عنوان مقاله:

Implementation of multilayer perceptron (MLP) and radial basis function (RBF) neural networks to predict carbon and inorganic phosphorus recovery in hydrothermal carbonization

نویسنده:

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خلاصه مقاله:

Modeling of hydrothermal carbonization (HTC) of poultry litter to high-value materials was conducted in order to understand the process and predict the influence of process parameters on product properties. Artificial neural network (ANN) models used the reaction temperature and time as input datasets and the carbon and inorganic phosphorous recovery as output datasets. Multilayer perceptron (MLP) and radial basis function (RBF) neural networks was used in order to correlate the process parameters to the outputs. At the same time, a Radial-based functions approach with a single hidden layer, was selected as the best ANN. It was evaluated by comparing to five two-layer backpropagation training methods from the Multilayer Perceptron algorithms approach, trainlm, trainbr, trangda, trancgb and trainbfg .Finally, the prediction accuracy of MLP and RBF models are compared using two evaluation metrics: R۲ and MSE. This comparison showed that the RBF model has slightly higher prediction accuracy than the MLP model. The optimum number of neurons in the MLP method's second hidden layers, as well as the RBF method's single hidden layer, has been determined to be [۱۰ ۱۰] and ۲۰, respectively. At ۱۷ and ۳۰۰ epochs, the best MSE evaluation efficiency of MLP and RBF networks was estimated to be ۶.۱۵۵۹E-۲۳ and ۲.۷۵۸۹۶E-۳۰, respectively.

کلمات کلیدی:

Artificial neural network modeling, Multi-layer perceptron, Radial basis function, Hydrothermal carbonization, Hydrochar

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