

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

Bias-Variance Trade-Off

Bias Error

- Also called 'Overfitting'

Variance

- Also called 'Underfitting'

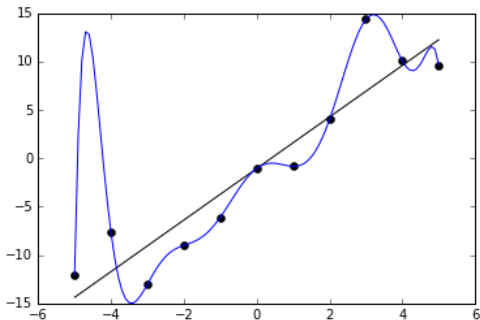
Bias-Variance Trade-Off

Bias Error

- Also called 'Overfitting'

Variance

- Also called 'Underfitting'



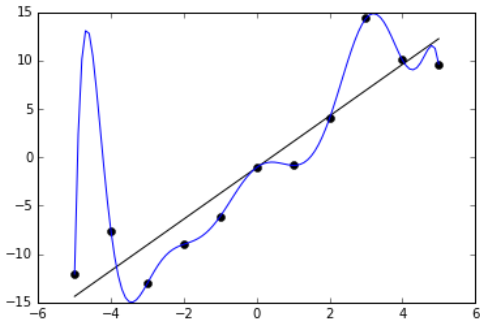
Bias-Variance Trade-Off

Bias Error

- Also called 'Overfitting'
- Predicts test data too well

Variance

- Also called 'Underfitting'



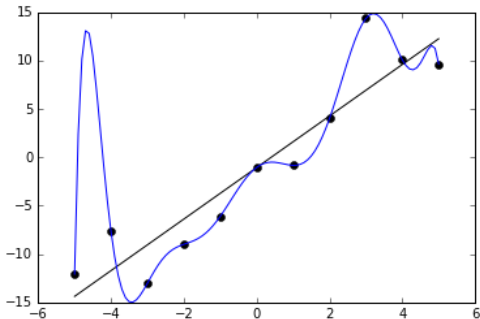
Bias-Variance Trade-Off

Bias Error

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Variance

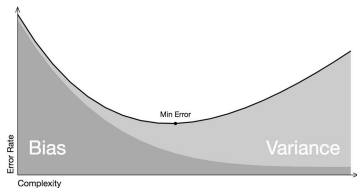
- Also called 'Underfitting'
- Generalizes too well



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

Predicting values through various means

The simplest method of regression may be to use $\hat{f}(x_n) = \bar{x}_n$

A model may be improved by extending the values contributing to the average

Dimensionality and Parametric Models

Assessing Model Accuracy and Bias-Variance Trade-Off

Classification Problems and K-Nearest Neighbors