Machine Learning

Week 1

Introduction

What is Machine Learning?

Arthur Samuel: Field of study that gives computers the ability to learn without being explicitly programmed.

Tom Mitchel: A computer program is said to learn from experience E with respect to some task T and some performance measure P, if its performance on T, as measured by P, improves with experience E.

Two Main Types of Machine Learning Algorithms:

* Supervised learning
* Unsupervised learning

Others: Reinforcement learning, recommender systems.

A screenshot of a social media post

Description automatically generated

Supervised Learning:

We gave our learning algorithm what the ‘right answers’ are, i.e. the labels.

Prediction Housing Prices: This is a regression problem – continuous output

Predicting Breast Cancer Type: This is a classification problem – discrete output

We can use different numbers of features for our learning algorithms.

A screenshot of a social media post

Description automatically generated

Unsupervised Learning:

Clustering Algorithm:

* Ex. Use case: Google News shows different news article about the same news event.
* Organizing computing clusters
* Social network analysis
* Market segmentation
* Astronomical data analysis

Non-clustering Algorithm:

The Cocktail party problem

* It’s very noisy and there are a lot of overlapping voices
* We put two microphones in the room at different positions
* There are two speakers, each microphone picks up each speaker at different distances
* The algorithm detects the two different audio sources and filters out the other source

A screenshot of a social media post

Description automatically generated