Ensemble Learning for Net-Load Forecasting Considering Spatio-Temporal Correlations

Our Team:
- The Renewable Power Grid (RPG) Lab at the University of Houston.
- Website: https://rpglab.github.io/
- Principal Investigator: Xingpeng Li, Assistant Professor, ECE Department.
- Nine current PhD students.

Research Focuses:
- Power system operations and optimization.
- Grid integration of renewable energy.
- Microgrid sizing and energy management.
- Load and variable renewables prediction.
- Applications of deep learning.

Proposed Method:
- Although a single deep learning (DL) method may provide decent prediction accuracy, it may not be very stable especially when outliers are present.
- We propose to develop an ensemble learning (EL) approach to stabilize the prediction accuracy and thus increase the algorithm robustness.
- Since the research problem is time-series net-load prediction over multiple sites, strong spatio-temporal correlations would exist and should be considered in the proposed EL method.
- Spatial correlations will be captured through convolutional neural network layers and/or graph neural network layers.
- Temporal correlations will be captured through long short-term memory layers and gated temporal convolution layers.
- Different DL models considering spatial correlations and/or temporal correlations will be combined to reduce the variance of net-load prediction.