عنوان مقاله:

Prediction of particulate matter through meteorological parameter analysis using delayed artificial neural networks (D-ANN) along with chaotic particle swarm optimization algorithm

محل انتشار:

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خلاصه مقاله:

The forecasting process of meteorologically based time series of particulate matter consisting of complex linear and nonlinear patterns seems to be difficult and complex. Air quality forecasting has always been one study case of Artificial Neural Networks (ANNs). Given the potential convergence to a local minimum and over-fitting of this network, ANNs faces limited accuracy. On the other hand, nonlinear patterns are usually recognized through chaotic particle swarm optimization (CPSO) algorithm based on chaos searching algorithms. Therefore, in order to improve forecasting accuracy, a new model of ANNs with inserted delay (D- ANN) is introduced in which the network predictability increases through Elman neural network improving the stepwise training process. The proposed model trained through traditional algorithms (LevenbergeMarquardt (LM) and PSO) is then examined with the measured data of days and nights. As far as the accuracy of the model is concerned, the proposed model (Delayed ANNs) with or without PSO and CPSO provides the best results relative to traditional ANNs indicating that the newly-developed model can be used as an effective tool in improving the forecasting accuracy of particulate matter. As demonstrated by the results, this model proves better performance for fine particles than for coarse ones. Therefore, the proposed model is potentially ready for predicting particulate matter as well as air pollution in similar cases.

کلمات کلیدی:

Particulate matter, Delayed artificial neural networks, Chaotic particle swarm optimization