A Review on Neural Network Based Models for Short Term Solar Irradiance Forecasting

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Abstract: : The accuracy of solar energy forecasting is critical for power system planning, management, and operation in the global electric energy grid. Therefore, it is crucial to ensure a constant and sustainable power supply to consumers. However, existing statistical and machine learning algorithms are not reliable for forecasting due to the sporadic nature of solar energy data. Several factors influence the performance of solar irradiance, such as forecasting horizon, weather classification, and performance evaluation metrics. Therefore, we provide a review paper on deep learning-based solar irradiance forecasting models. These models include Long Short-Term Memory (LTSM), Gated Recurrent Unit (GRU), Recurrent Neural Network (RNN), Convolutional Neural Network (CNN), Generative Adversarial Networks (GAN), Attention Mechanism (AM), and other existing hybrid models. Based on our analysis, deep learning models perform better than conventional models in solar forecasting applications, especially in combination with some techniques that enhance the extraction of features. Furthermore, the use of data augmentation techniques to improve deep learning performance is useful, especially for deep networks. Thus, this paper is expected to provide a baseline analysis for future researchers to select the most appropriate approaches for photovoltaic power forecasting, wind power forecasting, and electricity consumption forecasting in the medium term and long term.