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# Short term renewable energy forecasting based on feed Forward Back Propagation Neural Network strategy

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**Abstract: The fundamental inputs used as a renewable energy source are wind speed and solar radiation. Both parameters are very nonlinear and depending on their surroundings. As a result, reliable prediction of these characteristics is required for usage in a variety of agricultural, industrial, transportation, and environmental applications since they reduce greenhouse gas emissions and are environmentally benign. In this study, we used a Feed Forward Back Propagation Neural Network (FFBPN) technique to predict proper data such as temperature, relative moisture, sun radiations, rain, and wind speed. The FFBPN will be trained in such a way that it can conduct hybrid forecasting with little changes to the programming codes, ranging from hourly (short term forecasting) to daily forecasting (medium term forecasting). This feature is one of the significant improvements, showing the suggested hybrid renewable energy forecasting system's high robustness. Because the hybrid forecasting system is a unique approach, the system's accuracy will be determined by comparing the findings to the corresponding values of the persistent model, a stand-alone forecasting model. Finally, the completely created system package could be sold and/or used in future research initiatives to help researcher's analyses, validate, and illustrate their models across a variety of areas.**

**Keywords: Solar irradiance, wind speed, back propagation, forecasting**

## I. INTRODUCTION

Renewable energy sources such as wind and solar energy have been severely criticized as the energy problem worsens. According to statistics, global wind power generation reached 733 GW in 2020, an increase of 17.8% over 2019. Solar power generation worldwide reached 714 GW in 2020, up 21.6 percent from the previous year [1]. Wind and photovoltaic (PV) electricity generation are, in reality, both variable and intermittent. High levels of renewable energy penetration in power networks pose serious threats to the grid's security and economy [2]. As a result, under the concept of guaranteeing the power grid's economic and stable operation, we should strengthen the power grid's ability to penetrate more renewable energy.

On the one hand, energy storage devices such as concentrated solar power (CSP) with heat storage can be deployed on the grid to meet this requirement [3,4]. On the other hand, because to the complementarity and smoothness of wind and solar energy [5,6], combining different sources of renewable energy in the same region [7] is an effective way to increase renewable energy penetration. Nonetheless, CSP and bundled grid connection technologies cannot ensure renewable energy generation reliability.

More machine learning and artificial intelligence technologies have been applied in forecasting as computer processing speeds have improved. Machine learning methodologies, as compared to statistical and physical forecasting approaches, typically produce better outcomes [8–10]. As a result, in this paper, we employ a machine learning approach based on Feed Forward Back Propagation Neural Networks to forecast solar and wind power. The following objectives are motivated for this research work.

I. To reduce the issues and impact concerning distributed energy resources (wind energy and solar energy) and endorsing the optimal working of an energy system. This is achieved by the proposed novel and hybrid based forecasting models.