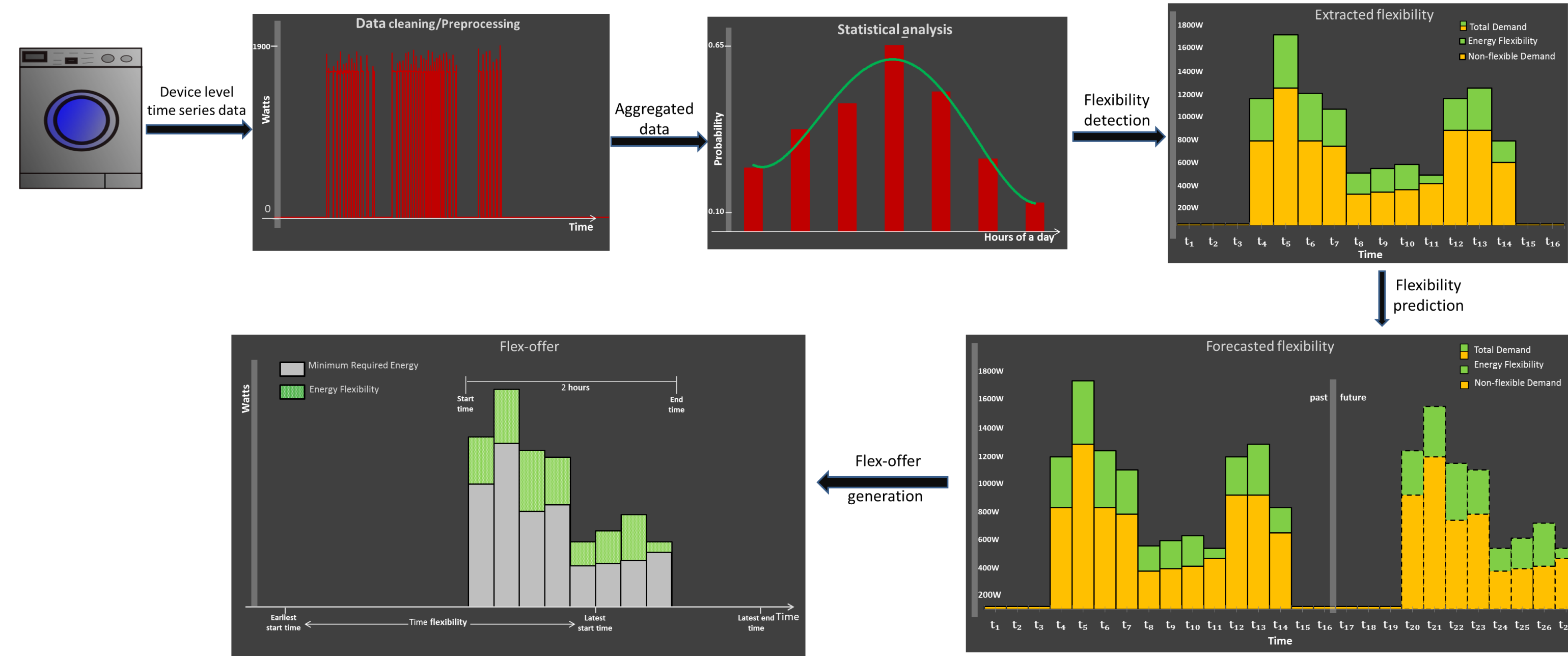


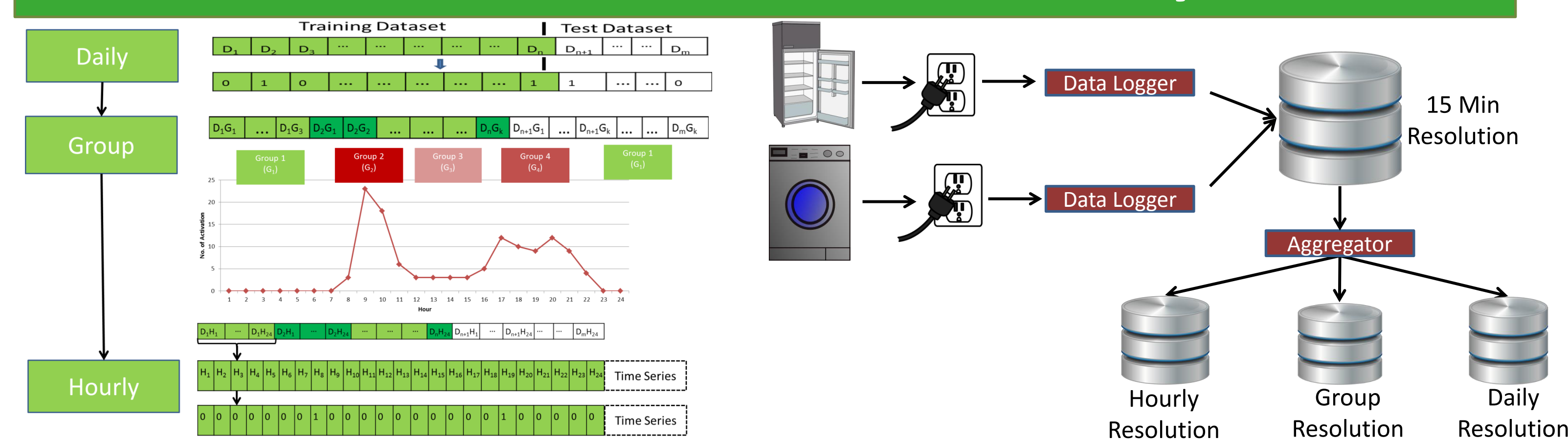
Device Level Demand Forecaster

A Flexibility market highly relies on the performance of the energy demand forecast model, to generate legitimate flex-offers. Any error in demand forecast results in invalid flex-offers and a market suffers a financial loss. However, most of the existing models are tailored made and tuned to specific dataset or forecast horizon. Therefore, a market player has to evaluate various forecast models to select the one with the best performance for each device/ device type.

Flexibility Detection and Flex-offer Generation

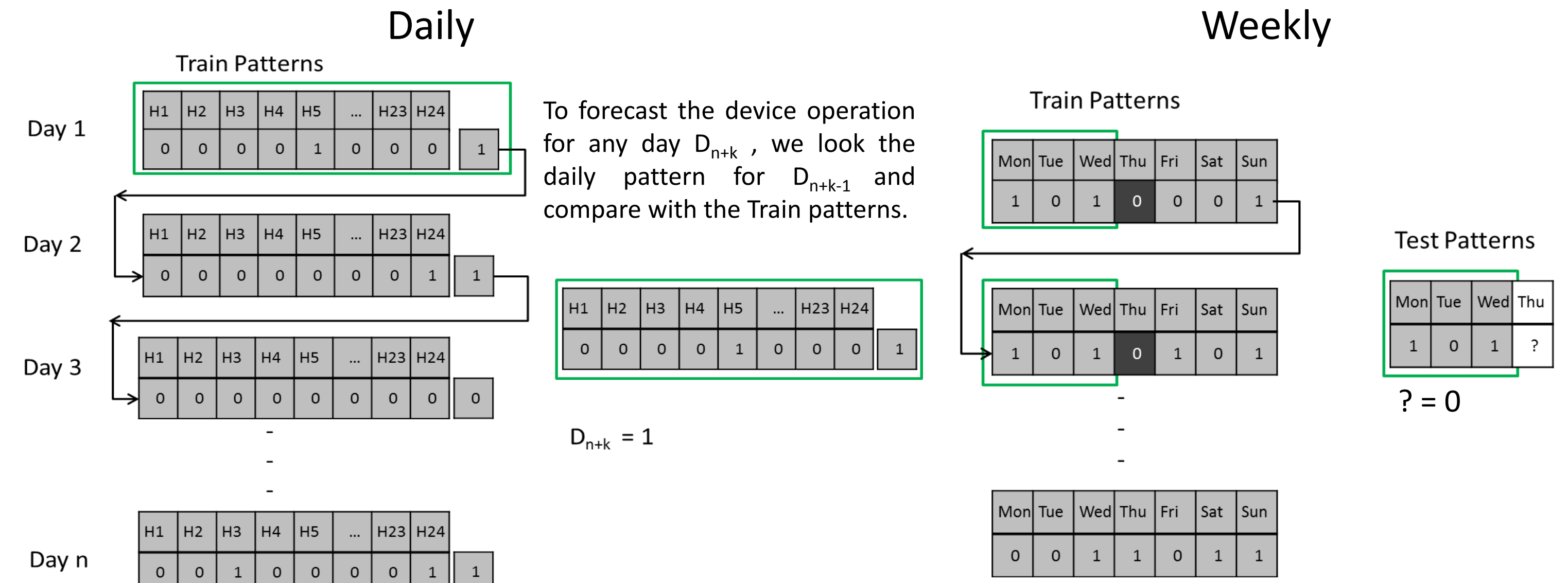


Forecast- and Data- Granularity



Forecast Models and Evaluation

Pattern Matching:



Logistic Regression :

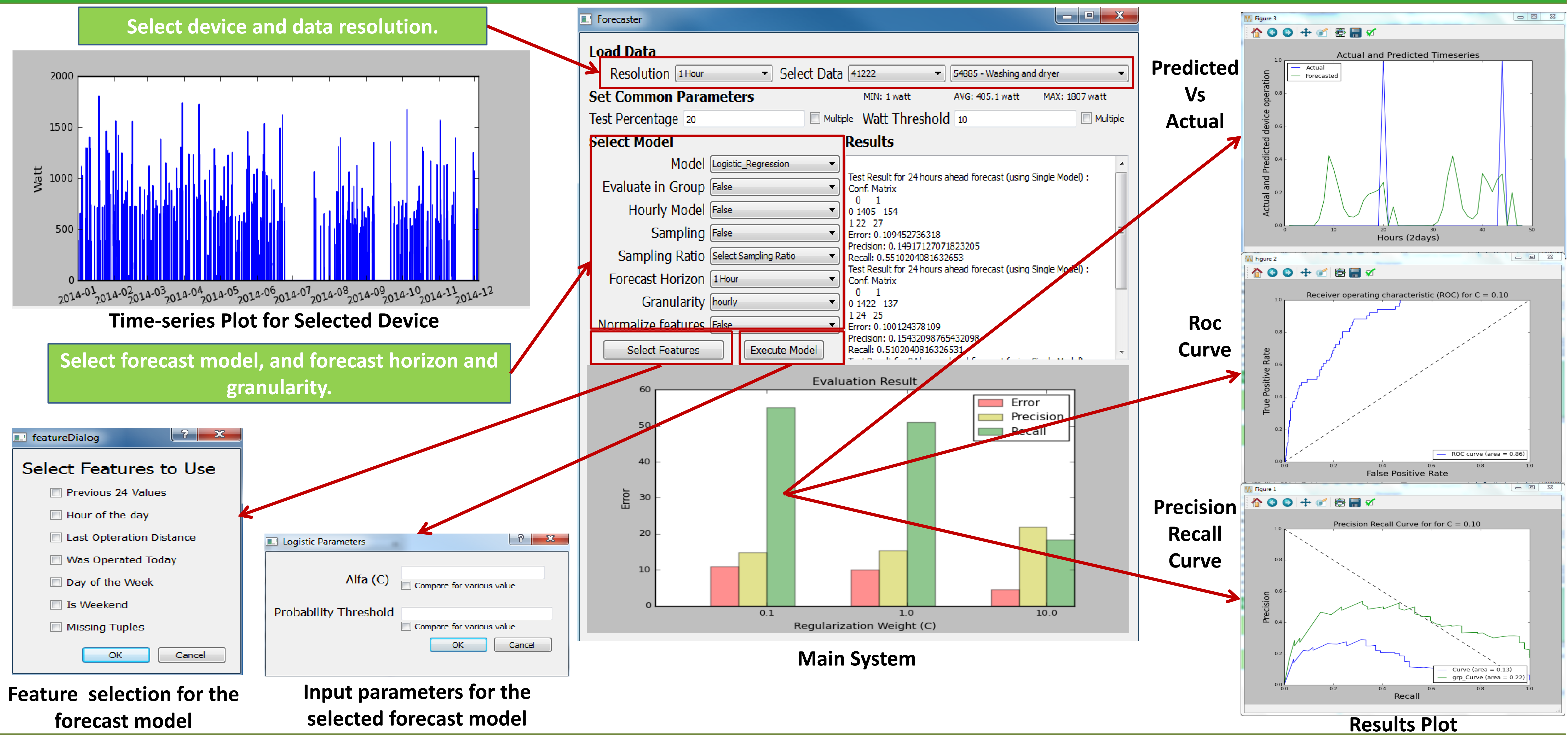
$$\text{Hypothesis: } h_{\theta}(x) = \frac{1}{1 + e^{-\theta^T x}}$$

$$\text{Cost function with L1 regularization: } J(\theta) = \frac{1}{m} \sum_{i=1}^m y^i \log(h_{\theta}(x^i)) + (1 - y^i) \log(1 - h_{\theta}(x^i)) + \frac{\lambda}{2m} \sum_{i=1}^m \theta_j$$

Evaluation Metrics:

- *Classification error* = $\frac{1}{n} \sum_{i=1}^n |(\hat{y}_i - y_i)|$
- *Precision* = $\frac{\text{True Positive}}{\text{True Positive} + \text{False Positive}}$
- *Recall* = $\frac{\text{True Positive}}{\text{True Positive} + \text{False Negative}}$
- Receiver operating characteristic Curve, Precision Recall Curve

System Screenshots



Results

