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Solar Power Forecasting using Deep Learning Hybrid CNN-RNN Technique

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Abstract: *Predicting the power production of large-scale renewable energy facilities, especially solar systems, shapes the future of clean energy. Accurate weather forecasts are crucial for solar power generation. We use the Genetic Algorithm (GA) to tune Convolutional Neural Network (CNN) hyper parametersto solve this problem and improve prediction accuracy. The GA's fitness function is determined by correlating hyper parameters and CNN performance and evaluation metrics. The GA optimizes hyper parameters for better forecasting across evaluation indices. We compare our findings with hybridized CNN-RNN, LSTM, and KNN-SVM forecasting algorithms without tuned hyper parameters to evaluate our strategy. GA-CNN outperforms all other methods. We use GA-CNN to add structural and data variety to our machine learning hybrid model to improve accuracy. We use the four ways and a comparable strategy to anticipate solar power for a given site. We test the method using a Jodhpur real-time series dataset. The validation dataset helps pick parameters, while the training dataset builds the prediction model. Performance measures including MAE, RMSE, MSE, and sMAPE are used to evaluate findings. Finally, using these performance indicators, we compare the results of the various alternative tactics with our proposed strategy. Our technique properly forecasts solar power generation, enabling more efficient and effective renewable energy use*

Keywords: Solar Power Forecasting, CNN, RNN, LSTM, SVM, KNN

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