

Neural Networks for Machine Learning

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Contents

| | | |
|----------|--|----------|
| 1 | Introduction | 5 |
| 2 | Perceptrons | 7 |
| 2.1 | Type of network | 7 |
| 2.2 | Perceptron | 7 |
| 2.3 | Geometrical view of perceptron | 8 |
| 2.3.1 | Weight-space | 8 |

Chapter 1

Introduction

Why is Machine Learning?

It is hard to write the program to compute and recognize

Chapter 2

Perceptrons

2.1 Type of network

- Feed-forward neural network: more hidden layers: deep. They compute a series
 - Recurrent network: have directed cycles in their connection graph; complicated dynamics; biological
 - remember information
 - Symmetrically connected networks: John Hopfield

2.2 Perceptron

The first generation of neural networks

The standard paradigm of statistical pattern recognition:

- Convert the row input into a vector of features activation
- Learn how to weight each of the feature activation to get the single scalar quantity

- set the threshold

Binary thresh neurons (decision units)

Learning procedure:

- add an extra component with value 1 to each input: bias
- Pick training case using any policy that ensure that every training case will keep getting picked
 - If the output unit is correct, leave its weight alone
 - If the output unit is incorrectly outputs a zero, add the input vector to the weight vector
 - If the output unit is incorrectly outputs a one, subtract the input vector from the weight vector ($w = w - \text{input}$)

2.3 Geometrical view of perceptron

2.3.1 Weight-space

has one dimension per weight

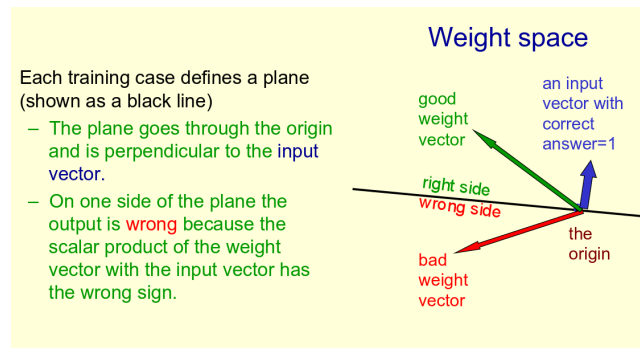


Figure 2.1: The weight space view