Time Series Regression

FinTech

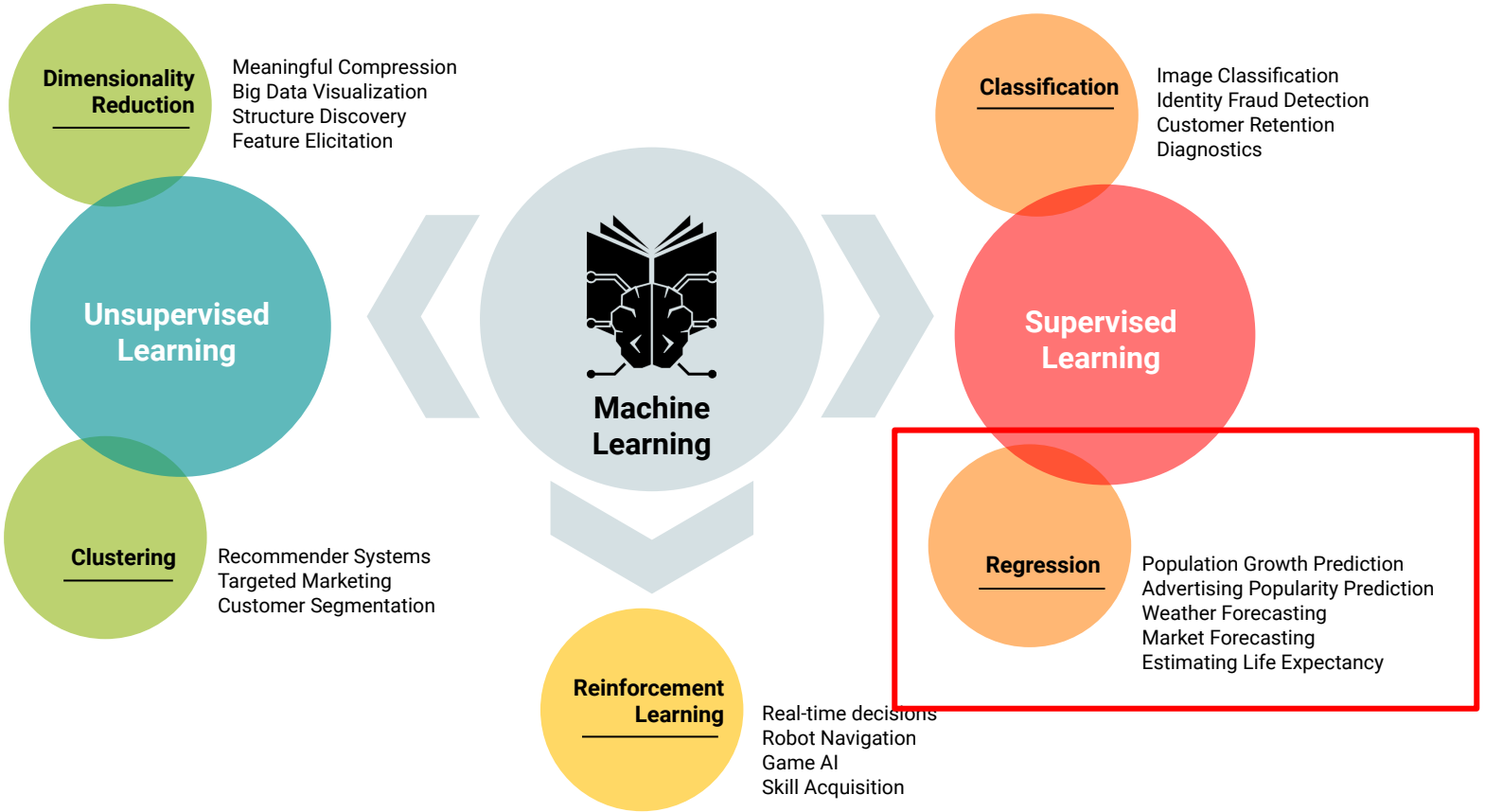
Lesson 10.3

Class Objectives

By the end of today's class you will understand:

- Linear Regression
- Time Series Linear Regression
- Regression Metrics
- Train Test Split
- Rolling Out-of-Sample

Mysticism of Machine Learning

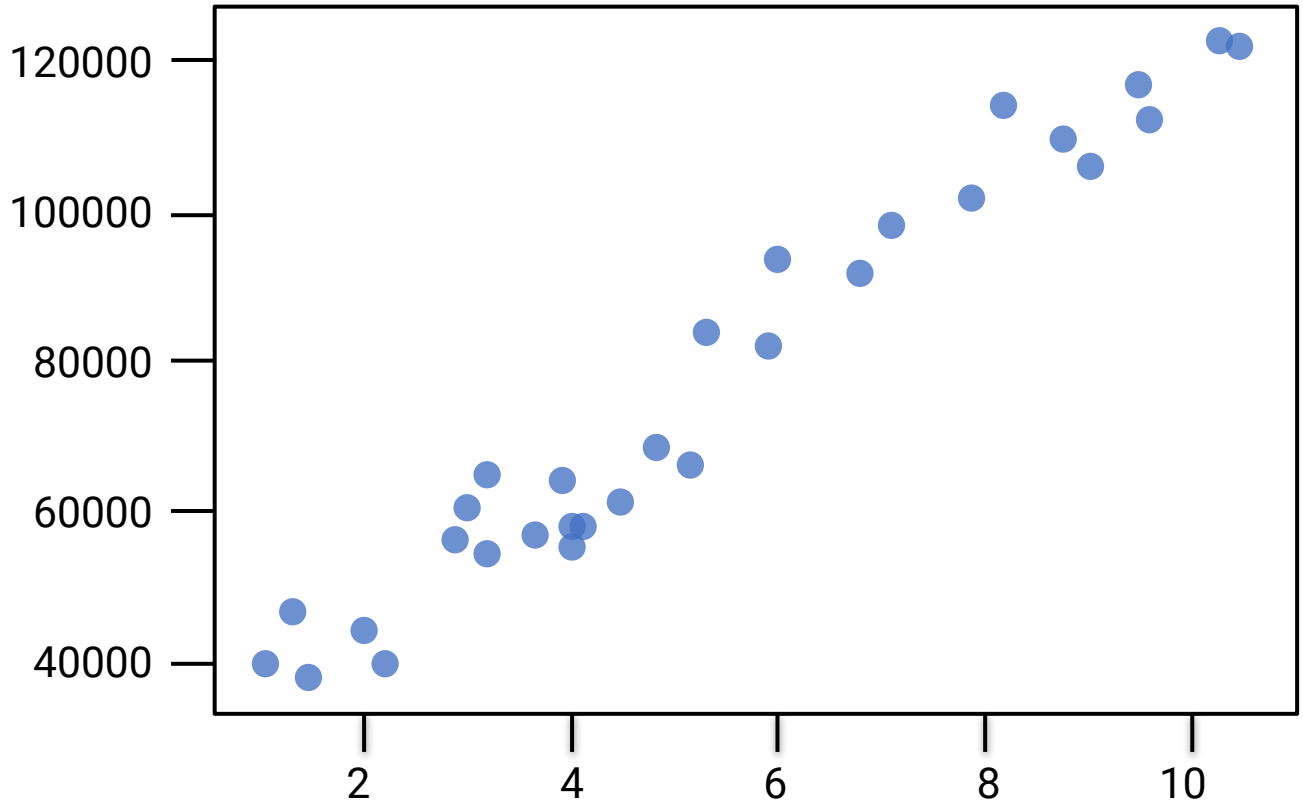


Linear Regression

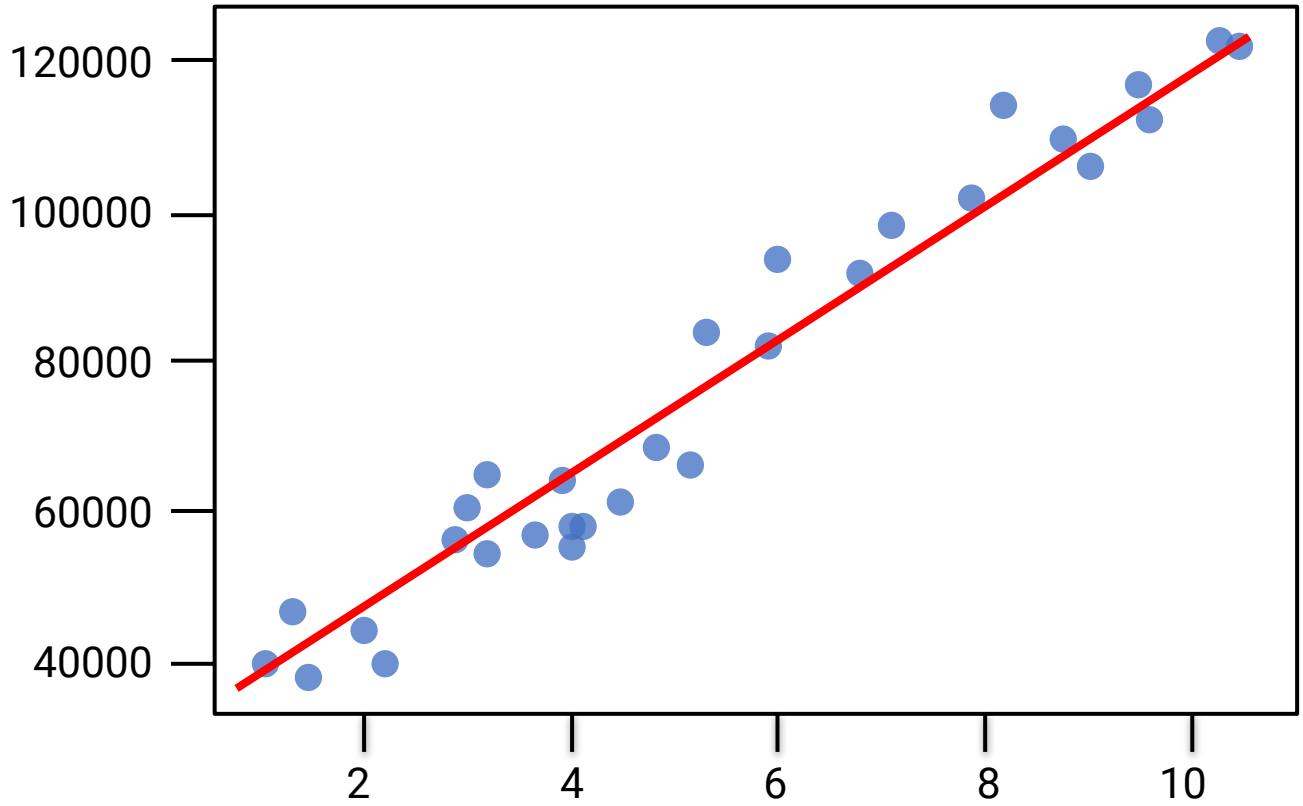
Line Equation

y	=	mx + b
m	=	slope
b	=	y-intercept (the value of y when x = 0)

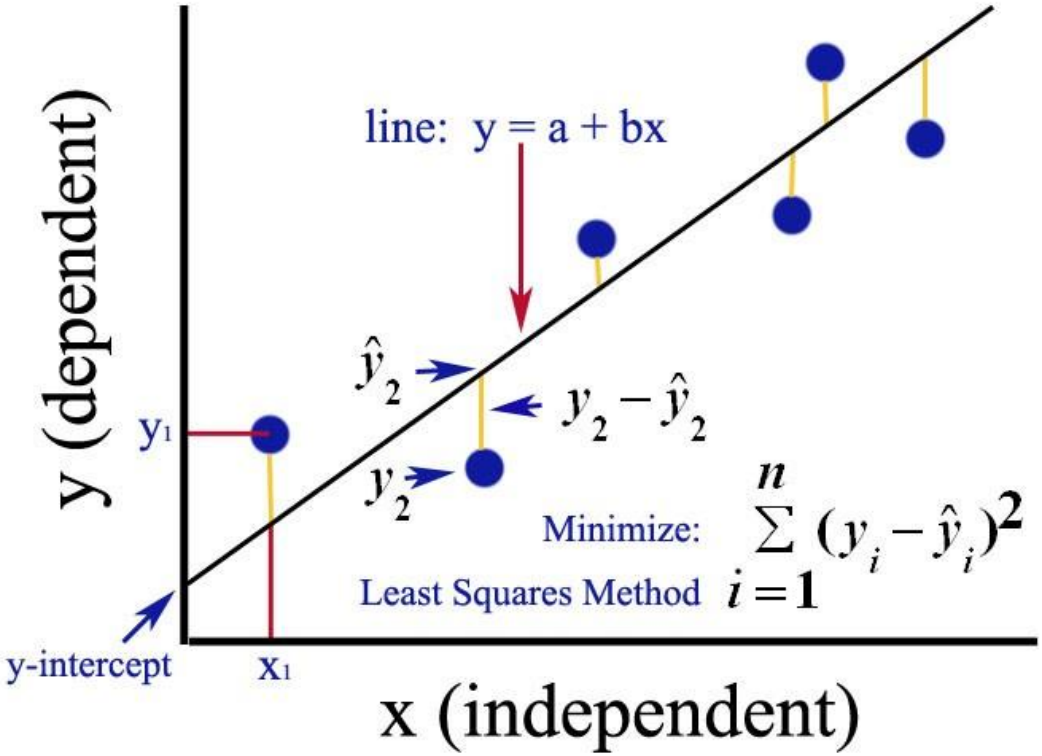
Linear Regression: Find the Line That Best Describes the Data

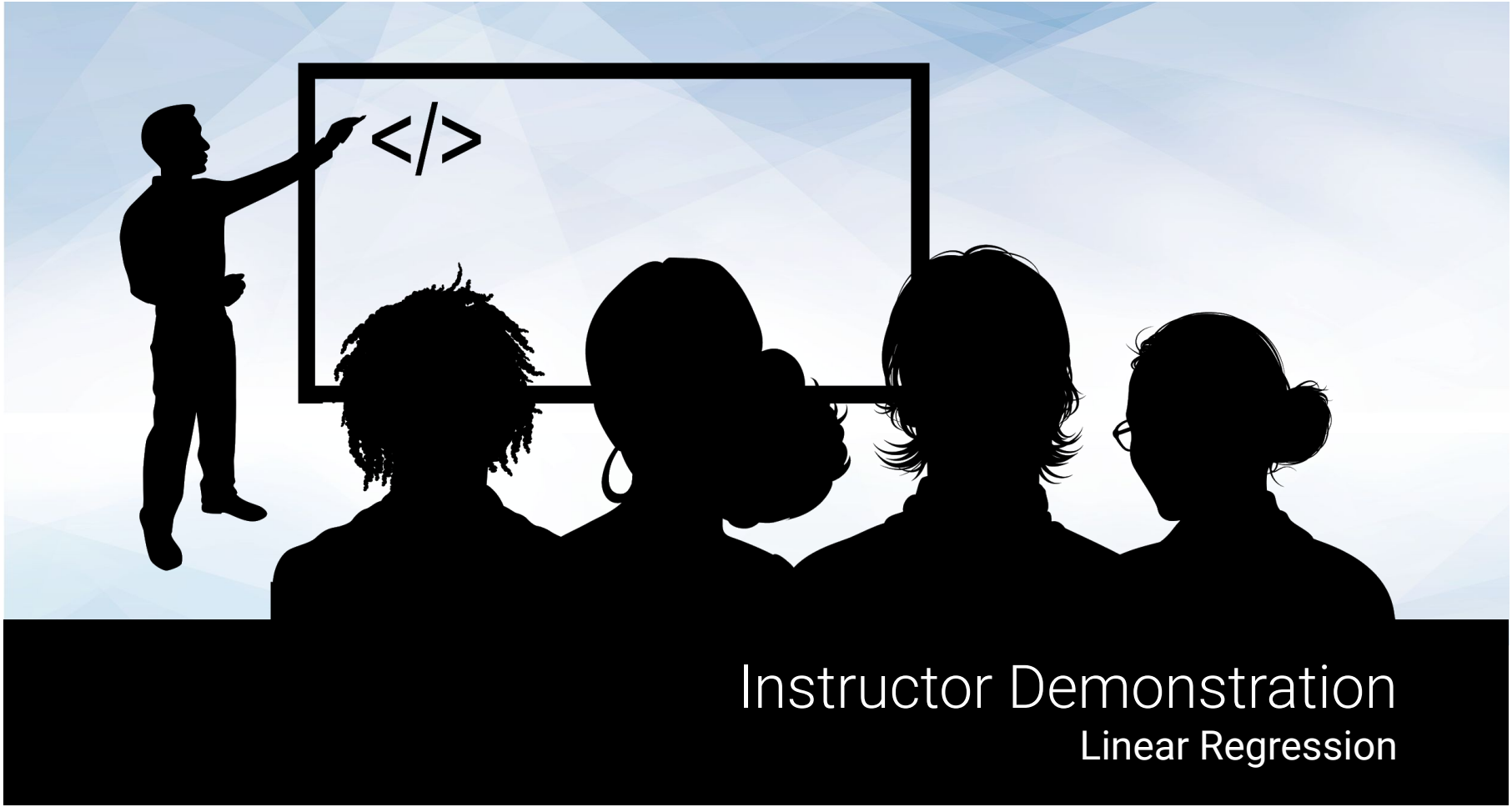


Best Fit Line



Regression Metrics

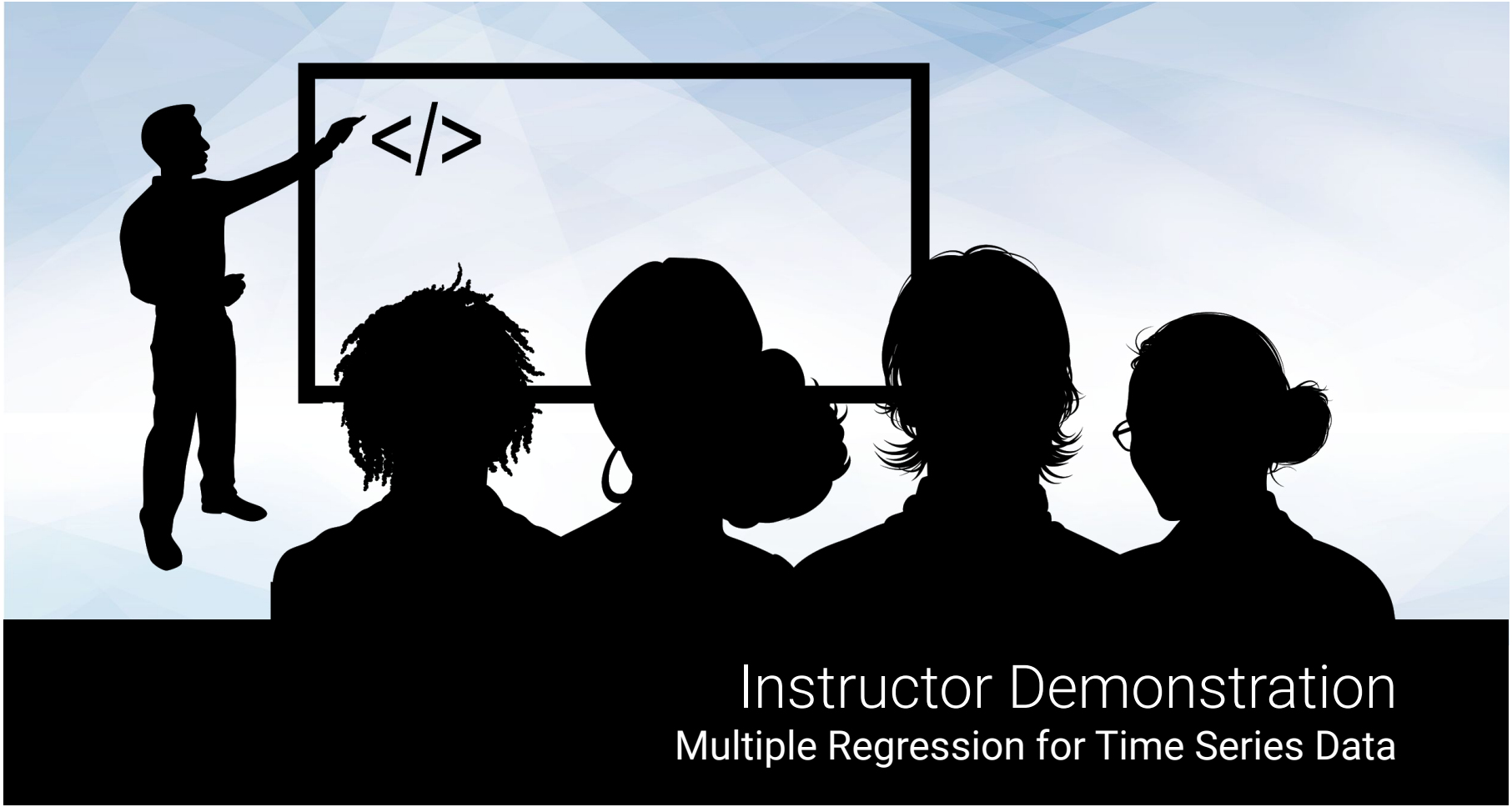




Instructor Demonstration

Linear Regression

Multiple Linear Regression



Instructor Demonstration

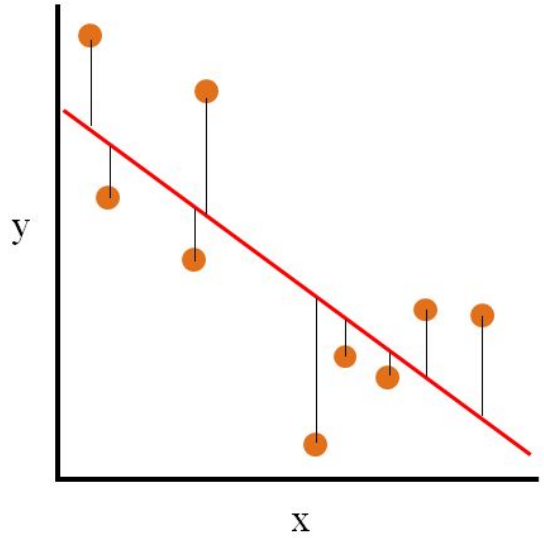
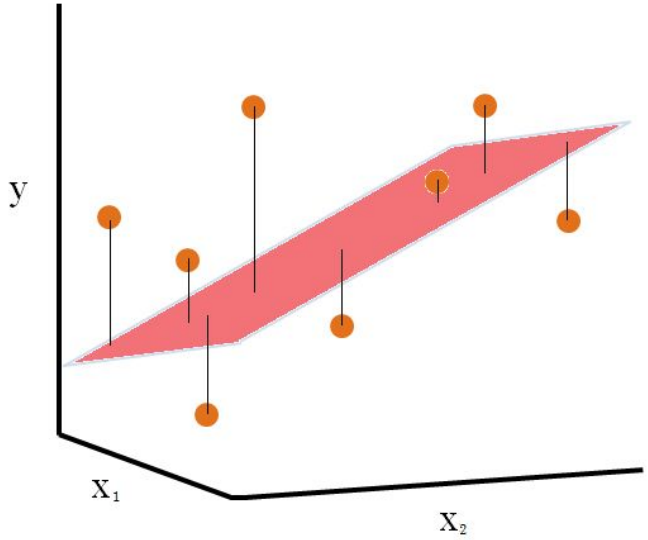
Multiple Regression for Time Series Data

Multiple Regression

Each week (X) is assigned its weight, or coefficient.

$$y = b_0 + b_1 X_1 + b_2 X_2 \ldots$$

Multiple Regression

Simple Linear Regression	Multiple Linear Regression (2 Independent Variables (x_1, x_2))
	

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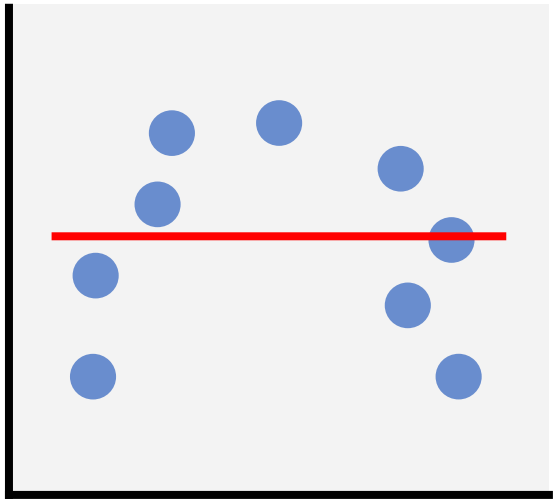
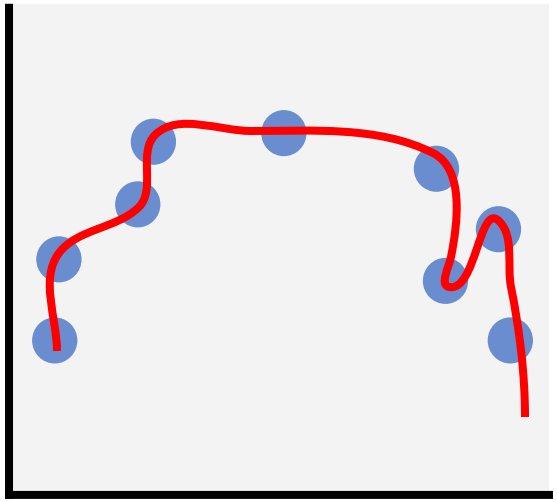
Overfitting

Overfitting

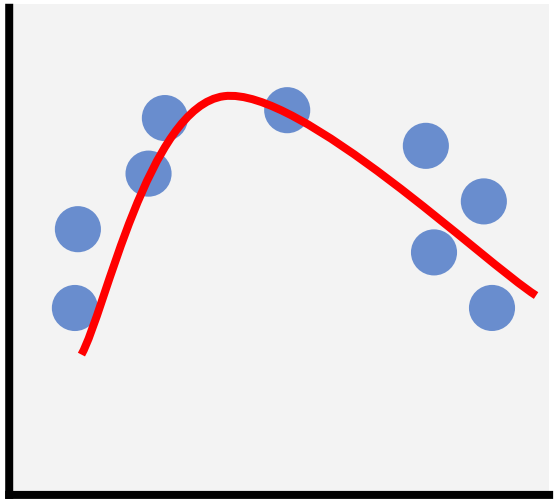
Underfit



Overfit

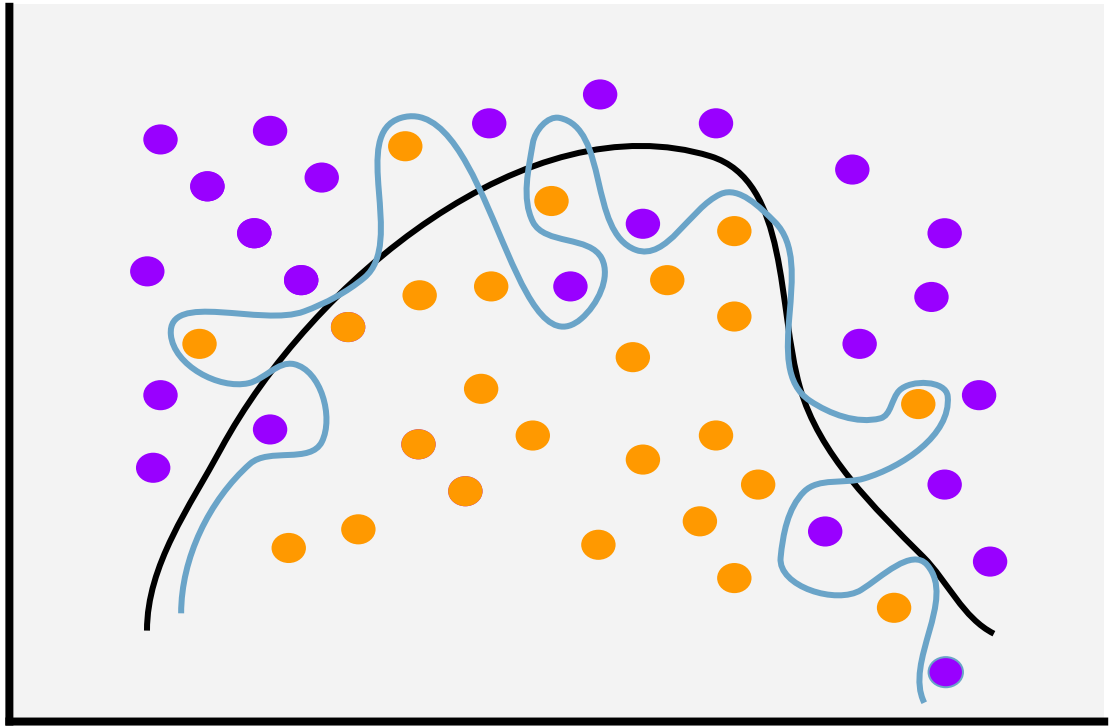


Ideal

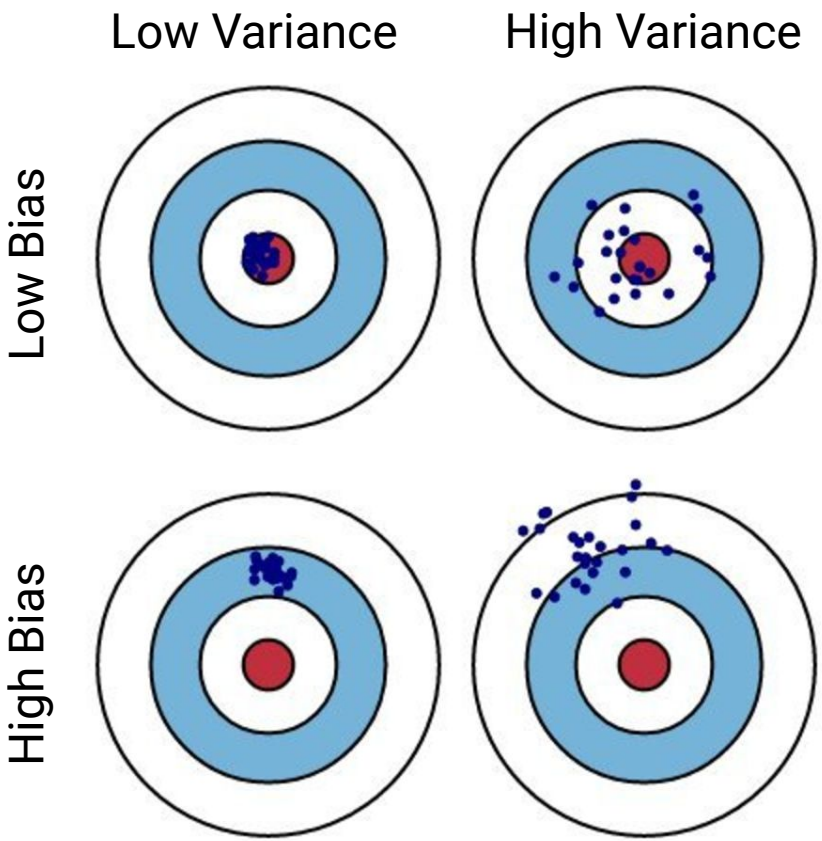


Overfitting

Overfit models learn the ‘noise’ found in the training data, rather than just the ‘signal’



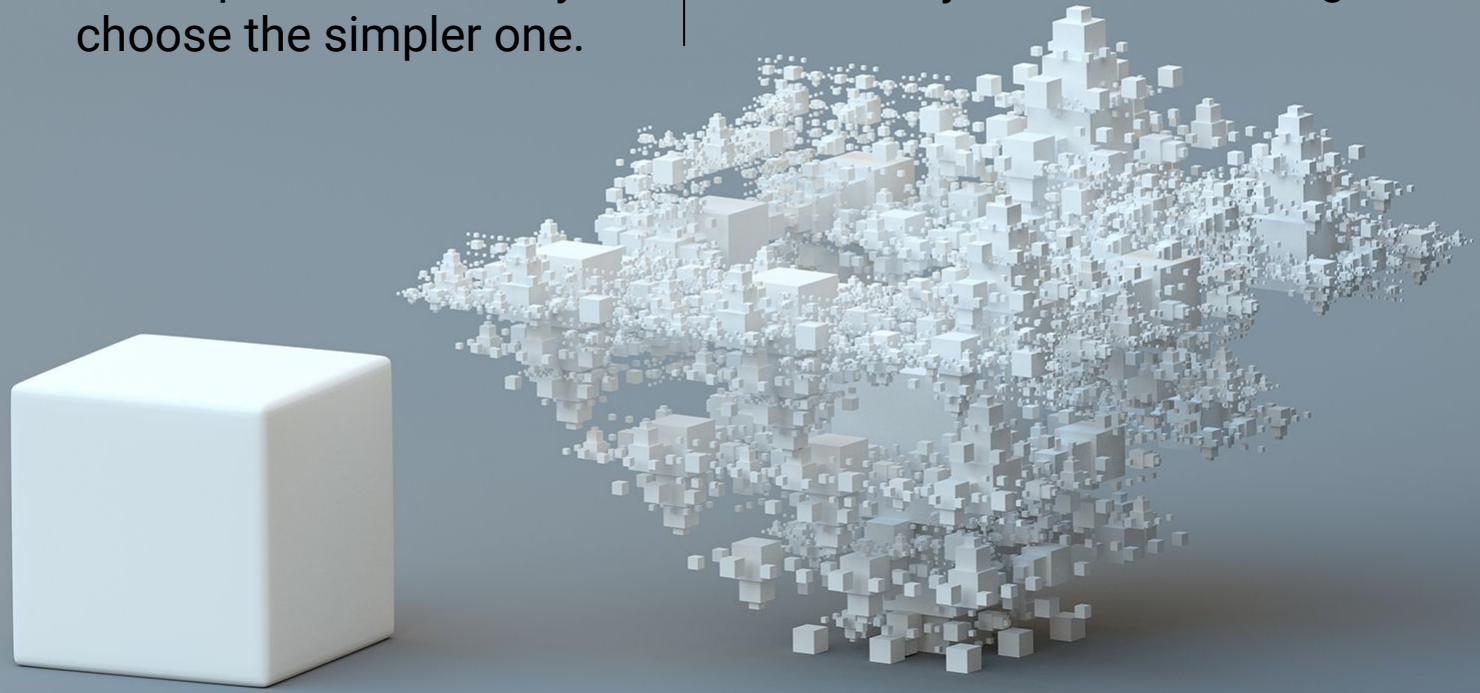
Variance vs Bias

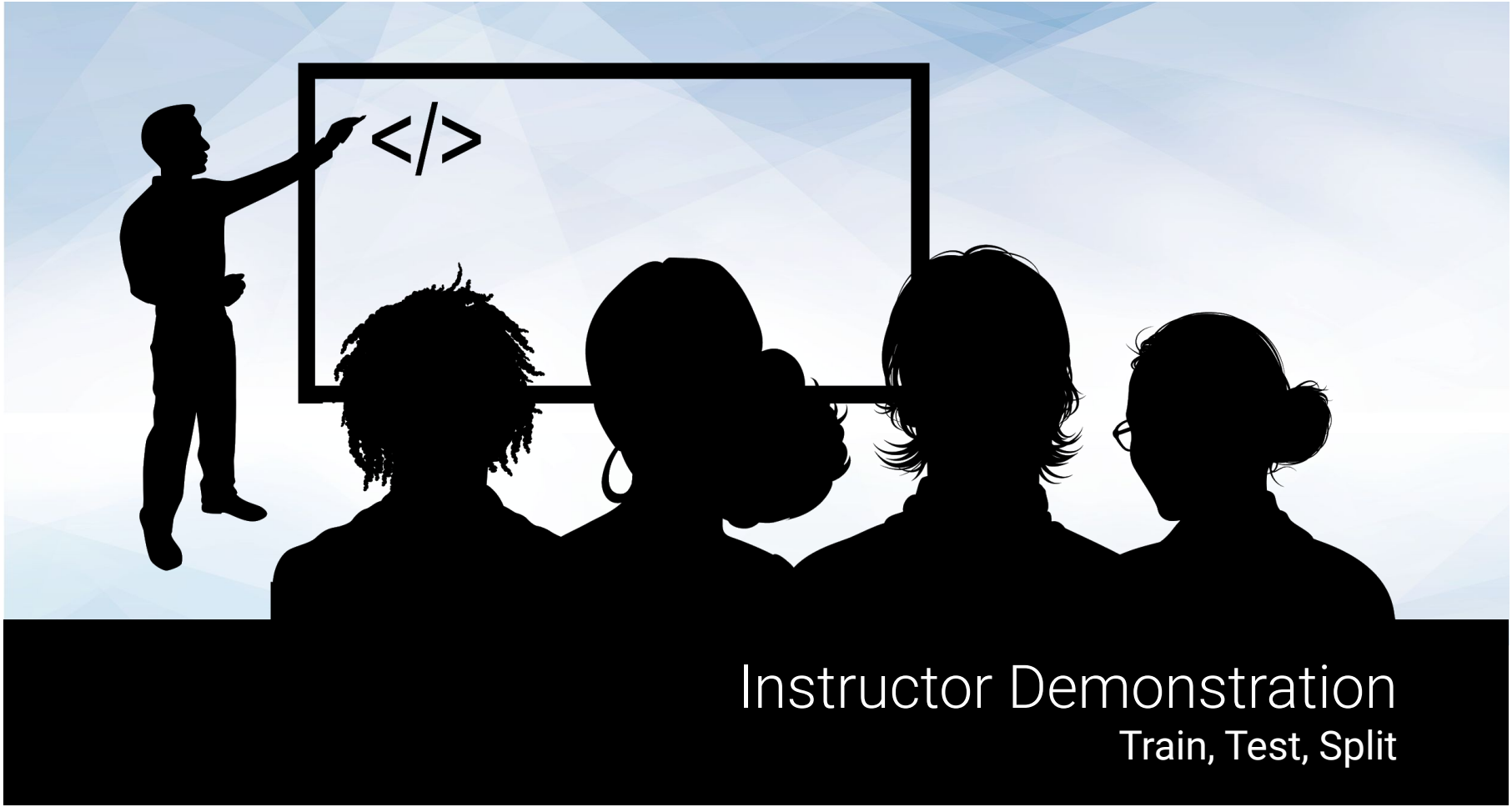


Parsimony

Statistical application of Occam's razor: when two models perform similarly, choose the simpler one.

Why? Needlessly complex models are harder to compute and may lead to overfitting.



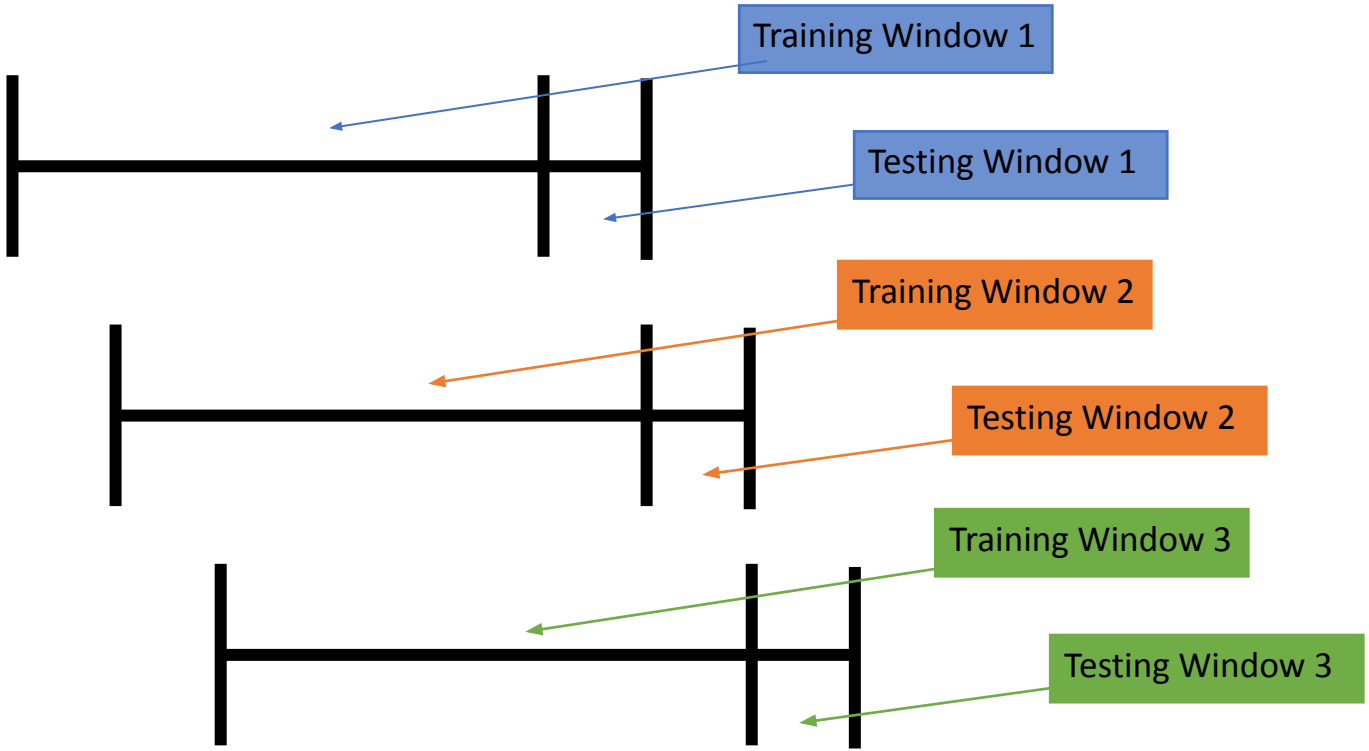


Instructor Demonstration

Train, Test, Split

Rolling Out-of-Sample

A Rolling Out-of-Sample Approach



Questions?