

新能源与分布式发电

基于主成分分析与人工神经网络的风电功率预测

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摘要:

提出了主成分分析与前馈神经网络相结合的风电功率预测模型。采用主成分分析法对原始多维输入变量进行预处理, 选择输入变量的主成分作为神经网络的输入, 既减少了输入变量的维数, 又消除了各输入变量的相关性, 从而简化了网络的结构, 提高了网络收敛性和稳定性。仿真结果表明, 相对于一般神经网络模型, 基于主成分分析的神经网络模型预测精度更高、泛化性能更好。

关键词: 风电功率预测 主成分分析 前馈神经网络 泛化性能

Prediction of Wind Power Based on Principal Component Analysis and Artificial Neural Network

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Abstract:

A wind power prediction model based on integration of principal component analysis (PCA) with back-propagation (BP) neural network is proposed. The PCA is used to preprocess original multi-dimensional input variables and principal components of input variables are chosen as the input of BP neural network, by this way either the dimensions of input variables can be reduced or correlativity among input variables can be eliminated, thus both convergence and stability of neural network can be improved. Simulation results show that the accuracy of wind power prediction by the proposed PCA-BP model is better than that by common neural network models and the proposed model possesses better generalization performance.

Keywords: wind power prediction principal component analysis back-propagation (BP) neural network generalization performance

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