

EP001

Prediction of Solar Power Potential
in Singapore using Numerical
Weather Prediction Models and
Machine Learning

Abstract

Given the increasing application of solar energy, the prediction of the clean energy output is becoming more significant over the time. We can derive solar radiation forecast from Weather Research and Forecast (WRF) model and in this case, the clear-sky ratio (CSR), which reflects the ratio relationship between Diffuse Solar Radiation (SWDIF) and Direct Solar Radiation (SWDIR), is employed to classify the solar power potential into different levels. However, despite its high accuracy, WRF is highly time-consuming and requires a huge amount of prior knowledge to operate. In order to make accurate predictions with shorter periods of time, Machine Learning Algorithms are now playing an important role in the area. In this paper, based on solar radiation data generated by WRF for the period 1 Jan 2018 - 1 Jan 2019 at 62 different locations across Singapore, a few machine learning models based on various algorithms such as Support Vector Machine (SVM), Random Forest, k-nearest neighbours (KNN) together with the Time-series models are going to be built. They are going to be assessed regarding their performance in prediction, in order to find an alternative approach that can yield feasible predictions with less time taken compared with the WRF model.