DATA-DRIVEN PROBLEM SOLVING IN MECHANICAL ENGINEERING

Model Development

Masoud Masoumi

ME 371 - Fall 2023

Department of Mechanical Engineering
The Cooper Union for the Advancement of Science and Art

October, 2023

Learning from Data



The basic premise of learning from data is the use of a set of observations to uncover an underlying process. That is a very broad premise and it is difficult to fit into a single framework.

- (a) **Supervised Learning:** Training data contains explicit examples of what the correct output should be for given inputs, i.e. pairs of (input, correct output)
- (b) **Unsupervised Learning:** Training data does not contain any output information. Can be viewed as the task of finding patterns and structure in input data.
- (c) Reinforcement Learning: is concerned with the problem of finding suitable actions to take in a given situation in order to maximize a reward. Here the learning algorithm is not given examples of optimal outputs, but must instead discover them by a process of trial and error. See Gym platform.

ME 371-Fall 2023 Masoud M.

Modeling



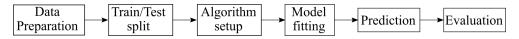
The process of encapsulating information into a tool which can forecast and make predictions.

"All models are wrong, but some models are useful" -George Box

To develop a model, we split the data into training data and test data, typically 80/20.

- Training Data: data used to fit your models or the set used for learning
- Test Data: data used to evaluate how good your model is.

General procedure



ME 371-Fall 2023 Masoud M.