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Applied Bayesian Regularized Artificial Neural Network for Up-Scaling Wind Speed Profile and Distribution

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Abstract : Maximize the benefit from the wind energy potential is the most interest of the wind power stakeholders. As a result, the wind tower size is radically increasing. Nevertheless, choosing an appropriate wind turbine for a selected site require an accurate estimate of vertical wind profile. It is also imperative from cost and maintenance strategy point of view. Then, installing tall towers or even more expensive devices such as LIDAR or SODAR raises the costs of a wind power project. Various models were developed coming within this framework. However, they suffer from complexity, generalization and lacks accuracy. In this work, we aim to investigate the ability of neural network trained using the Bayesian Regularization technique to estimate wind speed profile up to height of 100 m based on knowledge of wind speed lower heights. Results show that the proposed approach can achieve satisfactory predictions and proof the suitability of the proposed method for generating wind speed profile and probability distributions based on knowledge of wind speed at lower heights.

Keywords : bayesian regularization, neural network, wind shear, accuracy
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