

Machine Learning Basics

Lecture slides for Chapter 5 of *Deep Learning*

www.deeplearningbook.org

Ian Goodfellow

2016-09-26

Linear Regression

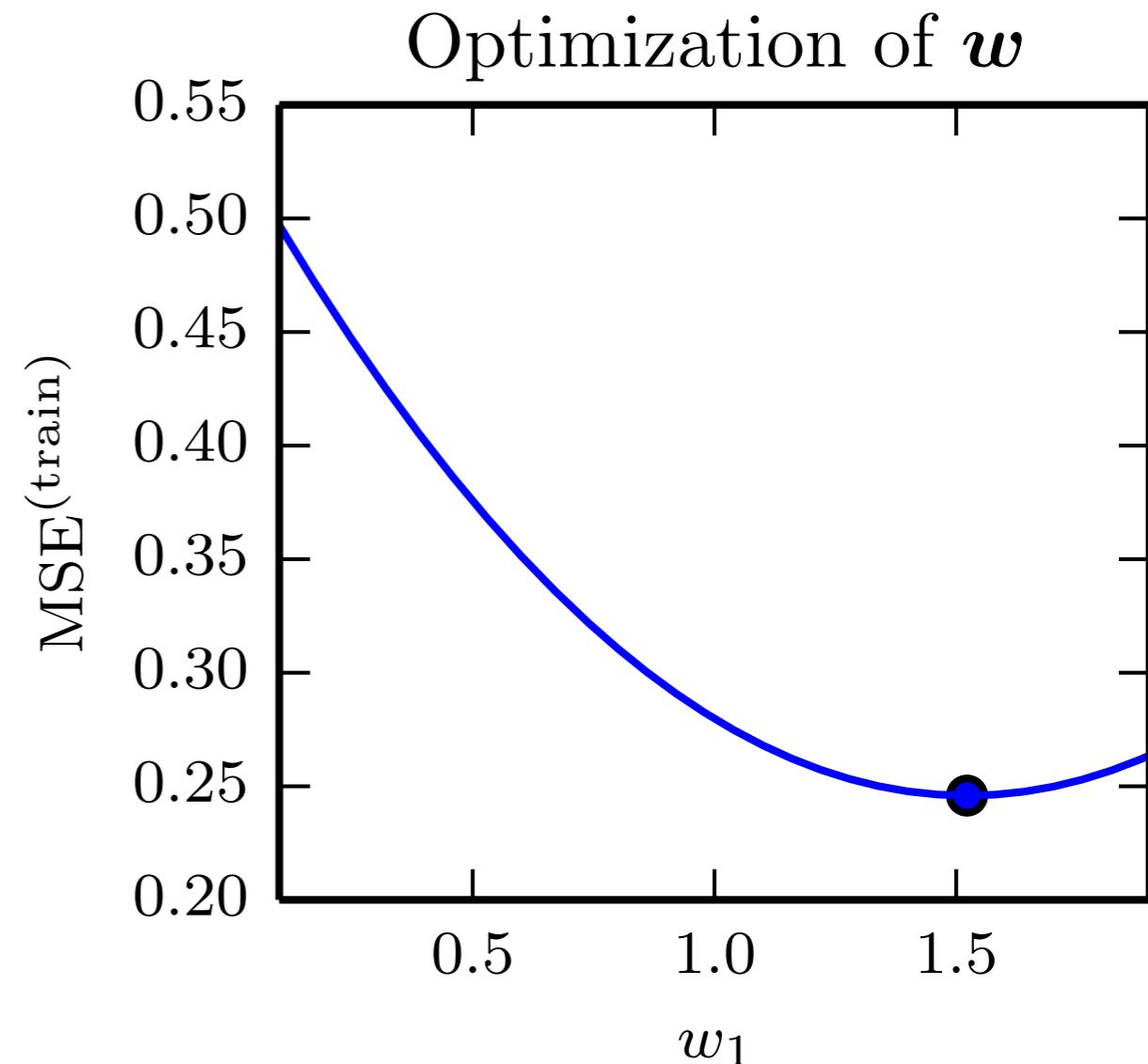
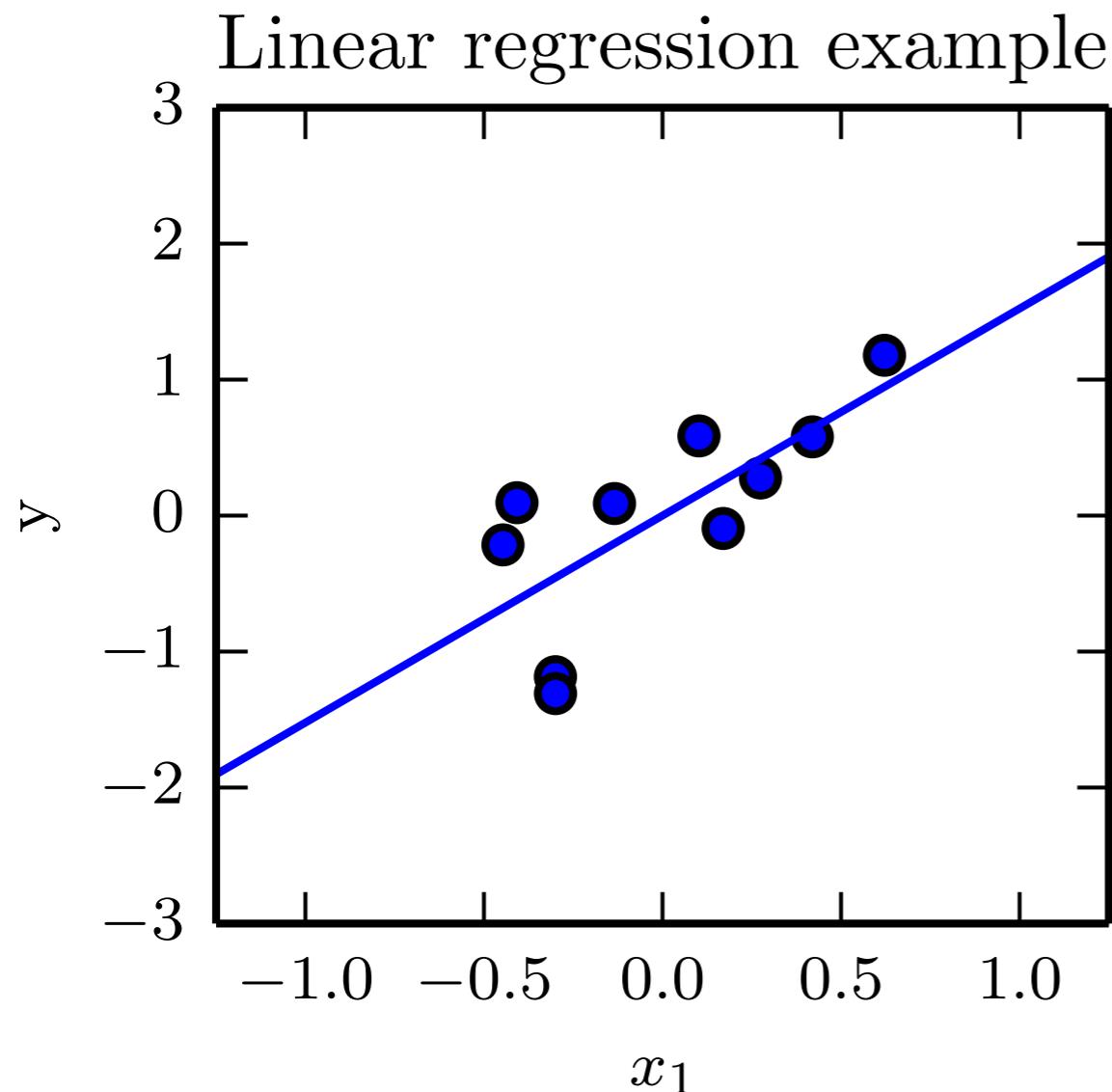


Figure 5.1

Underfitting and Overfitting in Polynomial Estimation

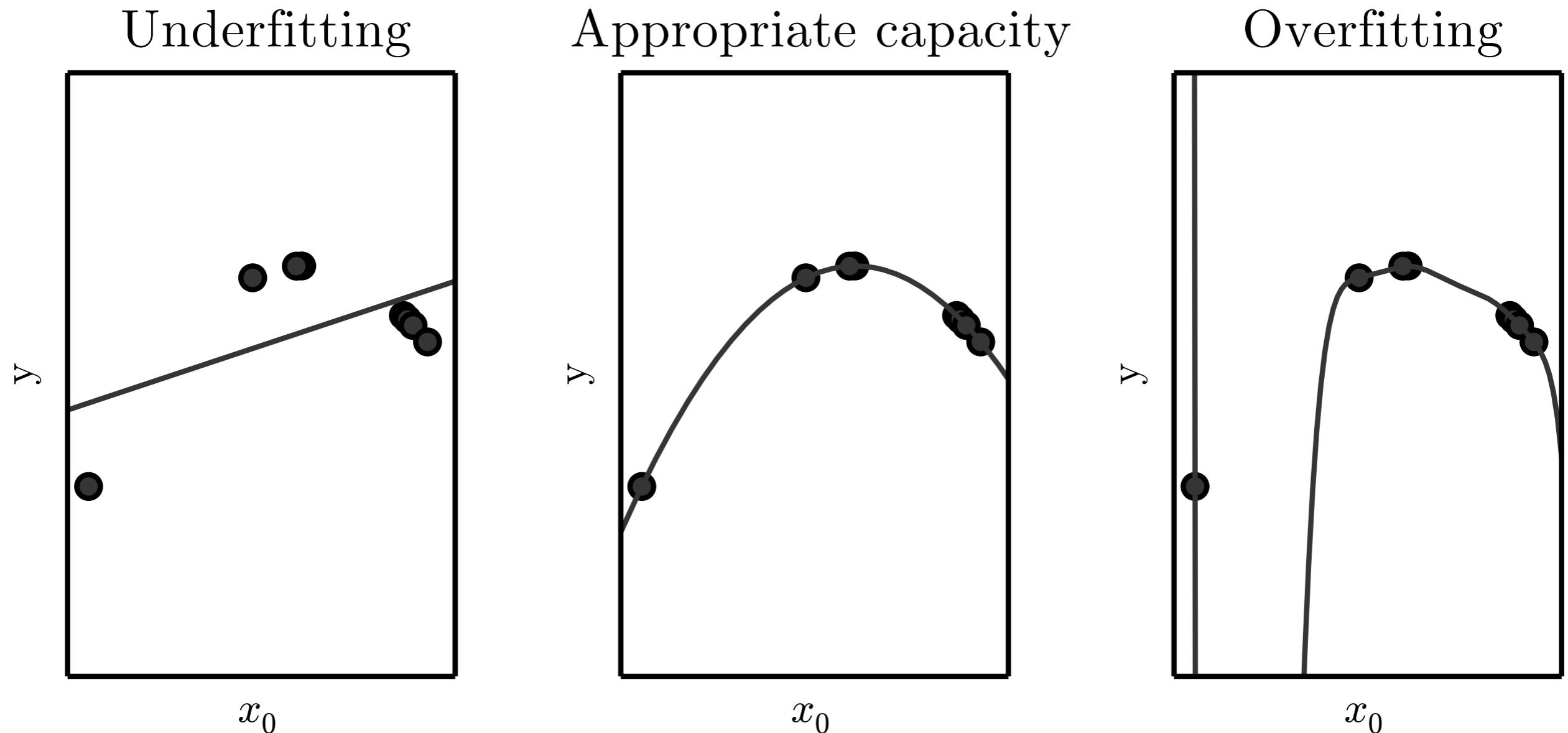


Figure 5.2

Generalization and Capacity

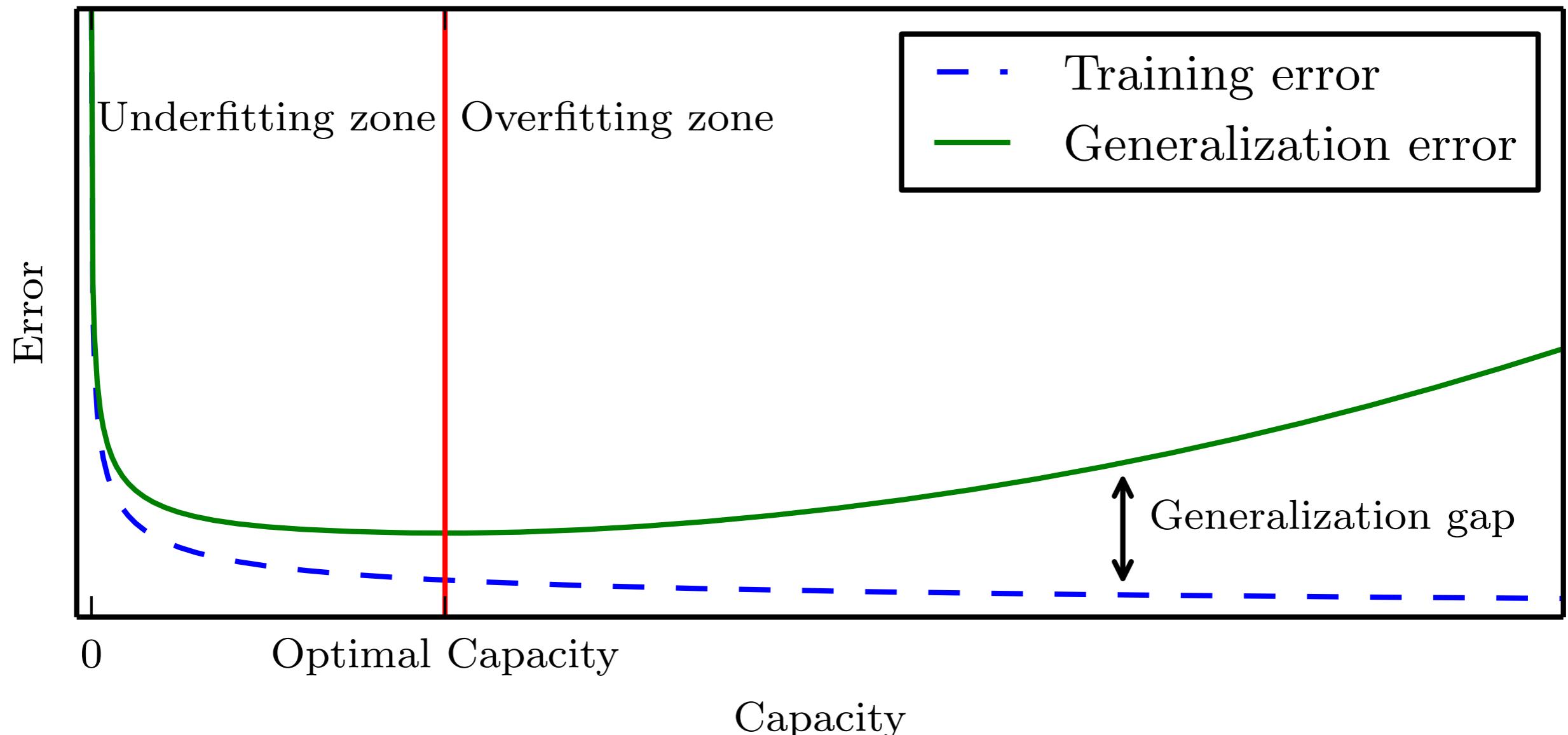


Figure 5.3

(Goodfellow 2016)

Training Set Size

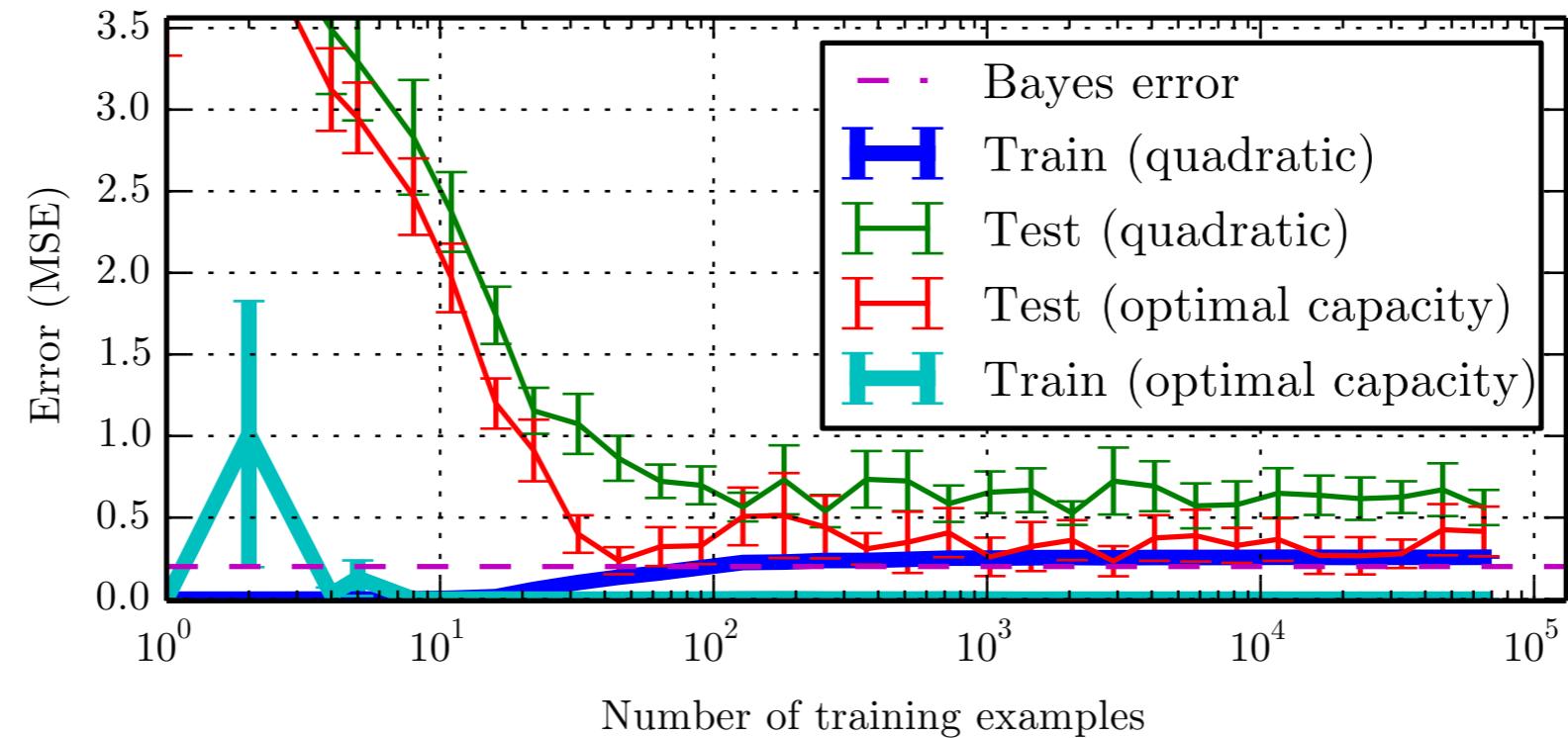
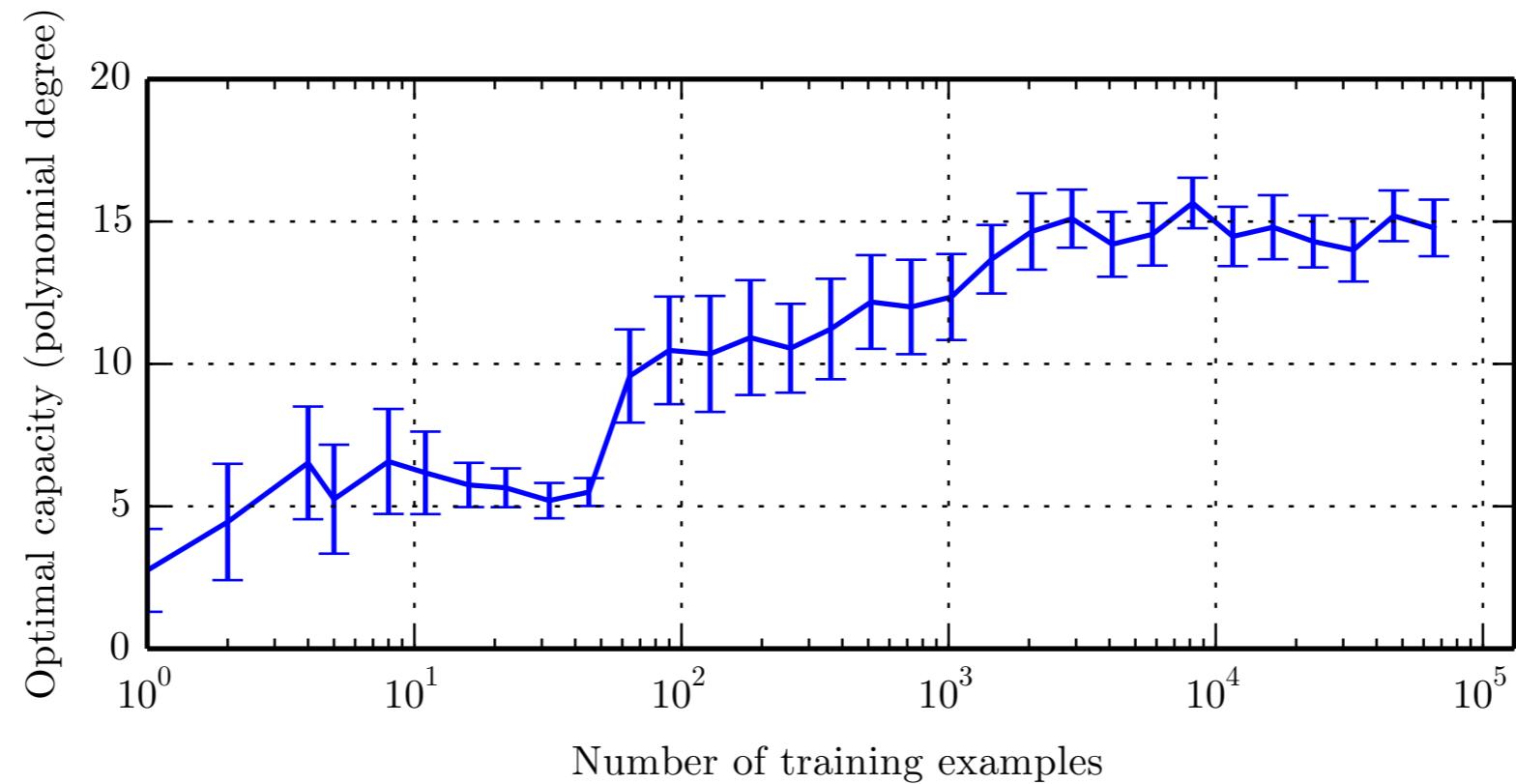
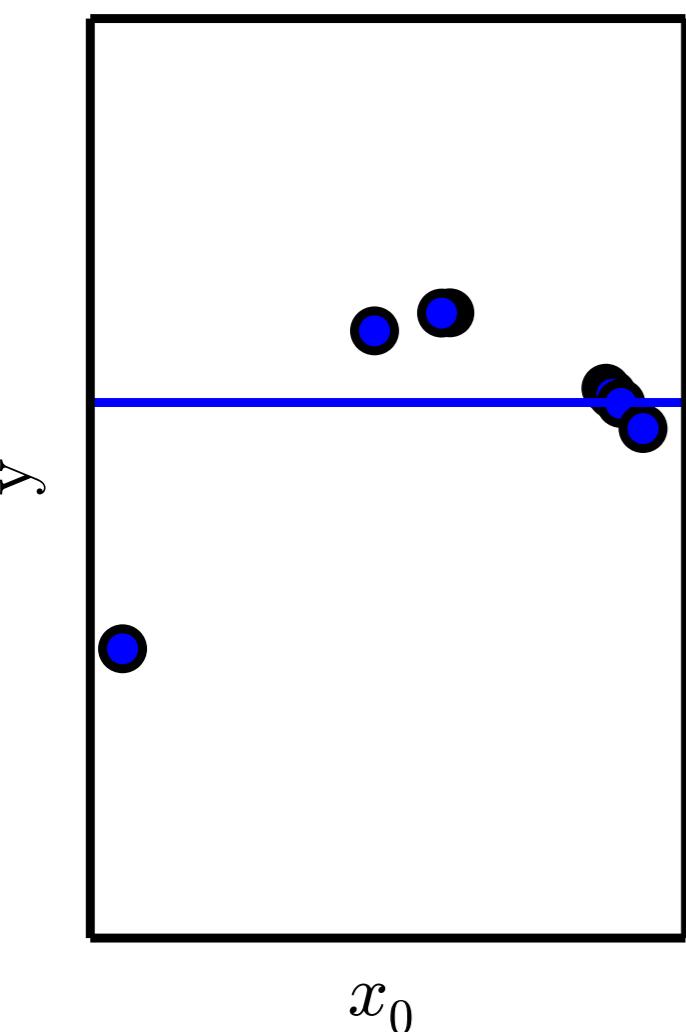


Figure 5.4

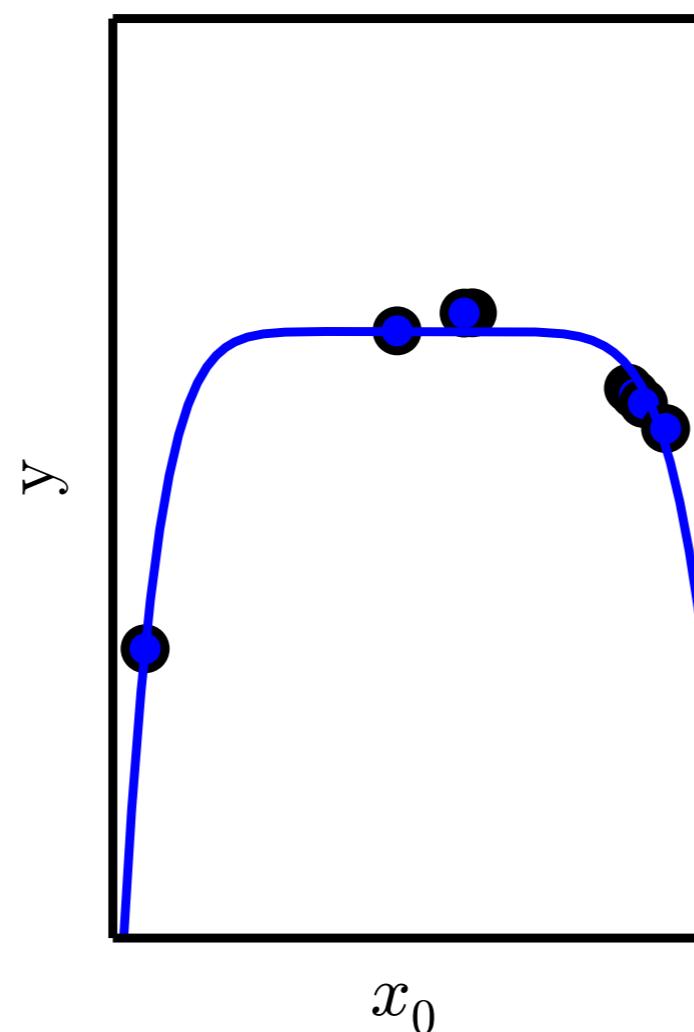


Weight Decay

Underfitting
(Excessive λ)



Appropriate weight decay
(Medium λ)



Overfitting
($\lambda \rightarrow 0$)

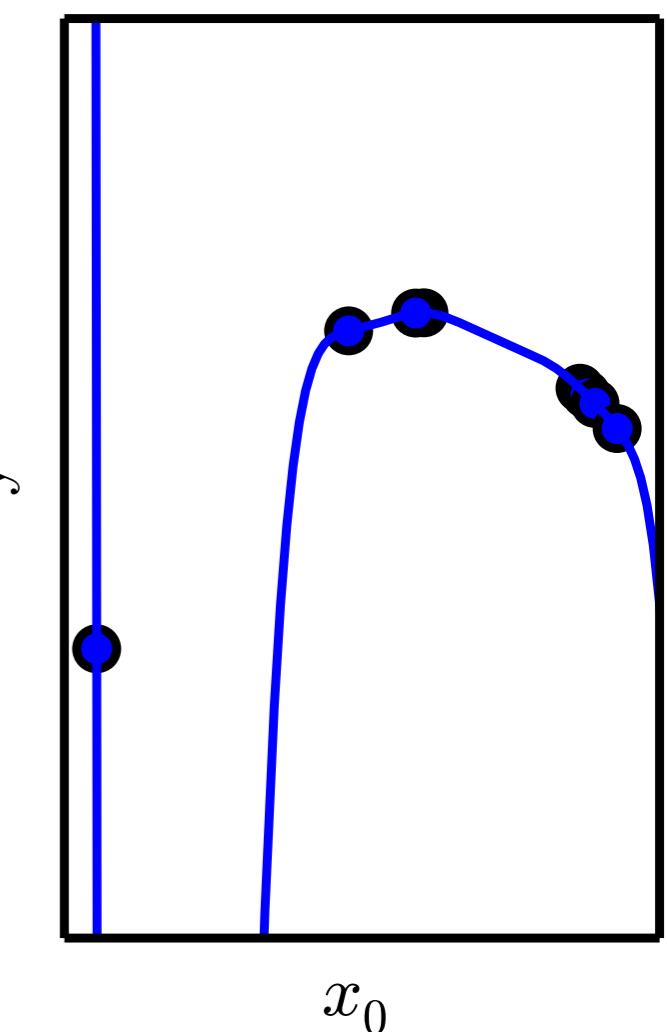


Figure 5.5

(Goodfellow 2016)

Bias and Variance

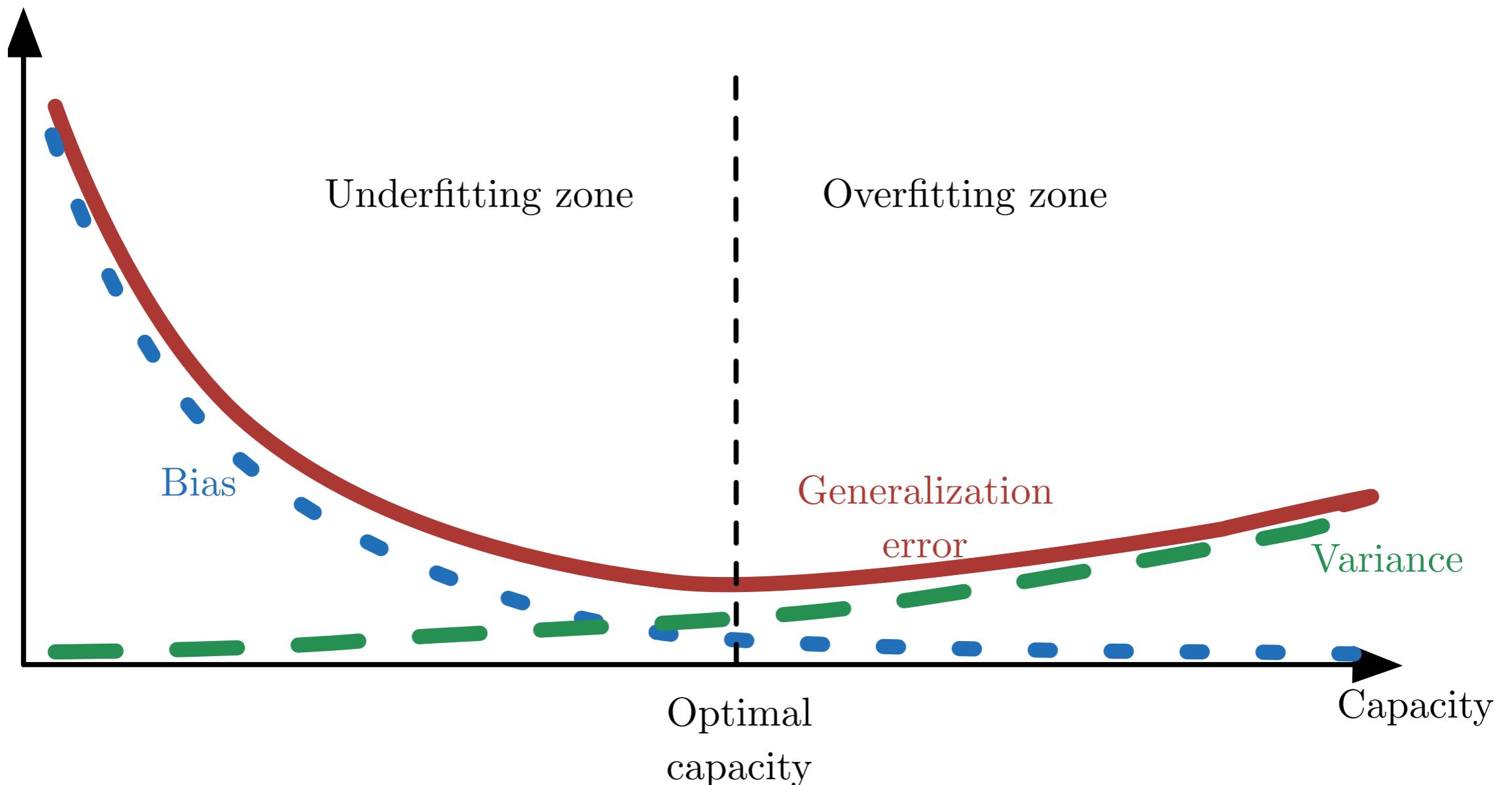


Figure 5.6

(Goodfellow 2016)

Decision Trees

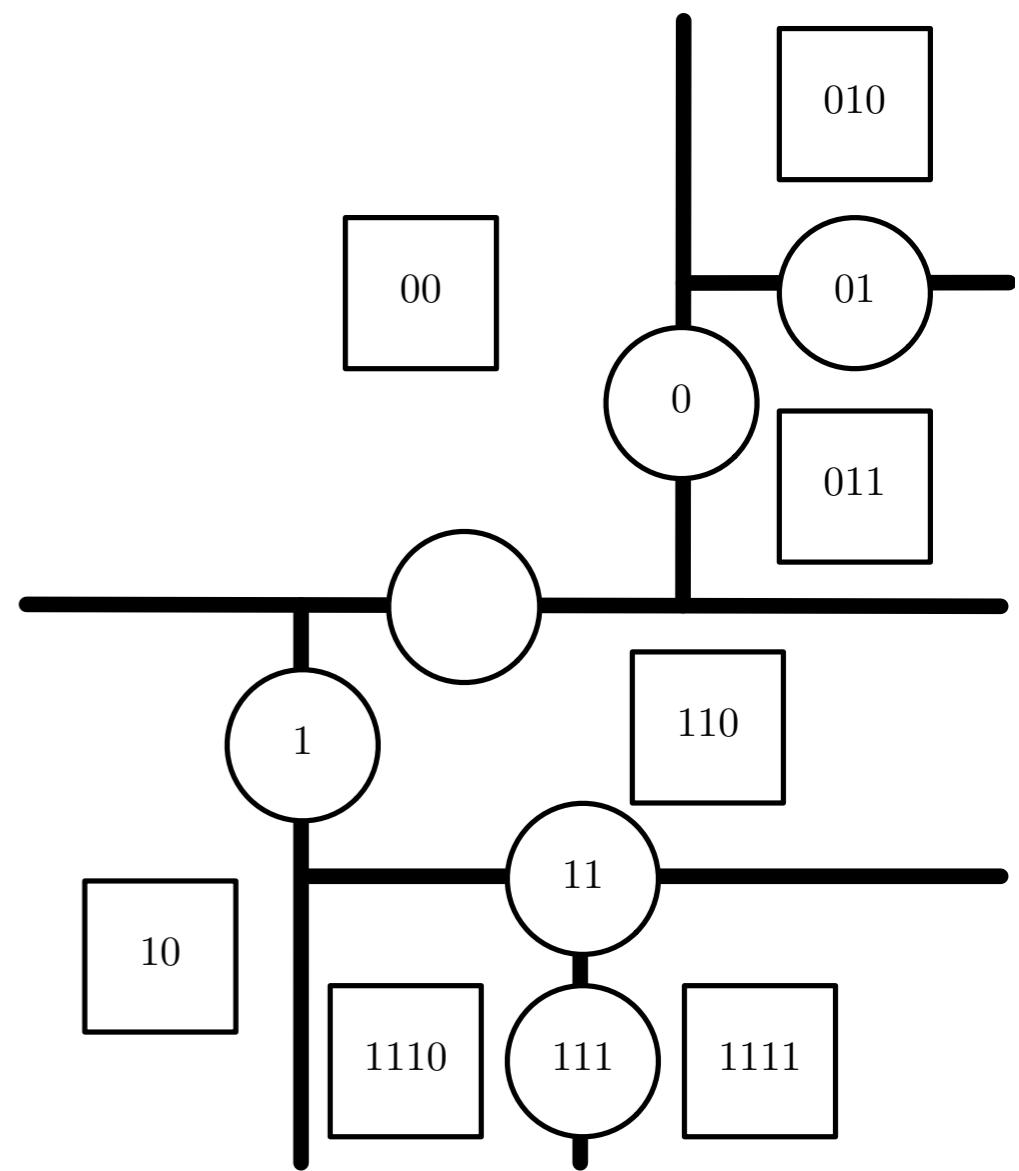
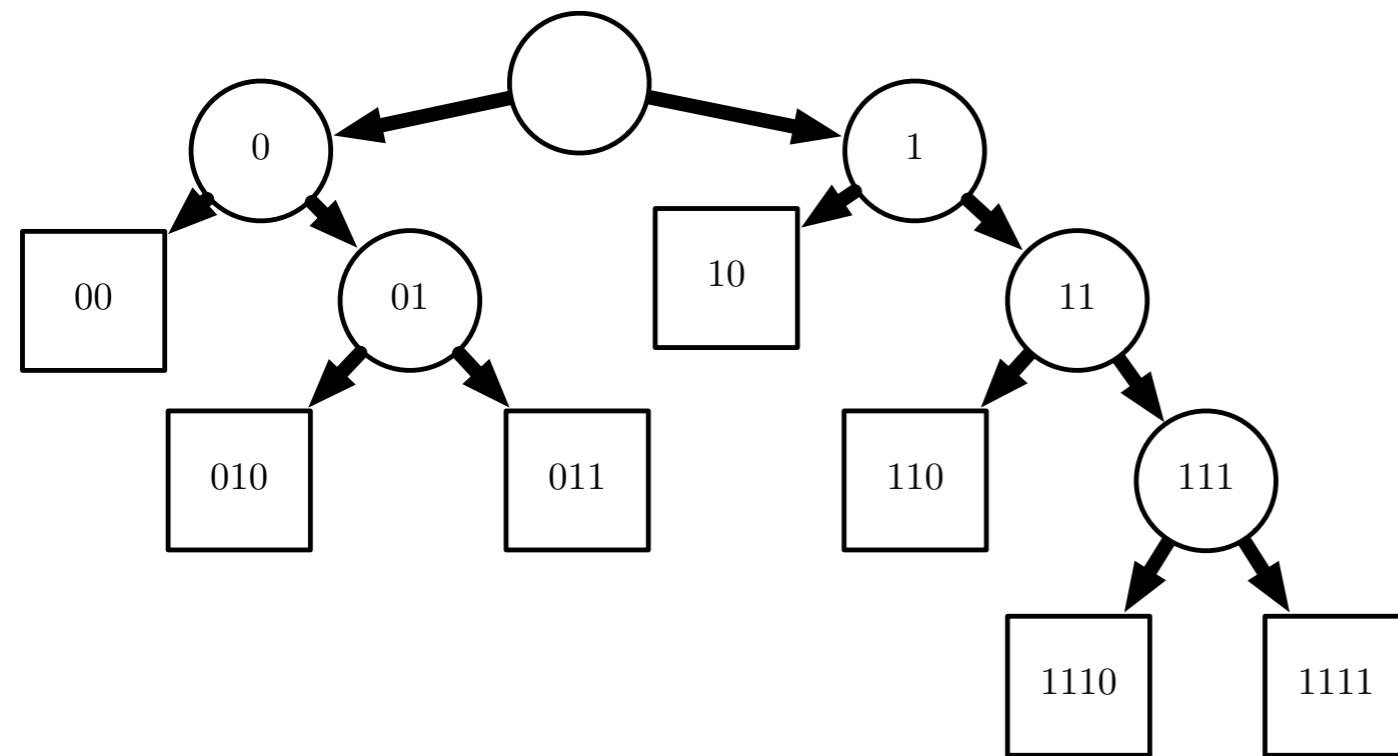


Figure 5.7

(Goodfellow 2016)

Principal Components Analysis

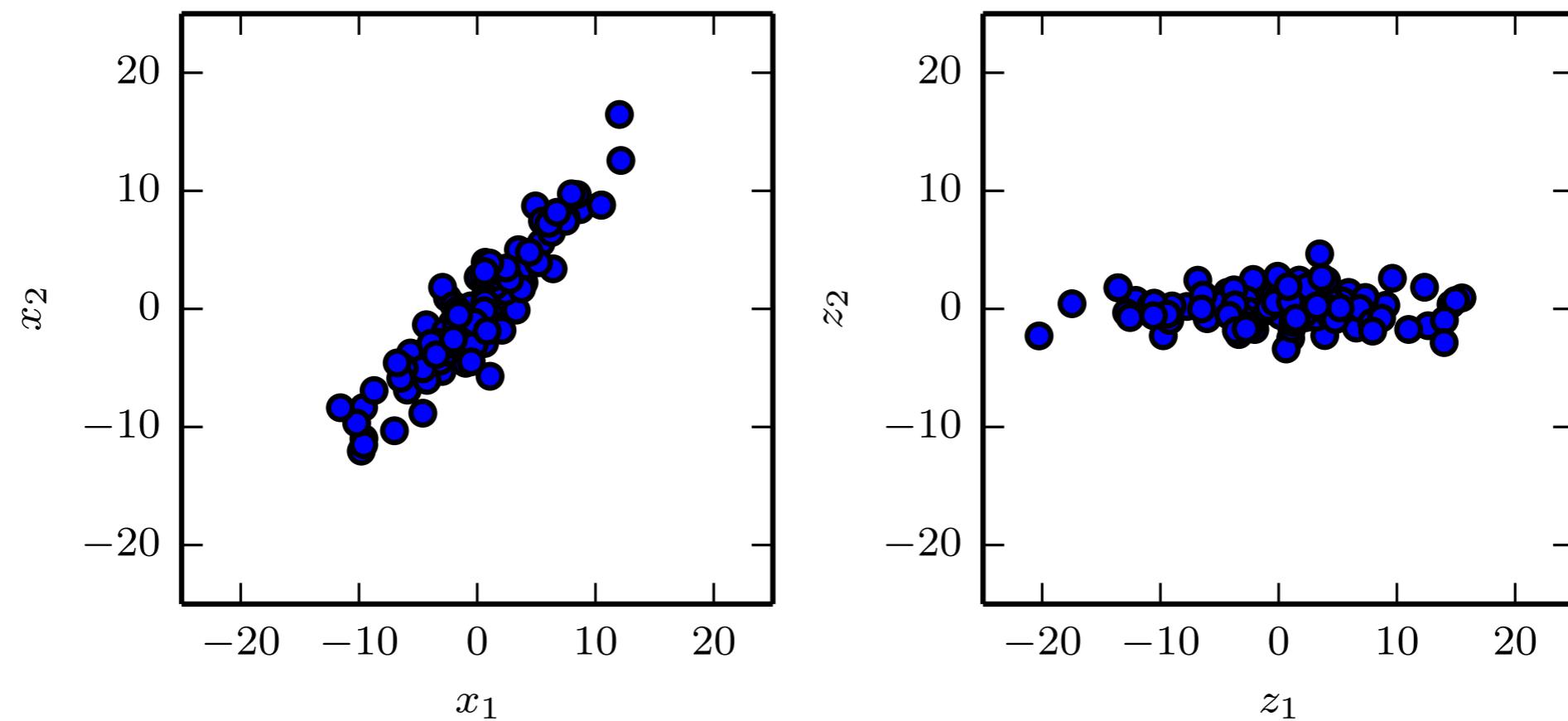


Figure 5.8

Curse of Dimensionality

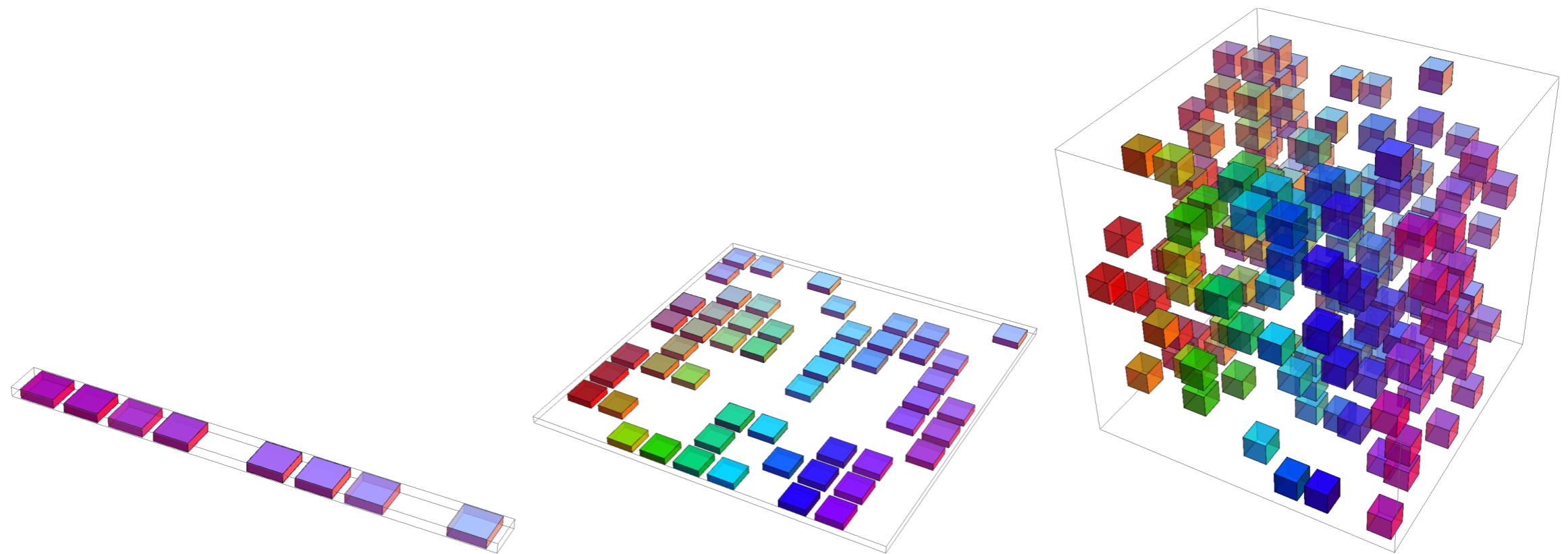


Figure 5.9

Nearest Neighbor

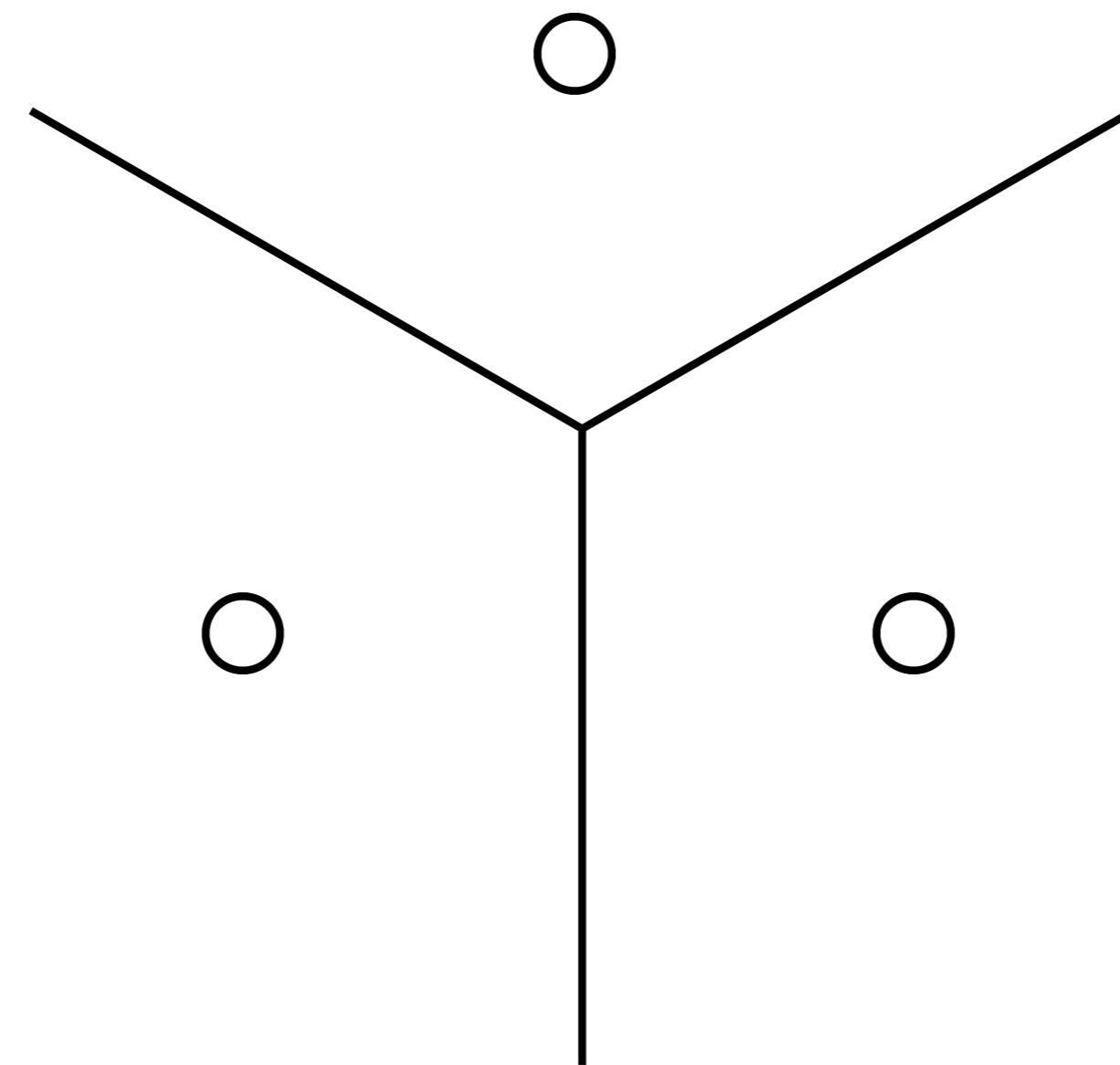


Figure 5.10

Manifold Learning

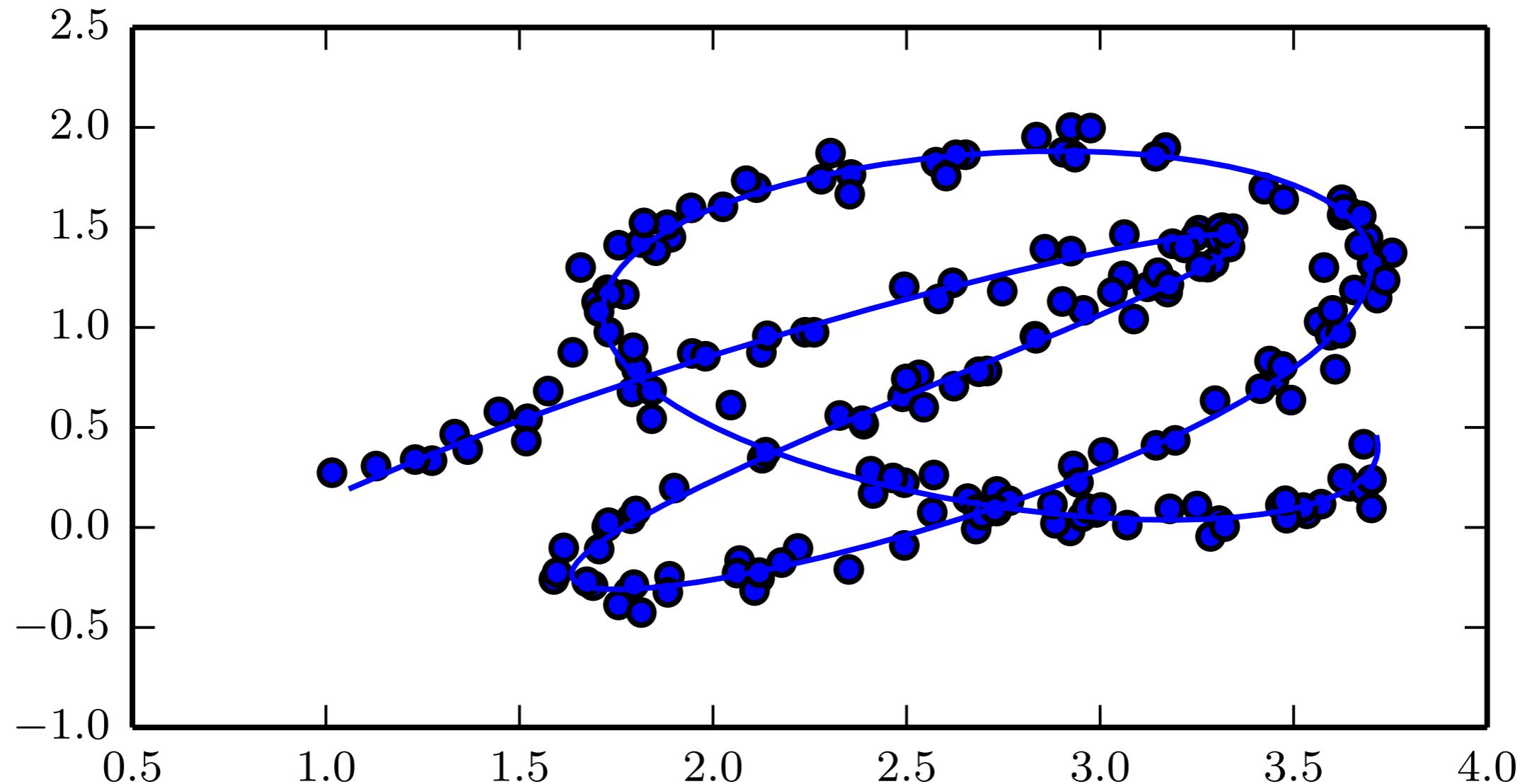


Figure 5.11

Uniformly Sampled Images

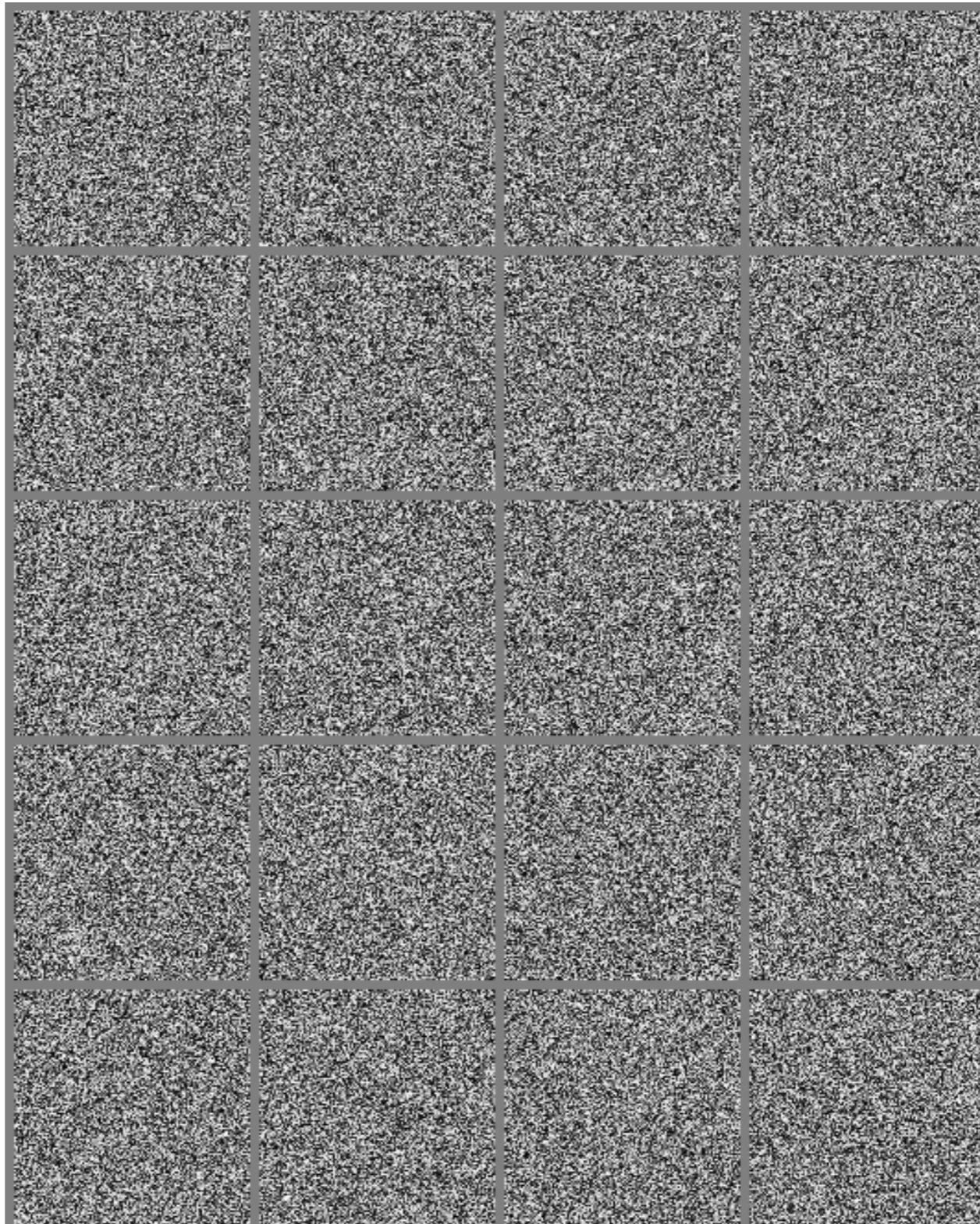


Figure 5.12

QMUL Dataset



Figure 5.13