

Surface Albedo Predictions Using Random Forests

SenSIP Algorithms and Devices REU

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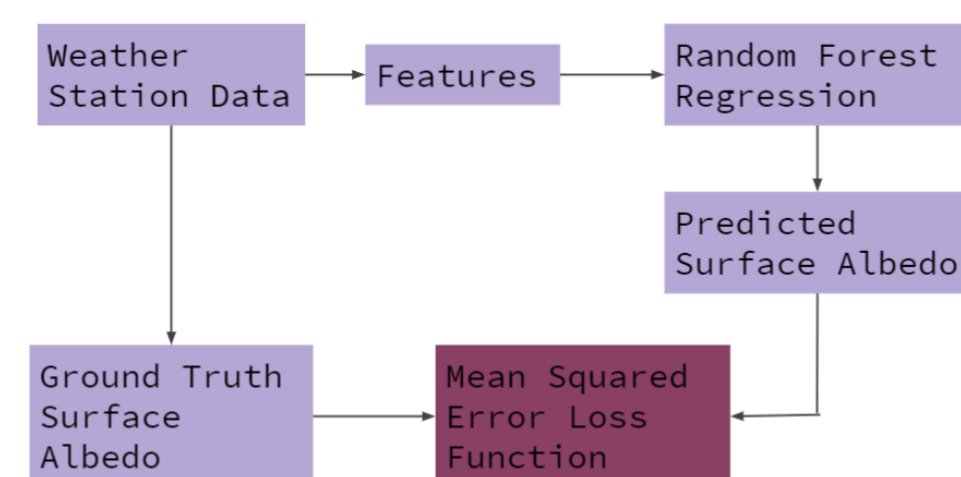


ABSTRACT

- Many environmental benefits to using photovoltaic (PV) systems
- Power output fluctuations make them difficult to implement in power grid
- Beneficial if we can change topology in response to predicted power output

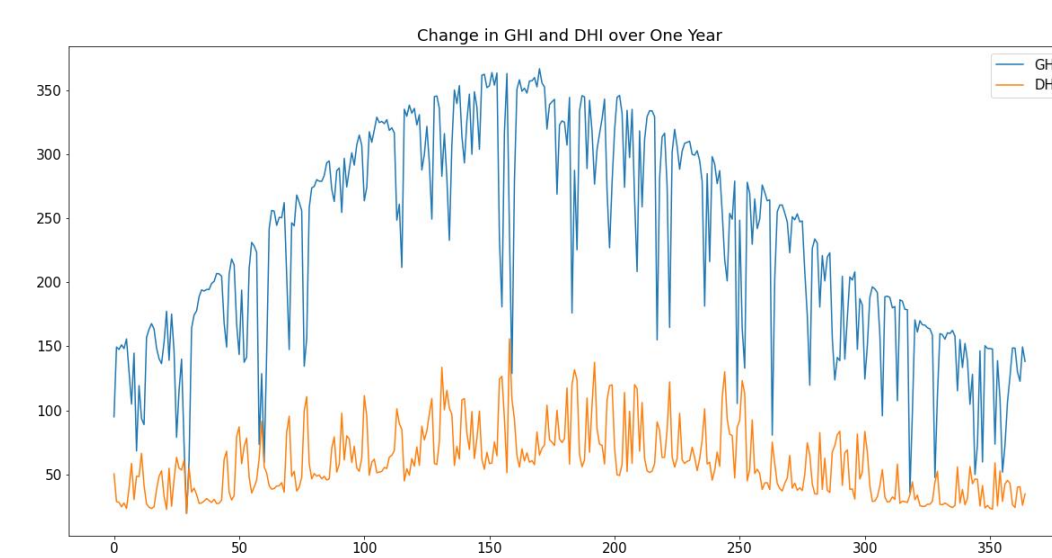
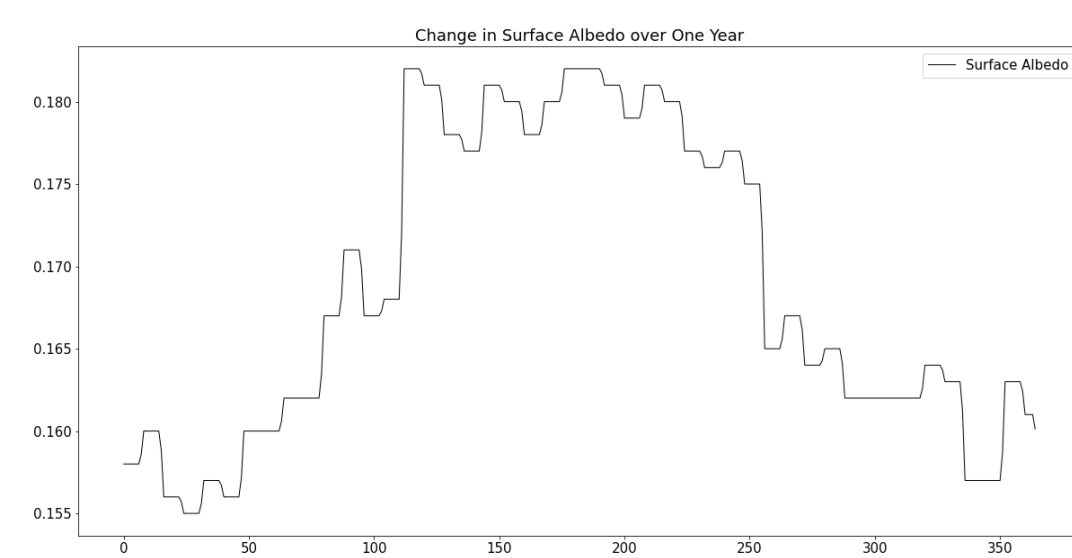
MOTIVATION

- Be able to control power output fluctuations in photovoltaic (PV) systems
- Use random forest regression to predict surface albedo
- Surface albedo used to predict power output



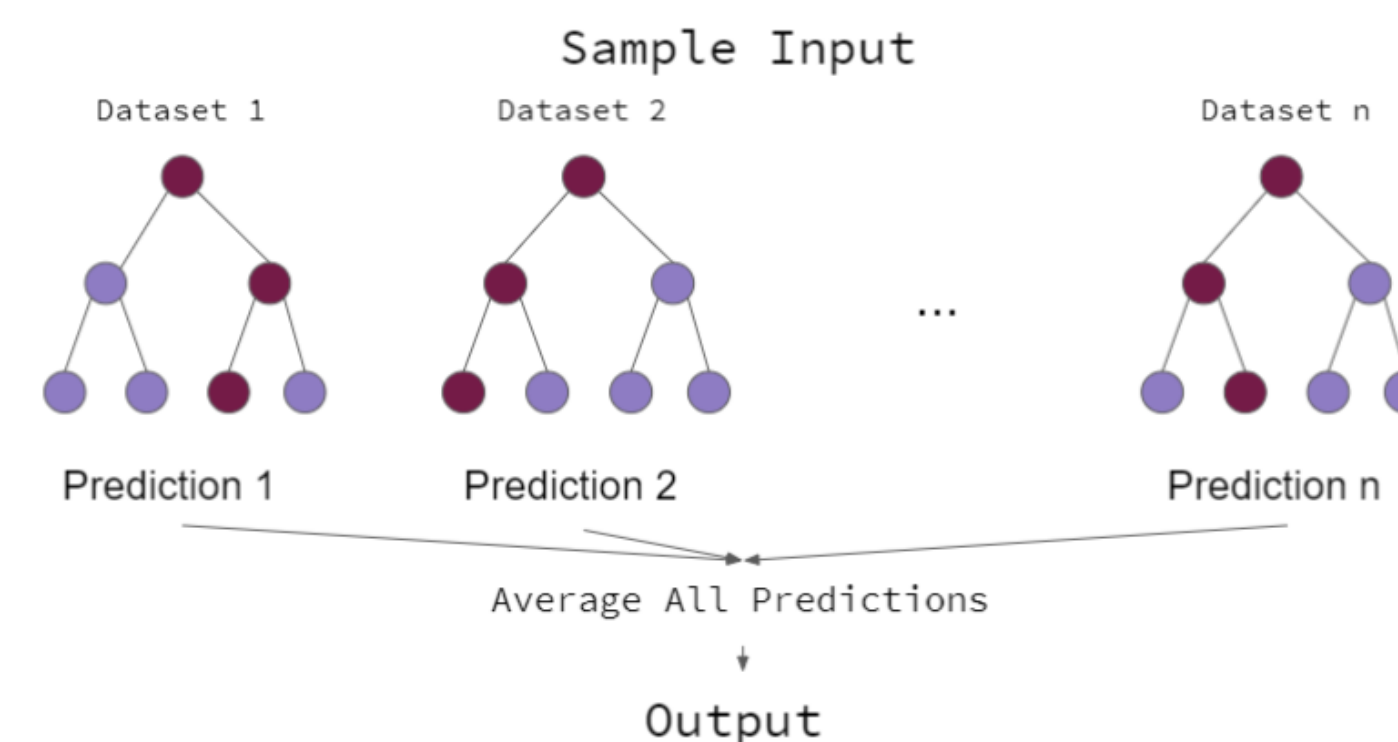
PROBLEM STATEMENT

- Predict surface albedo using the national solar research database (NSRDB) dataset
- What are goals achieved through the work?

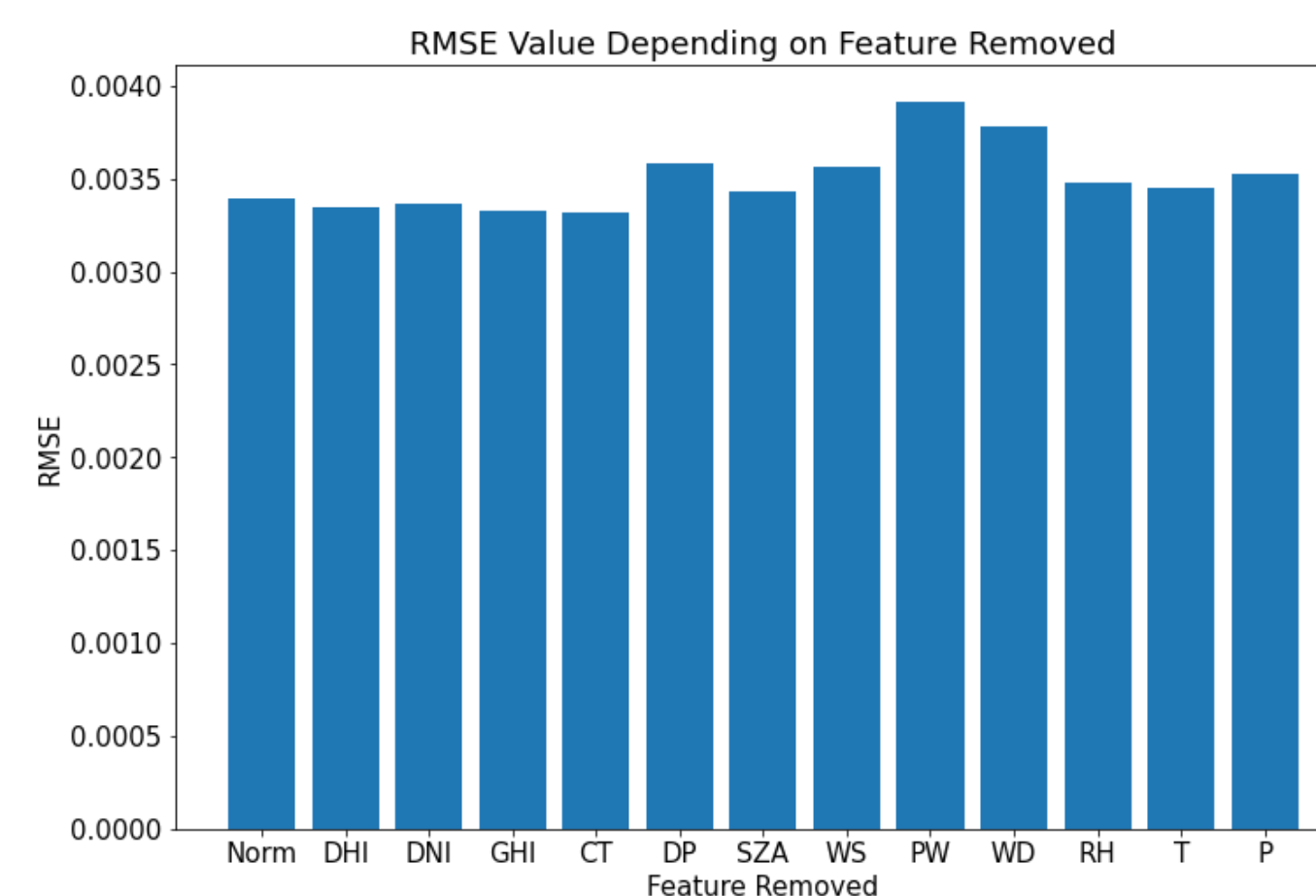


EXPERIMENTAL METHODS: SENSORS

- Data obtained from NSRDB dataset
- Preprocess data
- Use random forests to train the regressor
- Use hyperparameter tuning to optimize training the data

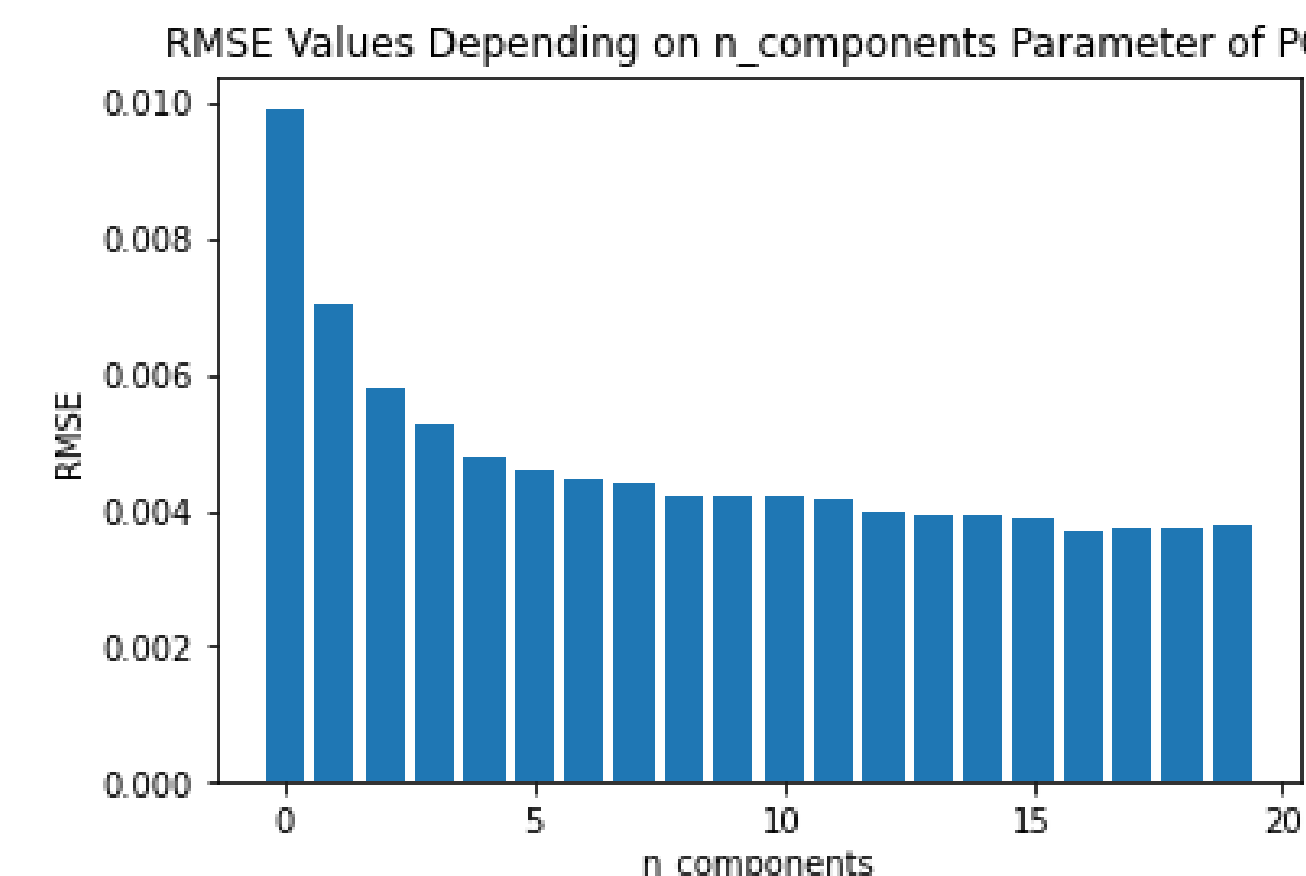
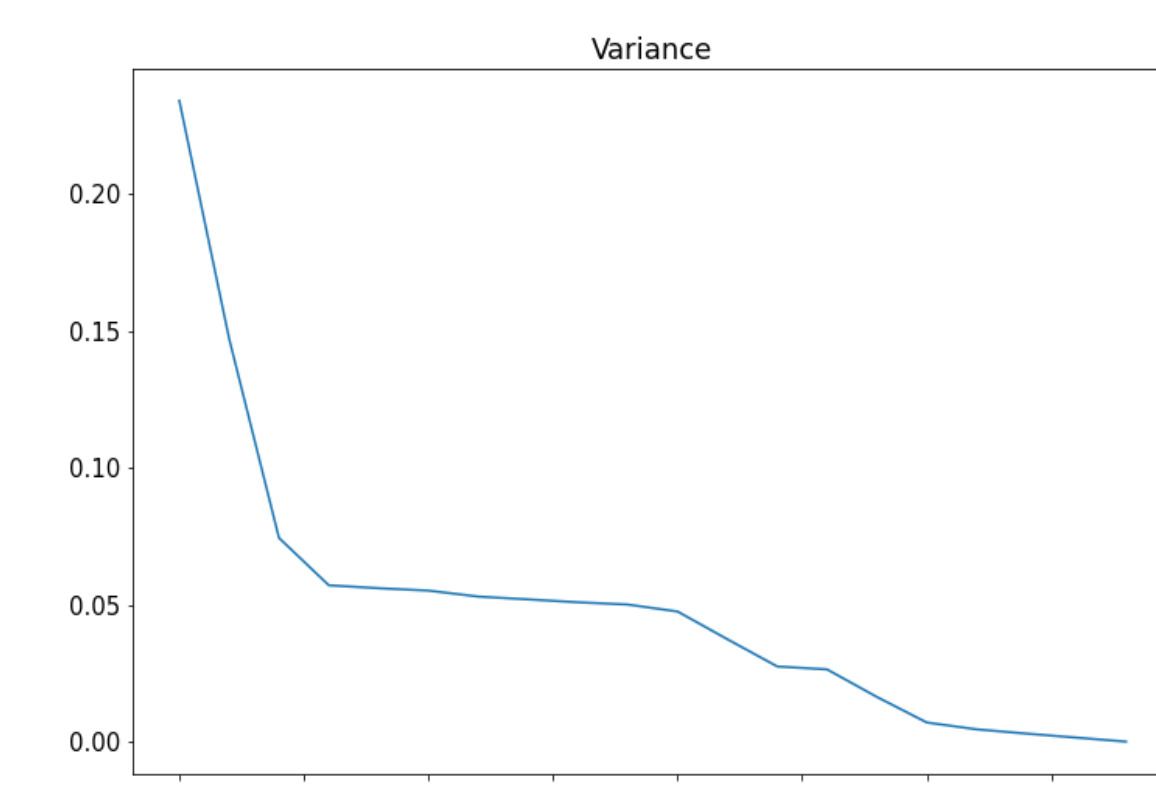


- Use hyperparameter tuning on criterion, max_depth, and max_features to minimize the root mean square error
- Manual feature ranking by removing individual features using parameters determined by hyperparameter tuning



PRELIMINARY RESULTS

- From PCA, determined 4 predictions were enough to make accurate predictions
- From feature ranking, determined those features to be: precipitable water, wind direction, dew point, and wind speed
- Lowest RMSE on test data: 0.0037



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ACKNOWLEDGEMENT

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