Surface Albedo Predictions Using Random Forests

Srinidhi Budhiraju, IRES Student, Arizona State University
Graduate Mentor: Sameeksha Katoch, Faculty Advisor: Andreas Spanias
SenSIP Center, School of ECEE, Arizona State University, University of Cyprus

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

REFERENCES


ACKNOWLEDGEMENT

This work is partly sponsored by NSF REU Grant 1854273 and ASU SenSIP Center