Machine Learning Course

By Kaustubh Olpadkar

Introduction

What Machines can do better than humans?

Mathematical Operations

Repetition of Operations

Storing & Processing volume of Data

What Humans can do better than machines?

Creativity & Imagination

Thinking

Learning

Insights

What is Artificial Intelligence?

Artificial Intelligence is a way of making a computer, a computer-controlled robot, or a software think intelligently, in the similar manner the intelligent humans think.

"The science and engineering of making intelligent machines, especially intelligent computer programs" - John McCarthy - The Father of AI

Philosophy of AI - "Can a machine think and behave like humans do?"

What is Machine Learning?

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

As Humans learn from Books, Experiences and Interactions with the environments.

Same algorithm can run successfully in different domains.

Why Now?

Techniques were invented many decades ago. But Machine Learning is applied largely in 21st century.

- Rise of Big Data.
- Computation Power Increased.
- IoT devices Increased.
- Various Social Platforms generated large volume of data.
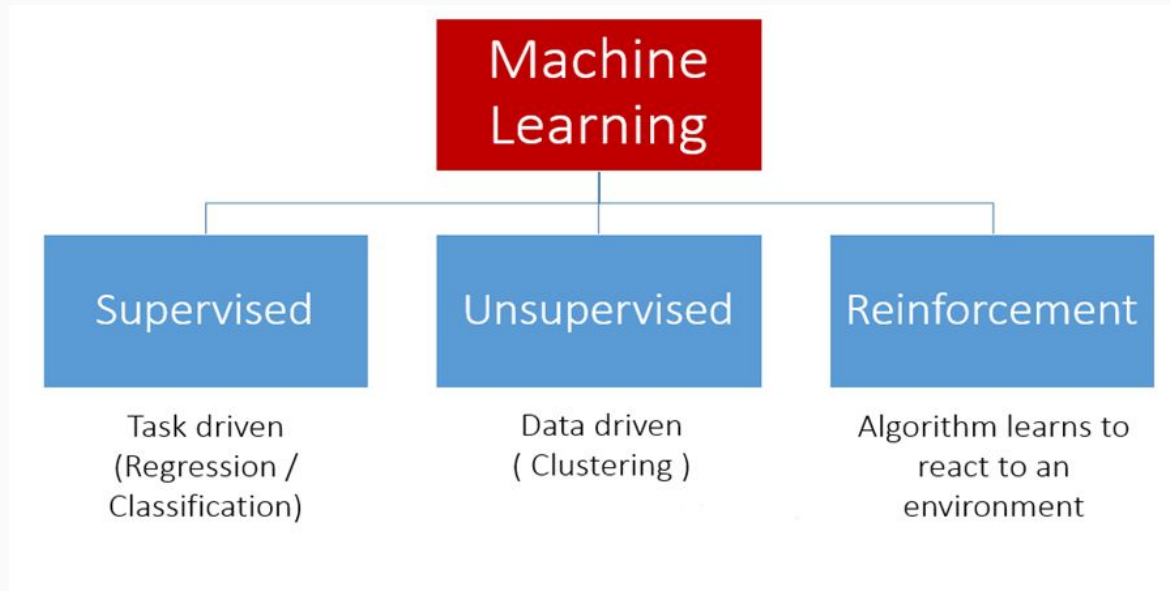- Investment of Large Tech Companies.
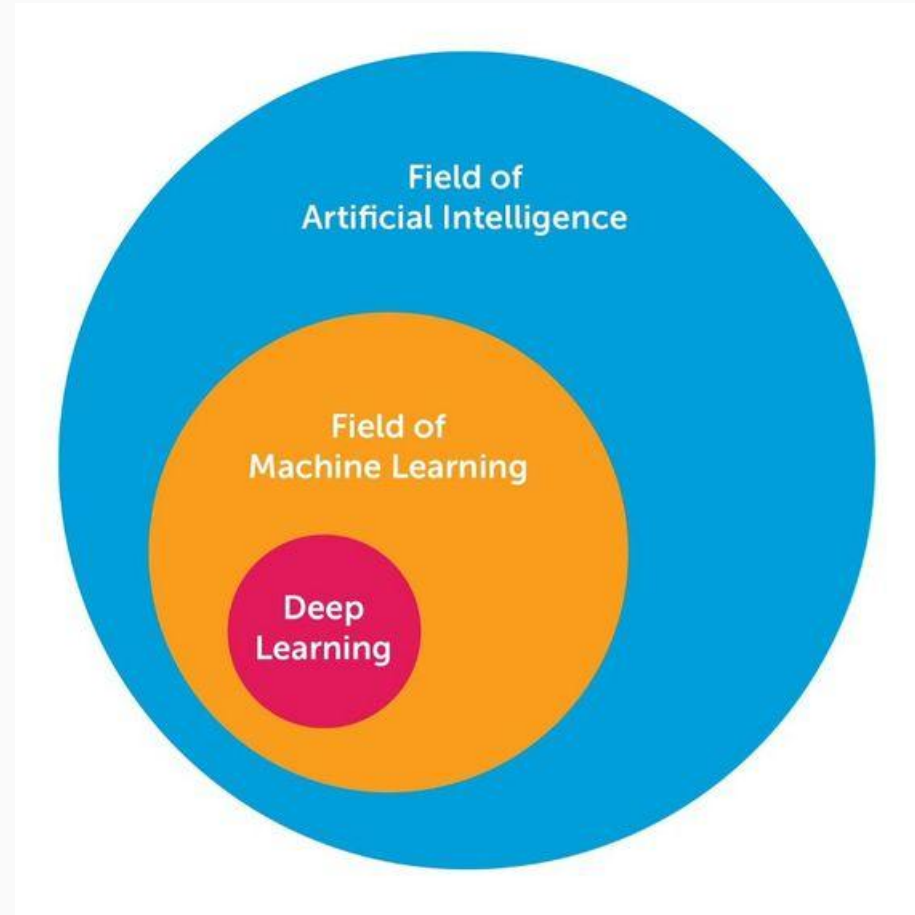
"If you torture the data long enough, it will confess!"
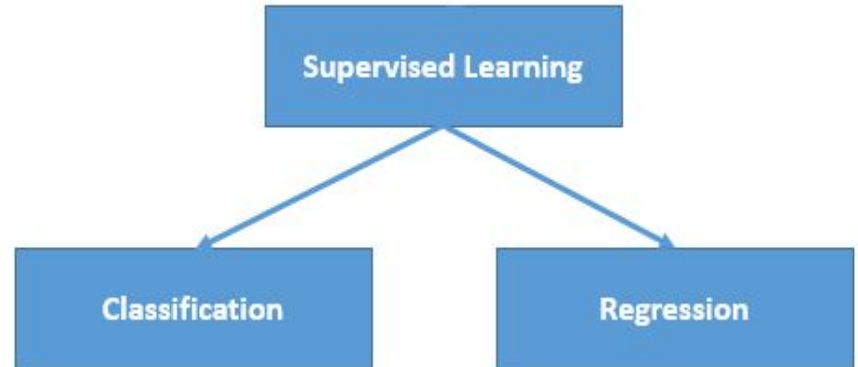
—

- Ronald Coase

Types of Machine Learning

Supervised Learning

Supervised learning is the machine learning task of learning a function that maps an input to an output based on example input-output pairs

The majority of practical machine learning uses supervised learning.
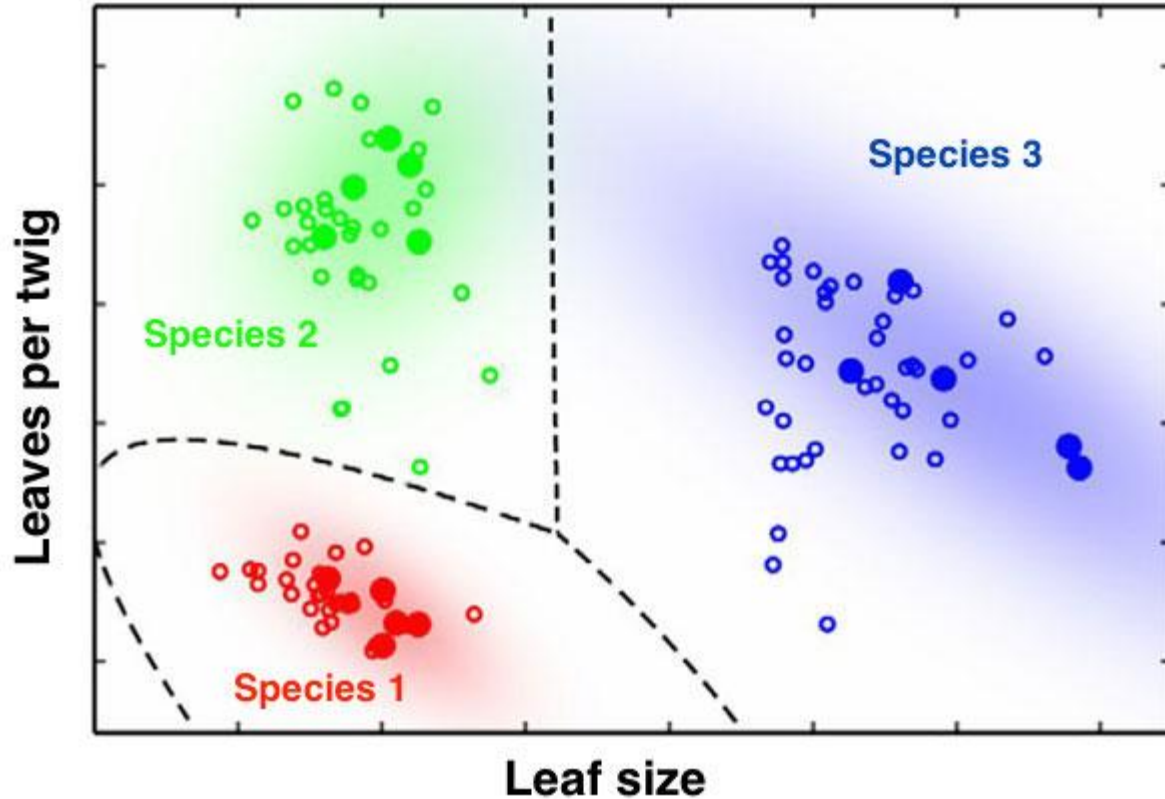
Classification

A classification problem is when the output variable is a category, such as "red" or "blue" or "disease" and "no disease".

Binary Classification and Multivariate Classification.

- Logistic Regression
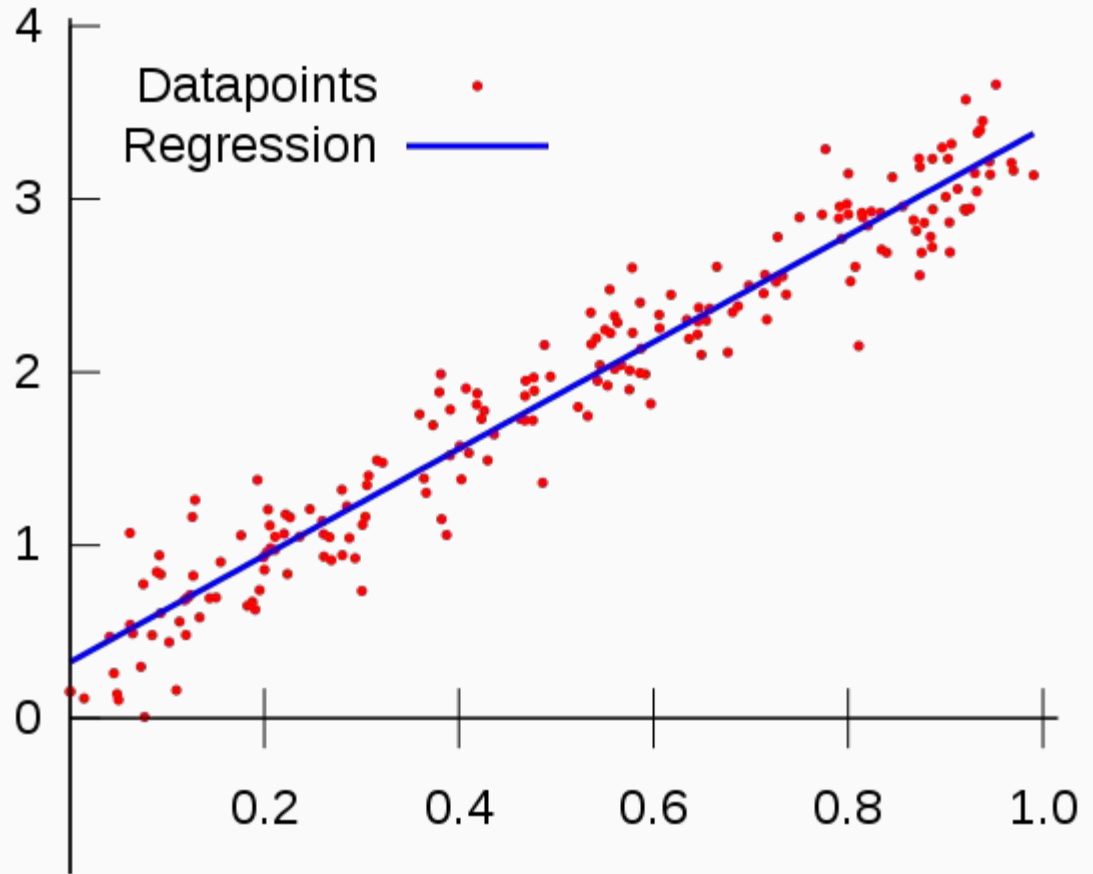- K nearest neighbours
- Decision Trees
- Neural Networks
- SVM

Regression

A regression problem is when the output variable is a real value.

Approximating a function of real value.

- Linear Regression
- Neural Networks
- K means clustering

Unsupervised Learning

The training data does not include Targets here so we don't tell the system where to go, the system has to understand itself from the data we give.

The goal for unsupervised learning is to model the underlying structure or distribution in the data in order to learn more about the data.
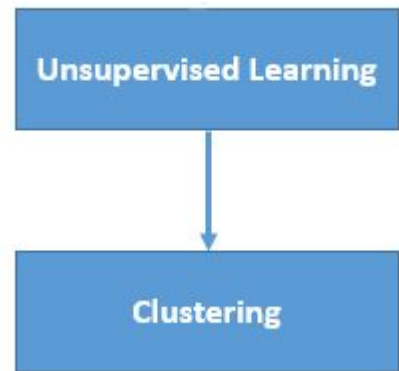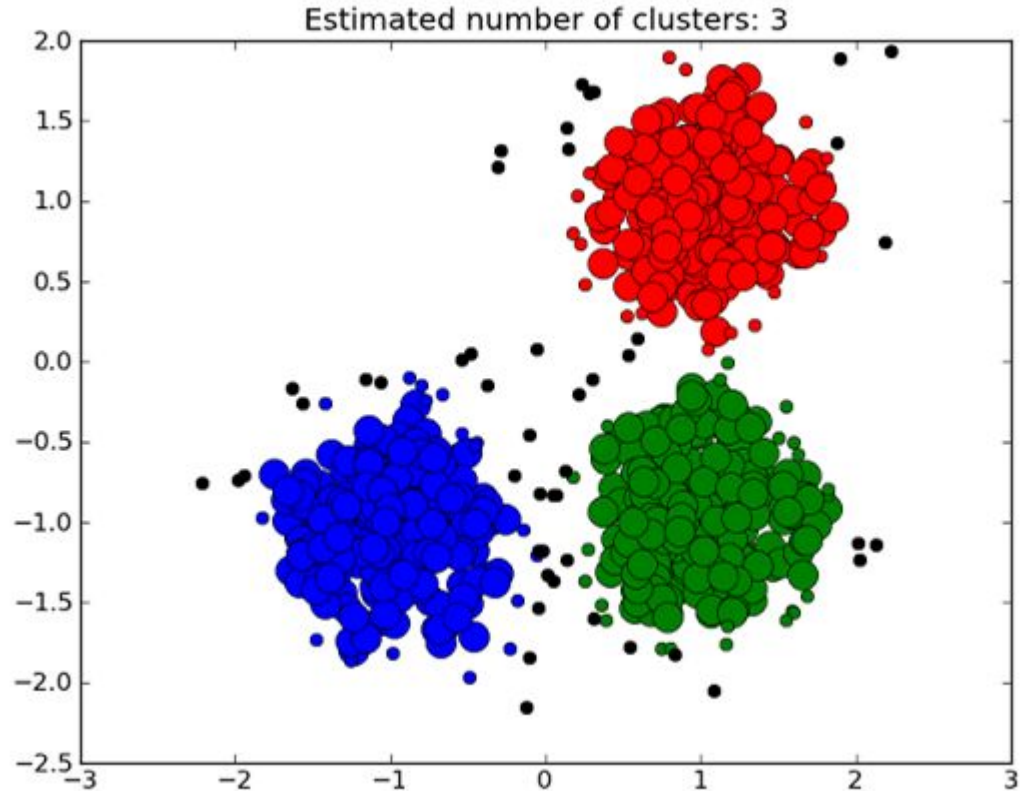
Clustering

A clustering problem is where you want to discover the inherent groupings in the data, such as grouping customers by purchasing behavior.

This is a type of problem where we group similar things together.

- K means Clustering
- DBSCAN
- SNN

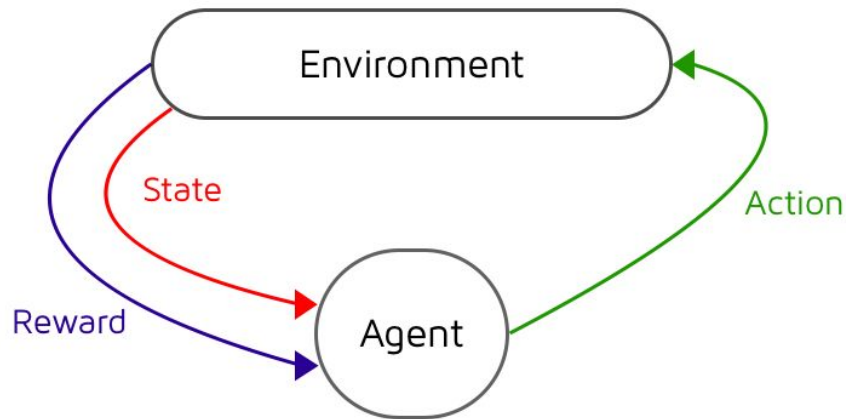Estimated number of clusters: 3

Reinforcement Learning

Reinforcement learning (RL) is an area of machine learning concerned with how agents should take actions in an environment so as to maximize some notion of cumulative reward.

Applications:

Self-Driving Cars
Automated Drones

Evolutionary Algorithms

Inspired from Biological Evolution and Darwin's theory of natural selection - *Survival of Fittest!*

It contains 4 overall steps: *initialization, selection, genetic operators, and termination*. These steps each correspond, roughly, to a particular facet of natural selection, and provide easy ways to modularize implementations of this algorithm category.
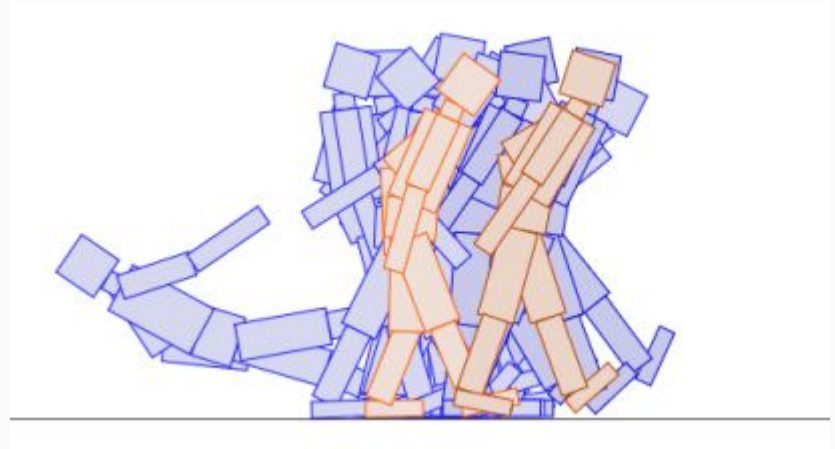
"A breakthrough in Machine Learning would be worth ten Microsofts."

— Bill Gates

Thanks!

Contact:

Kaustubh Olpadkar
56, Narayan Orbis
Sun Pharma Road
Vadodara, 390012

kaustubh.olpadkar@gmail.com
www.simulations.ml