and Engineering Aspects 2002; 211: 233-248.

Saritha V, Srinivas N, Srikanth Vuppala NV. Analysis and optimization of coagulation and flocculation process. Applied Water Science 2017; 7: 451-460.