Lecture 1

Introduction

August 4, 2025

The Goal: Minimizing Error

The Fundamental Task

- The fundamental task in training a neural network is to find the optimal set of parameters (weights W) for a given architecture that minimizes the difference between the network's output and the true target values.
- This difference is quantified by a cost function (or loss function).

The Goal: Minimizing Error

The Setup

- We are given a network architecture, which is a parametric function $f(x; W)$, and a set of training data $(x^{(n)}, y^{(n)})$.
- The total error $E(W)$ is the average loss over all N training instances:

$$E(W) = \frac{1}{N} \sum_{n=1}^{N} \text{loss}(f(x^{(n)}; W), y^{(n)})$$

- Our goal is to find the weights W that minimize this cost function.