***SOFT COMPUTING PACKAGE REPORT***

***Topic:***

Sequential wavelet-ANN with embedded ANN-PSO hybrid electricity price forecasting model for Indian energy exchange

***Team Members:***

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***Abstract:***

This research paper presents a novel sequential

wavelet-artifificial neural network (ANN) with embedded

ANN-particle swarm optimization (PSO) for short-term

day-ahead forecasting of market clearing price (MCP) in

the Indian energy exchange. A precise price forecasting

helps suppliers to set up bidding strategies, make invest

ment decisions and be cautious against risks. Conversely,

consumers can use price forecasting to exploit appropriate

power purchasing strategies for maximum utility utiliza

tion. Here the most inflfluential historical data, namely

purchase bid and MCP, are considered for training the

feed-forward back-propagation neural network. The pro

posed model involves three sequential phases. Initially, the

raw historical data are smoothened by removing the high

frequency components using a wavelet transform method

which may enable better training of neural network. Then,

ANN is used to train historical patterns. More number of

trials is carried out, and the fifinal weights that give the least

training error are stored. In the fifinal phase, the stored

weights that are obtained from various trials are used as the

initial population for the embedded ANN-PSO model. Here

the performance of the proposed forecasting model is

carried out using three error indices, namely mean absolute

percentage error, normalized mean square error and error

variance.

***Keywords:***

Artifificial neural networks , Particle swarm

optimization , Wavelet transform , Mean absolute

percentage error

***DataSets Description:***

A typical market

snapshot of IEX can be obtained from http://www.iexindia.

com/marketdata/marketsnapshot.aspx. The most inflfluential

historical data [20], namely hourly Purchase Bid (MW) and

Market Clearing Price (INR), are taken from the website for

the proposed work. The historical data considered for per

formance analysis are taken for a time period from 4 January

2014 to 1 November 2014. The smoothing feature of the

Daubechies [9] wavelet of order 4 (db4) is used to remove

higher-frequency component.

***Performance Comparison Study:***

The following are the five types of ANN-based

forecast models used for the performance study.

(a) ANN

(b) ANN–ANN-PSO

(c) Wavelet-based ANN

(d) Wavelet-based ANN–ANN-PSO

(e) Wavelet-based ANN-PSO (random initialization)

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