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Big data analytics and machine learning techniques to manage the smart grid

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M. Elavarasi ; Ramakrishna Kolikipogu ; Mahesh Kotha ; M. V. B. T. Santhi All Authors

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Abstract



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Abstract:

Big data is a crucial part of the Energy Internet. Integrating renewables and smart grids is vital and exciting. Any power plant must collect and evaluate data to make educated choices. This study examines big data analytics in renewable energy based power plants. This paradigm implements big data analytics for renewable energy utilities and smart grids. The authors describe a five-step machine-learning approach to predict smart grid dependability. Using 64,000 occurrences and 12 attributes from an intelligent grid data system, we expected the system's stability using three machine-learning algorithms. The penalized linear regression model achieves 95% accuracy using 70% of the training data. The random forest model is 84% accurate vs 77% for the decision tree. CNN and gradient-boosted decision tree models obtained 86% classification accuracy. This study's small dataset prevents extensive data analyses. Cloud computing and real-time event analysis are well-suited for a data analytics infrastructure. Future research should include data from additional countries and renewable energy sources.

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Smartphones, computers, enhanced measurement infrastructures, and human activities and conversations produce more data. Exabytes and zettabytes are used to quantify internet data. Rational, productive, and efficient data analysts benefit everyday lives and business. The acquired data are growing exponentially and getting more complex. Big data is a new problem and an opportunity for processing and analysing enormous volumes of data.

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