

# Recitation CS:461

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# Outline:

- ❑ How do we learn ?
  - ❑ How computer understand things ?
- ❑ Different kinds of Programming
  - ❑ Machine learning concepts
- ❑ Types of machine learning.
  - ❑ What is machine learning?
- ❑ Main goals of machine learning
  - ❑ Machine learning famous algorithms

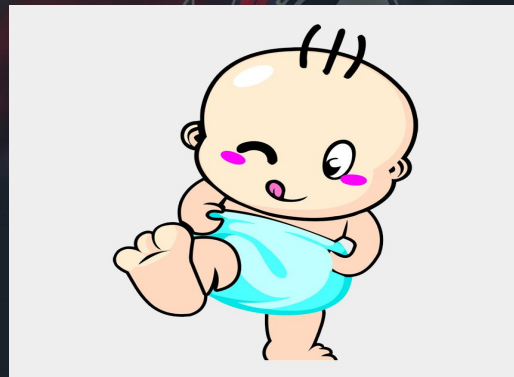


# How do we learn??

- In school



- In real life



# Different kinds of Programming

Classical programming

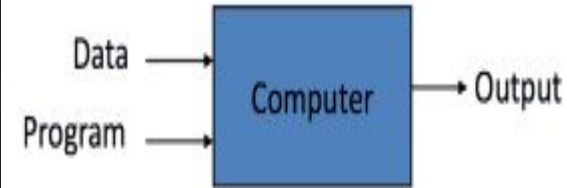
using structures as input

In some cases they can be intelligent

Machine learning or Data science

Using data as input

## Traditional Programming



## Machine Learning



# Machine learning concepts

- Training , Validation , Test Set

Dividing our whole data set to three parts for different purpose

- Overfitting

Just memorize the train set like the students who memorise math :)

- Underfitting

Just understanding not enough to learn the patterns and .....



# Types of Machine learning

a) Supervised learning

b) Unsupervised learning

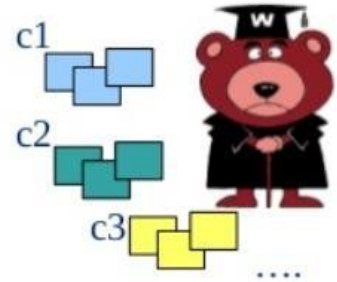
c) Semi supervised learning

d) Reinforcement Learning

## Supervised Vs. Unsupervised

### ▪ Supervised

- **knowledge of output** - learning with the presence of an "expert" / teacher
  - data is **labelled** with a class or value
  - **Goal:** predict class or value label
    - e.g. Neural Network, Support Vector Machines, Decision Trees, Bayesian Classifiers ....

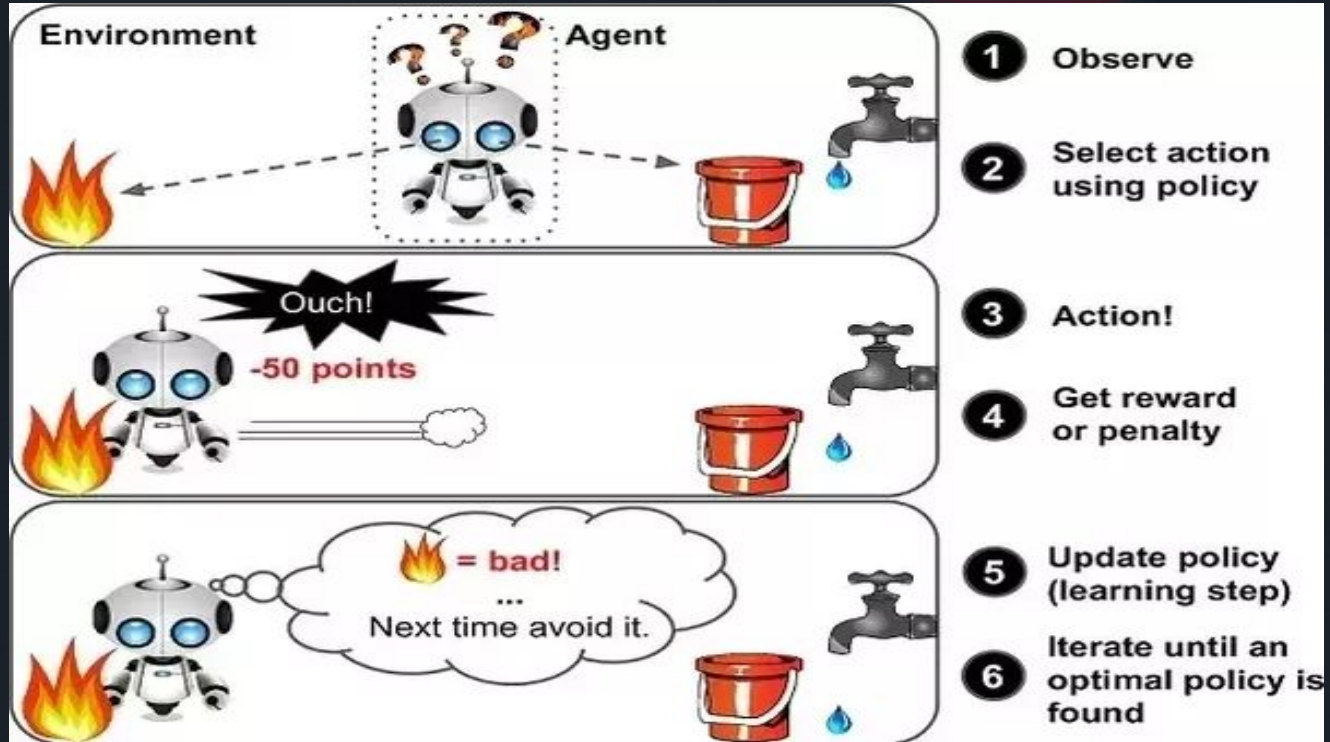


### ▪ Unsupervised

- **no knowledge of output** class or value
  - data is **unlabelled** or value un-known
  - **Goal:** determine data patterns/groupings
- Self-guided learning algorithm
  - (internal self-evaluation against some criteria)
  - e.g. k-means, genetic algorithms, clustering approaches ...



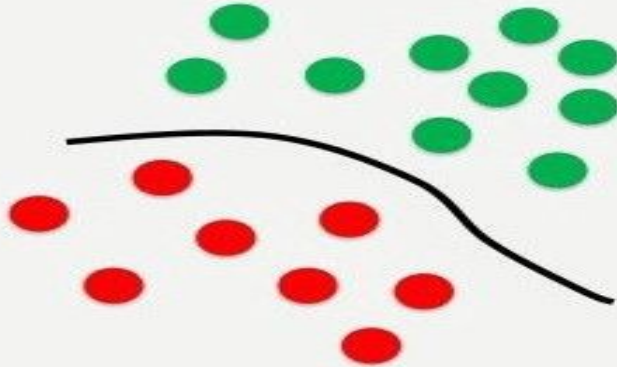
# Reinforcement Learning



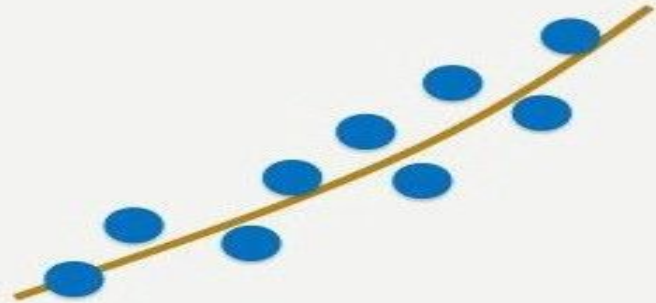
# Main goals of supervised machine learning

## CLASSIFICATION vs REGRESSION

Classification

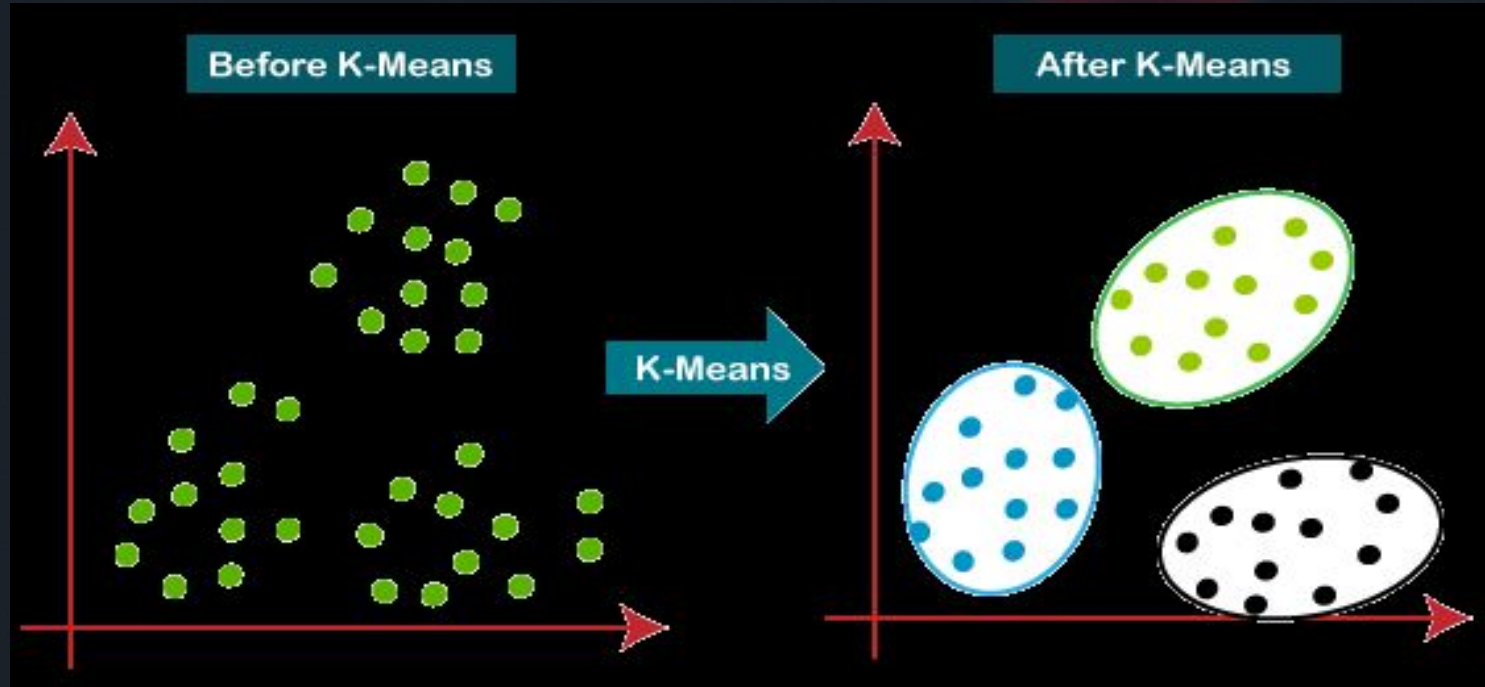


Regression





# Main goal of Unsupervised machine learning



# Famous Machine learning Algorithms

## → Supervised Learning

◆ Decision Tree

◆ Artificial Neural Networks

- Dense
- Deep learning
- CNN
- GAN



◆ SVM

◆ KNN

# Famous Machine learning Algorithms

→ Unsupervised Learning

◆ K-mean



# Decision Tree

- Most similar machine learning algorithm to Classical Programming

Different parts of Decision tree :

- Leaf
- branch
- Node
- Main node

