

Advanced Predictive Analytics Modules and Learning Objectives

0 – Introduction to R (available with all other modules as background)

- Write and execute basic commands in R and RStudio
- Use best practices to write code in R

9 – Advanced Topics in Model Construction

- Understand the advantages, disadvantages, and limitations of ensemble techniques and apply them using bagging, random forests, gradient boosting machines, and stacking.
- Apply techniques for handling imbalanced data.
- Describe the use cases, data requirements, and results associated with hyperparameter tuning and apply it to models covered previously.

10 – Additional Models

- Understand and apply k -nearest neighbors.
- Understand and apply Bayesian learning.
- Understand and apply additive models.
- Understand and apply neural networks.
- Understand and apply support vector machines.

11 – Model Explainability

- Understand the importance of being able to explain the model.
- Apply and interpret global methods (variable importance and partial dependence plots).
- Apply and interpret local methods (individual conditional expectation plots, local interpretable model-agnostic explanations, and Shapley values).

12 – Ethical Use of Data and Models

- Understand and apply a general ethical framework.
- Understand common types of statistical bias in data and models (e.g., selection, observer, survivorship, cognitive) and the techniques for mitigating associated risks.