



Department of Statistics
Purdue University

Myra Samuels Memorial Lecture 2018

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Lawson (LWSN) 1142

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Model-Free prediction and regression: a transformation-based approach to inference

Abstract

Prediction has been traditionally approached via a model-based paradigm, i.e., (a) fit a model to the data at hand, and (b) use the fitted model in order to extrapolate/predict future data. Due to both mathematical and computational constraints, 20th century statistical practice focused mostly on parametric models. Fortunately, with the advent of widely accessible powerful computing in the late 1970s, computer-intensive methods such as the bootstrap and cross-validation have freed practitioners from the limitations of parametric models, and paved the way towards the ‘big data’ era of the 21st century.

Nonetheless, there is a further step one may take, namely going beyond even nonparametric models. The Model-Free Prediction Principle is based on the simple notion of transforming a complex dataset to one that is easier to work with, e.g., i.i.d. or Gaussian. As such, it restores the emphasis on observable quantities, i.e., current and future data, as opposed to unobservable model parameters and estimates thereof. Coupled with resampling, the Model-Free Prediction Principle further allows us to go beyond point prediction in order to construct frequentist prediction intervals without resort to unrealistic assumptions such as normality or linearity.