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| Title | REDf: a deep learning model for short-term load forecasting to facilitate renewable integration and attaining the SDGs 7, 9, and 13 | | |
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| Abstract |  |
| Integrating renewable energy sources into the power grid is becoming increasingly important as the world moves towards a more sustainable energy future in line with the United Nations (UN) Sustainable Development Goal (SDG) 7 (Affordable and Clean Energy). However, the intermittent nature of renewable energy sources can make it challenging to manage the power grid and ensure a stable supply of electricity, which is crucial for achieving SDG 9 (Industry, Innovation and Infrastructure). In this article, we propose a deep learning model for predicting energy demand in a smart power grid, which can improve the integration of renewable energy sources by providing accurate predictions of energy demand. Our approach aligns with SDG 13 (Climate Action) on climate action, enabling more efficient management of renewable energy resources. We use long short-term memory networks, well-suited for time series data, to capture complex patterns and dependencies in energy demand data. The proposed approach is evaluated using four historical short-term energy demand data datasets from different energy distribution companies, including American Electric Power, Commonwealth Edison, Dayton Power and Light, and Pennsylvania-New Jersey-Maryland Interconnection. The proposed model is compared with three other state-of-the-art forecasting algorithms: Facebook Prophet, support vector regression, and random forest regression. The experimental results show that the proposed REDf model can accurately predict energy demand with a mean absolute error of 1.4%, indicating its potential to enhance the stability and efficiency of the power grid and contribute to achieving SDGs 7, 9, and 13. The proposed model also has the potential to manage the integration of renewable energy sources effectively. | |