NARASARAOPETA ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

2023-2024

BATCH NUMBER	BB-8
TEAM MEMBERS	G.Karthik Reddy(20471A0580) K.Dhanush(20471A0591)
GUIDE	M.Mounika Naga Bhavani M. Tech.
TITLE	Solar Radiation Prediction Using Different Machine Learning
DOMAIN/TECHNOLOGY	MACHINE LEARNING
BASE PAPER LINK	https://www.frontiersin.org/articles/10.3389/feart.2021.596860/full
DATASET LINK	https://www.kaggle.com/datasets/dronio/SolarEnergy?select=SolarPrediction.csv
SOFTWARE REQUIREMENTS	Browser: Any latest browser like Chrome Operating System: Windows 7 Server or later Python (Numpy,Scipy,Pandas,OpenCV)
HARDWARE REQUIREMENTS	Processor: Intel® Dual Core 2.0GHz minimum Hard Disk: 1TB minimum RAM: 8GB or more

ABSTRACT	Solar radiation is the Earth's primary source of energy and has an important role in the surface radiation balance, hydrological cycles, vegetation photosynthesis, and weather and climate extremes. The accurate prediction of solar radiation is therefore very important in both the solar industry and climate research. We constructed 12 machine learning models to predict and compare daily and monthly values of solar radiation and a stacking model using the best of these algorithms were developed to predict solar radiation. The results show that meteorological factors (such as sunshine duration, land surface temperature, and visibility) are crucial in the machine learning models. Trend analysis between extreme land surface temperatures and the amount of solar radiation showed the importance of solar radiation in compound extreme climate events. The gradient boosting regression tree (GBRT), extreme gradient lifting (XGBoost), Gaussian process regression (GPR), and random forest models performed better (poor) prediction capabilities of daily and monthly solar radiation. The stacking model, which included the GBRT, XGBoost, GPR, and random forest models, performed better than the single models in the prediction of daily solar radiation but showed no advantage over the XGBoost model in the prediction of the monthly solar radiation. We conclude that the stacking model and the XGBoost model are the best models to predict solar radiation.