Sample title

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Overview

1. Q1: Bias–variance tradeoff
2. Q2: Hastie and Tibshirani

Bias-Variance Trade-Off

Bias Error

- Also called 'Overfitting'

Variance

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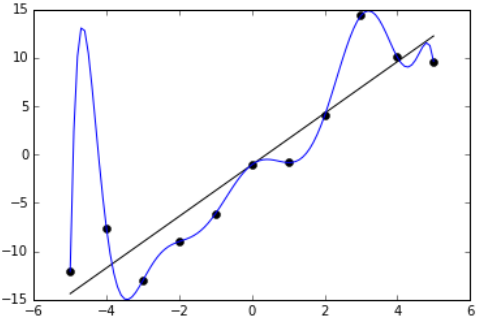

Bias-Variance Trade-Off

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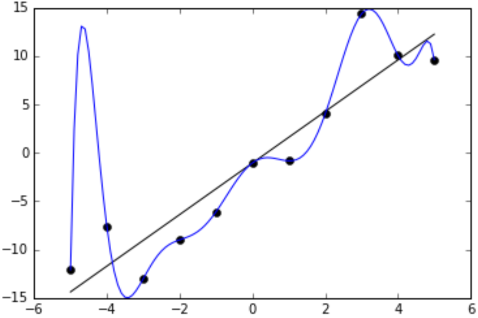
- Predicts test data too well

Variance

- Also called 'Underfitting'



Bias-Variance Trade-Off

Bias Error

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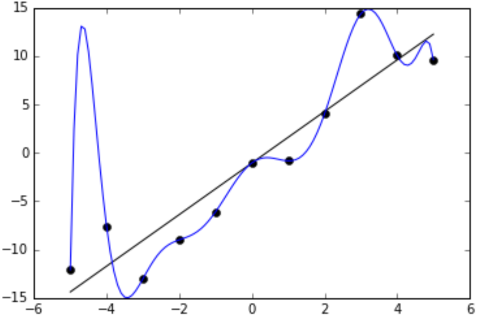
Variance

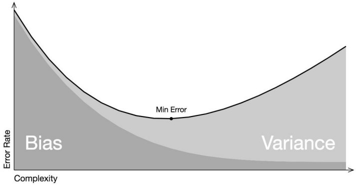
- Also called 'Underfitting'
- Generalizes too well



Bias-Variance Trade-Off

- Aiming for the lowest total error typically means finding a "middle-ground"
- A common technique for this is determining the minimum *mean squared error.*

$$\begin{aligned} \text{MSE} &= \left(E\left[\hat{f}(x)\right] - f(x)\right)^2 + E\left[\left(\hat{f}(x) - E\left[\hat{f}(x)\right]\right)^2\right] + \sigma_e^2 \\ &= \text{Bias}^2 + \text{Variance} + \text{Irreducible Error} \end{aligned}$$



Hastie Lectures

- Statistical Learning and Regression
- Dimensionality and Parametric Models
- Assessing Model Accuracy and Bias-Variance Trade-Off
- Classification Problems and K-Nearest Neighbors

Statistical Learning and Regression

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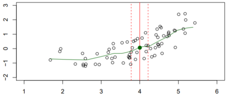

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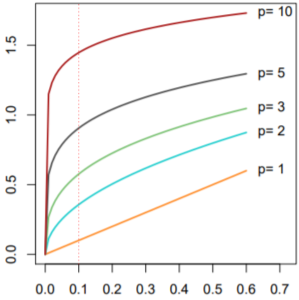

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- Structured models may help address these scaling problems
  The simplest structured model is a linear model:
  $$f_L(X) = \beta_0 + \beta_1 X_1 + \cdots + \beta_n X_n$$

Assessing Model Accuracy and Bias-Variance Trade-Off

Classification Problems and K-Nearest Neighbors