



{ p r o g r a m m i n g }

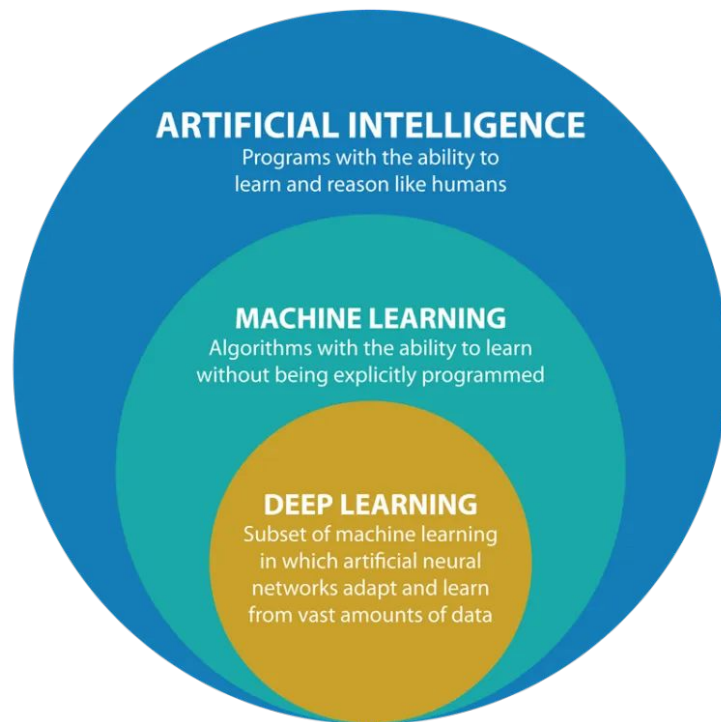
Introduction to Machine Learning

August 12th, 2020

What is machine learning?

Definition

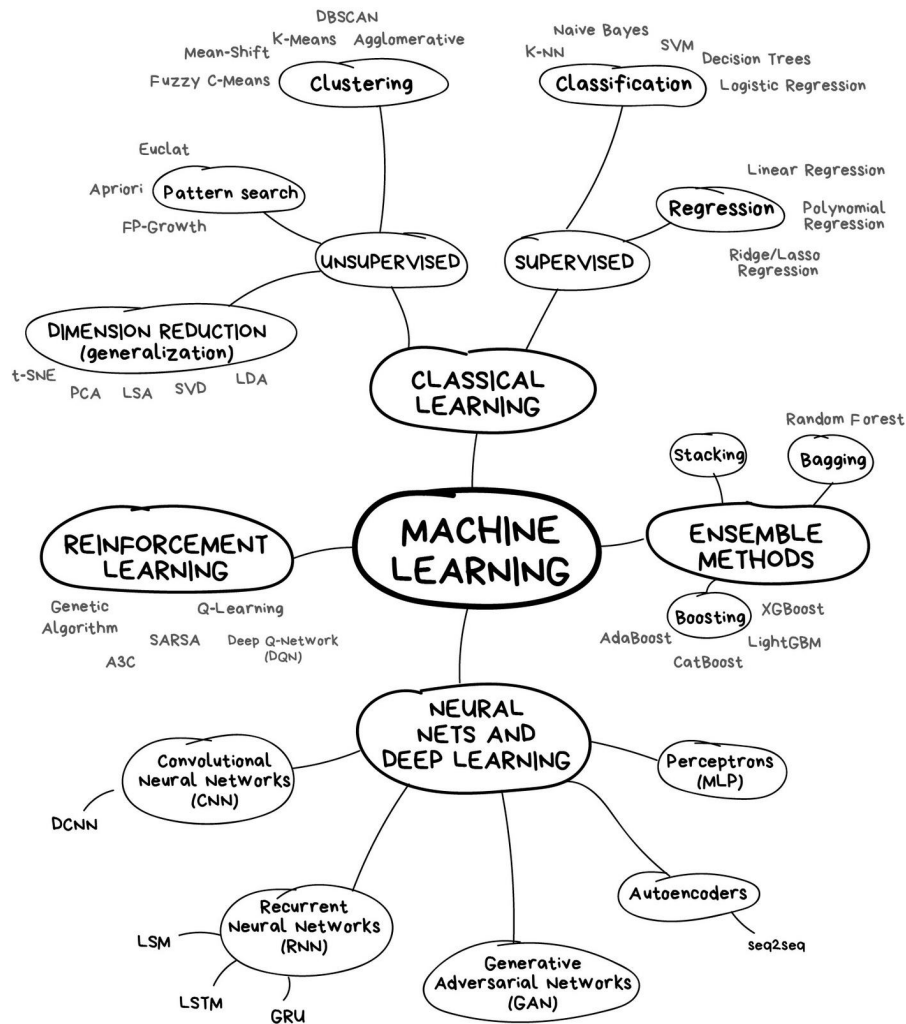
“Machine learning is the science of getting computers to act without being explicitly programmed.” — [Stanford University](#)



Machine Learning

Different types

- Supervised
 - Classification
 - Regression
- Unsupervised
 - Clustering
 - Dimension reduction
- Reinforcement learning
- Ensemble methods
- Deep learning



Supervised

What does it mean?

- Labeled data
(=input and output data is known)

Cat



Cat



Dog



Dog



Dog



Cat



Unsupervised

What does it mean?

- Unlabeled data

?



?



?



?



?



?



Supervised

Classification

- The process of predicting a *class* given data points

Class 1



Class 2

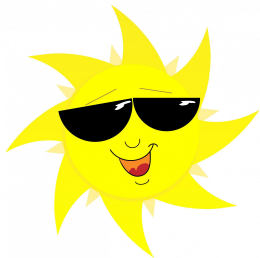


Supervised

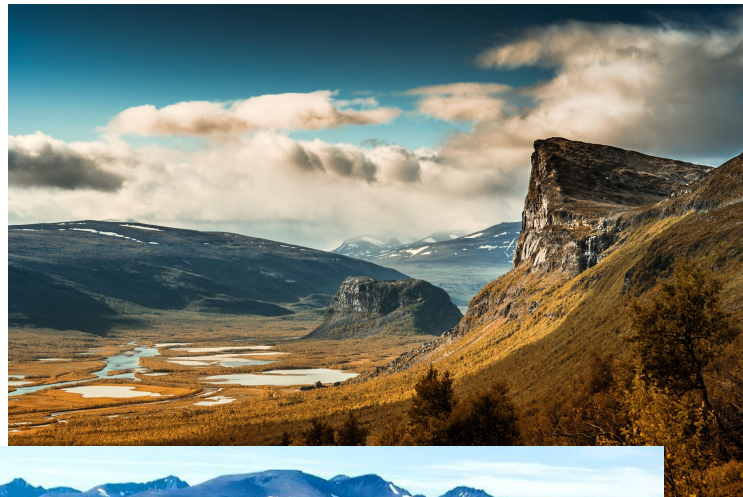
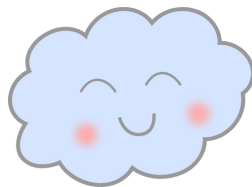
Regression

- The process of predicting a *value* given data points

25 °C



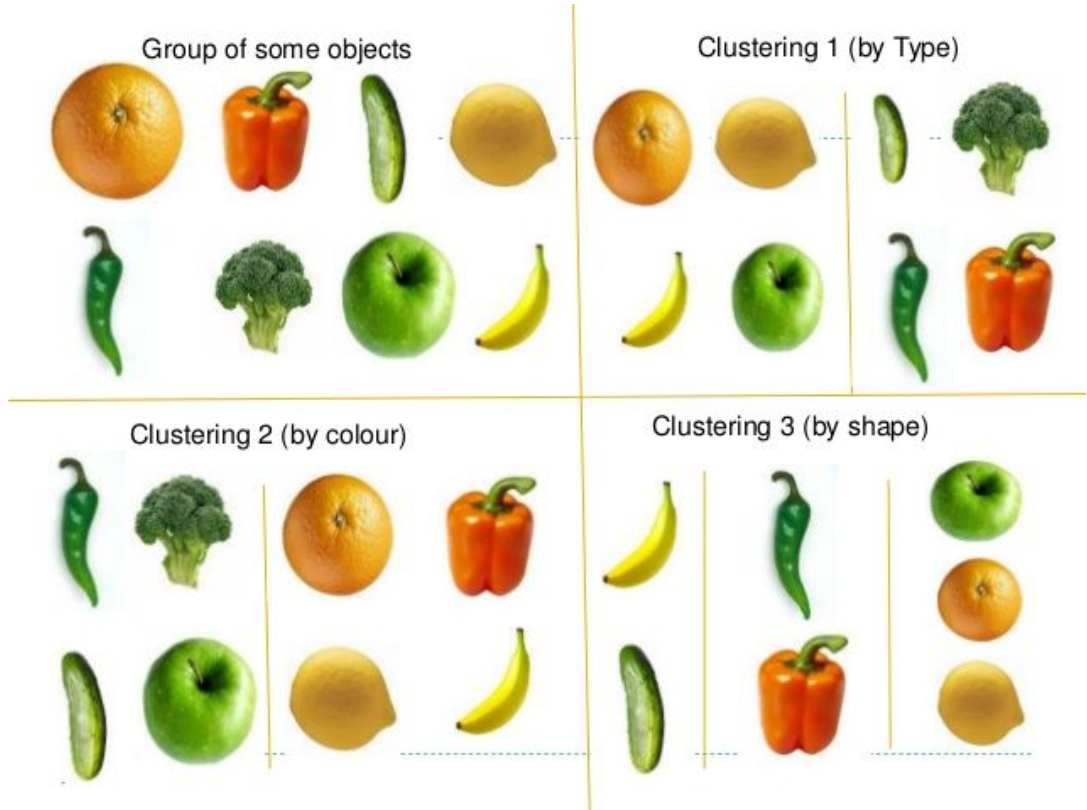
15 °C



Unsupervised

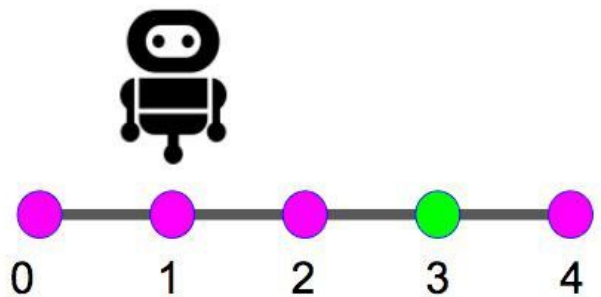
Clustering

- The process of organizing objects into groups whose members are similar in some way



Reinforcement learning

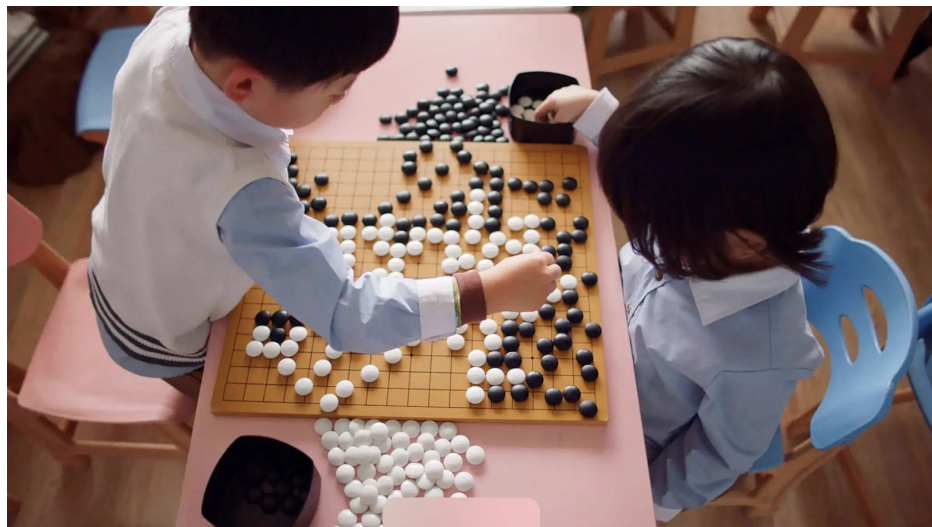
Reward based learning



Reinforcement learning

Go

- originated in China 3000 years ago
- two players
- white and black stones
- surround and capture opponents stones or strategically create spaces of territory
- simple rules, but profoundly complex



Reinforcement learning

AlphaGo

- In October 2015, AlphaGo won against a Go professional with a score of 5-0.



Reinforcement learning

AlphaStar

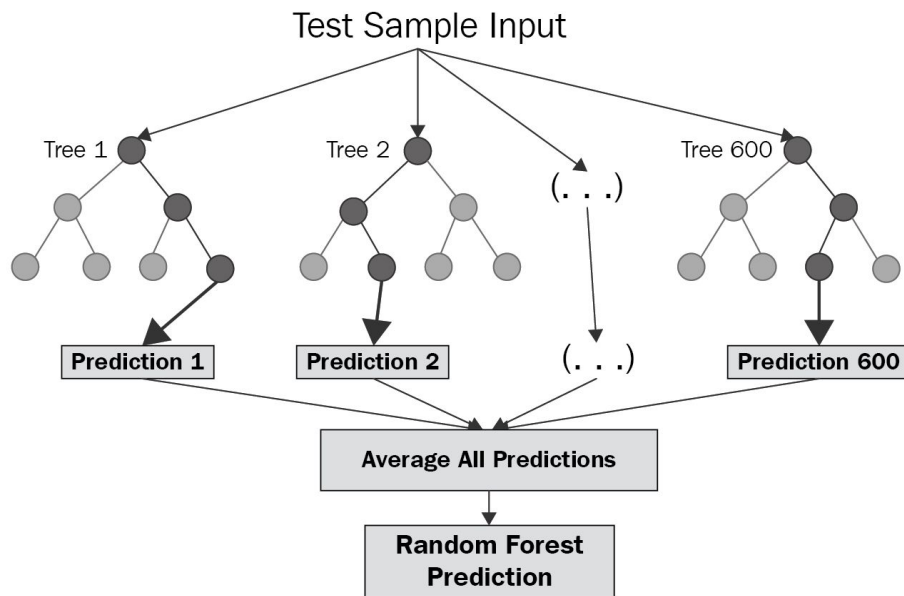
- In December 2019, AlphaStar defeated top professional players in StarCraft
- One of the most challenging Real-Time Strategy (RTS) games



Ensemble methods

A technique of combining multiple base models to create an improved one.

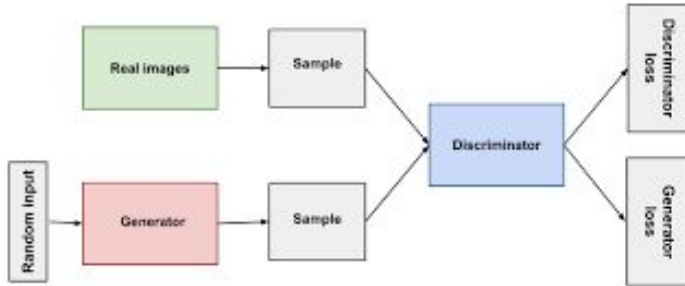
- Random forest
- AdaBoost
- XGBoost
- LightGBM
- CatBoost



Neural Nets & Deep learning

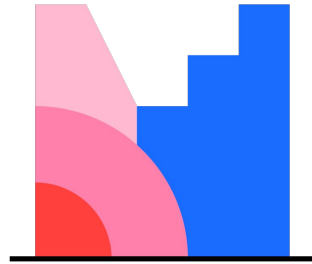
Deep fakes

- GAN (Generative Adversarial Networks)
- Generate video content that has not occurred



Question

We are surrounded by machine learning, can you think of anything you use on a daily-basis that uses machine learning algorithms?



Mentimeter

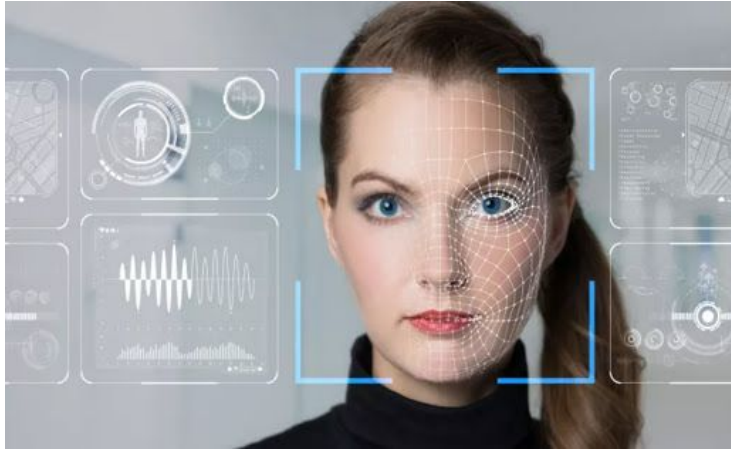
Real life application

Virtual Personal Assistants



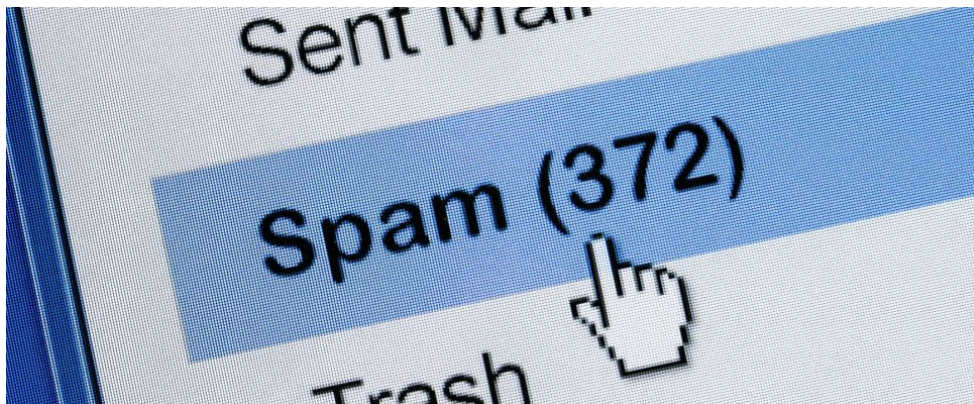
Real life application

Social Media (Face recognition, Sentimental analysis etc.)



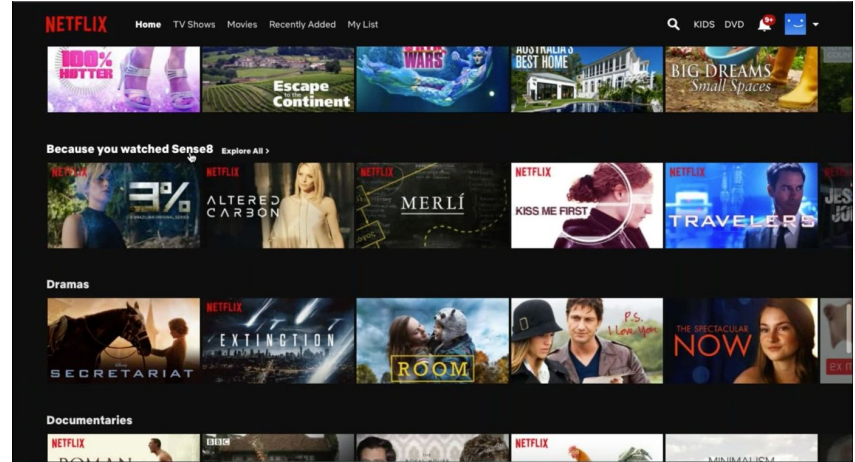
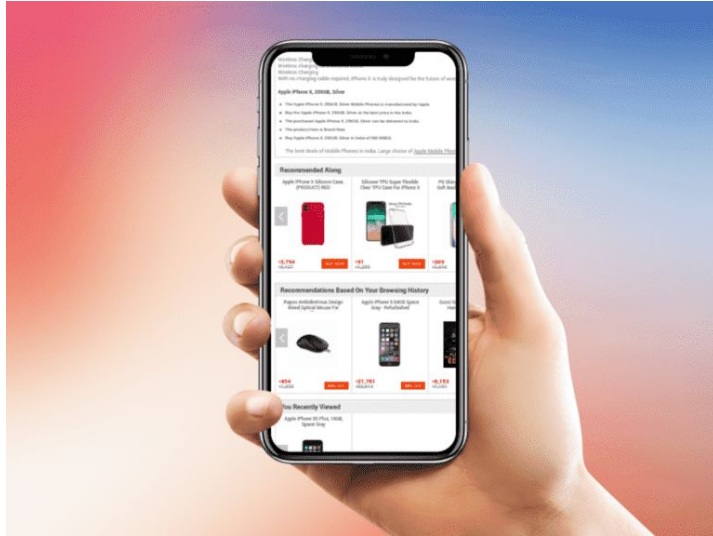
Real life application

Email spam and malware detection



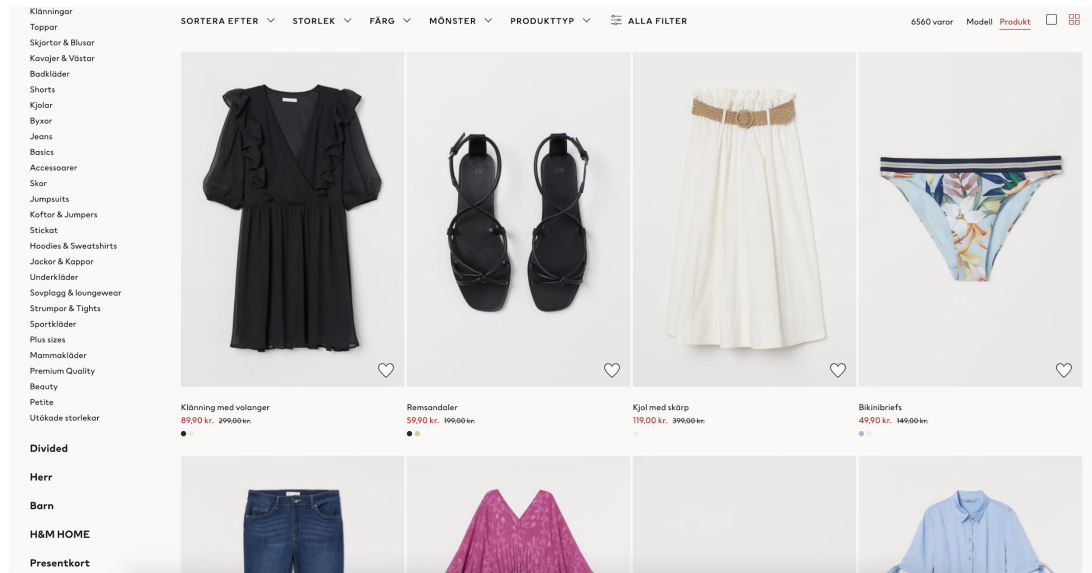
Real life application

Product recommendations



Real life application

Markdown Online



Difficulties

Ethics

If my self-driving car kills someone on the road, whose fault is it?



Difficulties

Data

- Lack of data
- Lack of good data

“Garbage in, garbage out”



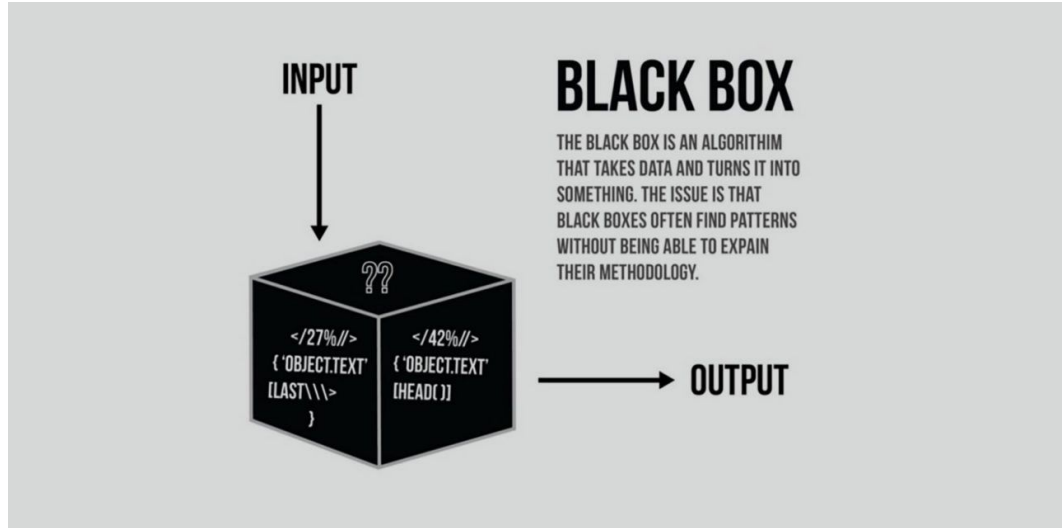
Your analysis is as good as your data.



Difficulties

Interpretability

Difficult to convince business to use the model in practise



Thank you for listening! :)