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Short-term Wind Power Forecasting using K-Means Clustering with Bagging Neural Network

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1. **INTRODUCTION**

The development and utilization of renewable energy has been one of the hottest spots around the world. Wind power generation is rapidly expanding into a large-scale industry due to the cleanness and wide availability, and has been characterized as a fluctuating and intermittent power. An accurate and reliable wind power forecasting approach is essential for power quality, reliability management while reducing the cost of supplying spinning reserve.

1. **PROBLEM DEFINITION**

A wind power forecast corresponds to an estimate of the expected production of one or more wind turbines in the near future. In the electricity grid at any moment balance must be maintained between electricity consumption and generation - otherwise disturbances in power quality or supply may occur. Wind generation is a direct function of wind speed and, in contrast to conventional generation systems, is not easily [dispatchable](https://en.wikipedia.org/wiki/Dispatchable_generation" \o "Dispatchable generation). Fluctuations of wind generation thus receive a great amount of attention. 

1. **OBJECTIVE**

A data mining approach for wind power forecasting, which consists of the K-means clustering method and bagging neural network. The historical data are clustered according to the meteorological conditions and historical power. Pearson correlation coefficient is used to calculate the distance between the forecasting day and the clusters.

1. **SCOPE/IMPORTANCE OF PROJECT**

Wind power forecasting (WPF) is significant to guide the dispatching of grid and the production planning of wind farm effectively. The intermittency and volatility of wind leading to the diversity of the training samples have a major impact on the forecasting accuracy. As the balance between consumption and generation of power must be kept therefore fluctuations of wind generation is a very important field of study.

1. **METHODOLOGY**

To deal with the training samples dynamics and improve the forecasting accuracy, a data mining approach consisting of K-means clustering and bagging neural network is proposed for short-term WPF. Based on the similarity among historical days, K-means clustering is used to classify the samples into several categories, which contain the information of meteorological conditions and historical power data. In order to overcome the over fitting and instability problems of conventional networks, a bagging-based ensemble approach is integrated into the back propagation neural network.

**VII. REFERENCES**

http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7870674