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Solar Panel Efficiency Prediction Using Machine Learning

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Abstract

In a fast-paced world, we are always on the move to maintain a busy lifestyle in order to achieve our goals and objectives. As our living standards grow, so will our energy use. The need for energy began with the creation of electricity by coal and progressed to energy formation via oil and gas, which will further create new forms of energy. Existing energy sources are insufficient to meet this ever-increasing need for fuel. The Sun's thermonuclear activities produce heat and electromagnetic radiation, and only a small portion of this electromagnetic radiation reaches Earth, which is the primary source of energy. Because life on Earth is supported by the Sun, this energy is critical in every way. This solar energy has the ability to be transformed to electricity if it is caught by photovoltaic cells in a solar panel. This process is called solar power generation.

In this study, the proposed system would forecast solar power output in kilowatts in a user-selected solar panel system as well as the efficiency of generating solar electricity in a selected area for a selected time frame. The solution's core technique is machine learning, and both predictions will be done separately using two models. A gradient boosted regressor model will be used to forecast solar power generation. In addition, a Time series model will be utilized to estimate the efficiency of solar power output in a given year.

Keywords: Machine Learning, Timeseries Model, Regressor, Gradient Boosting, Artificial Neural Networks, Photovoltaic Cells, Sun Intensity

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