

sensor development using novel multi-activation functions based ensemble echo state network

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In recent years, due to the continuous expansion of the scale of chemical industry, chemical industry data presents the characteristics of high dimensionality, large quantity, and strong nonlinearity, which greatly increases the difficulty of process modeling. Data-driven soft-sensing modeling methods have been widely used. Echo State Network, as a typical recurrent neural network, plays an important role in the field of time series prediction. However, the traditional Echo State Network (ESN) only uses a single kind of activation functions. Faced with strong coupling and high nonlinear influencing factors, the prediction performance of ESN will decrease. In order to solve the above problem, this paper proposes a variety of different activation functions into the Echo State Network to improve the ability to deal with complex process data. In the proposed method, three kinds of activation functions are utilized. In order to test the performance, High Density Polyethylene (HDPE) industrial process data is used. The simulation results show that the proposed method can achieve better performance in terms of accuracy than other models.