IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 9, June 2025
Impact Factor: 7.67

Wind Energy Prediction Using Hybrid LSTM and CNN Approaches

Rakhi Biswas[1], Sunit Jana[2], Koushik Pal[3], Debasmita Basak[4], Disha Das[5], Anirban Ghosal[6]
Department of Electronics & Communication Engineering
Guru Nanak Institute of Technology, Kolkata, India[1-5]
JIS college of Engineering , Kolkata[6]

Abstract: *Maintaining grid stability and optimizing energy dispatch depend heavily on accurate wind energy forecasting. The complex temporal and spatial fluctuations present in wind patterns are frequently difficult to model using conventional statistical and stand-alone machine learning models. This work presents a new hybrid deep learning framework that combines Long Short-Term Memory (LSTM) networks for temporal dependency capture and Convolutional Neural Networks (CNN) for spatial feature extraction in a synergistic manner. By utilizing real-world wind power datasets, the suggested model outperforms traditional methods, such as CNN, standalone LSTM, and classical regressors, resulting in a significant decrease in both Mean Absolute Error (MAE) and Root Mean Square Error (RMSE). The outcomes highlight the framework's efficacy and scalability, providing a solid way to support the integration of renewable energy sources into contemporary power systems.*

Keywords: CNN, LSTM, Wind Energy, Renewable Energy, Hybrid Deep Learning, Time Series Forecasting, Smart Grid.

DOI: 10.48175/IJARSCT-28233