# C.A.S.A. in C.V.

## Context Aware Security Analytics in Computer Vision
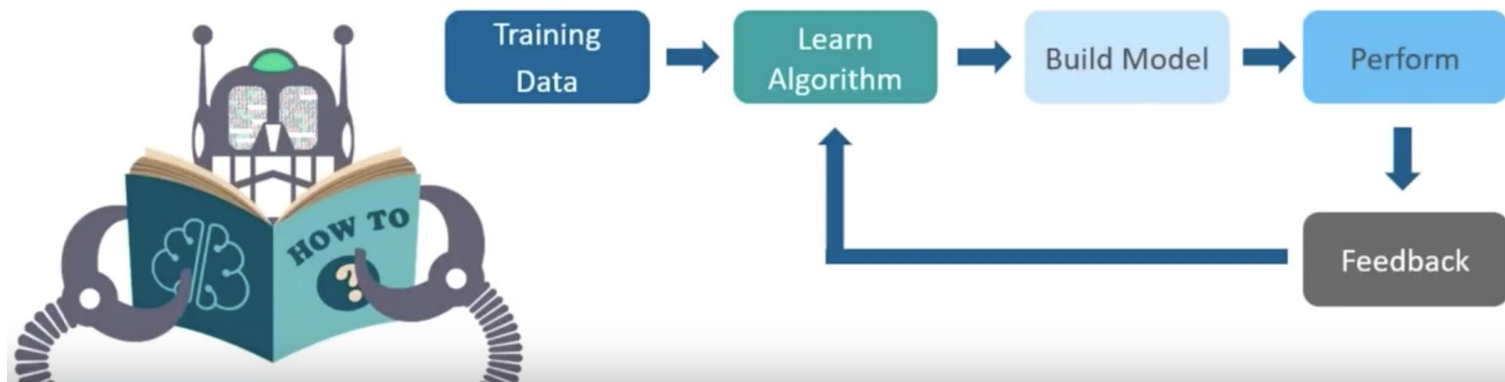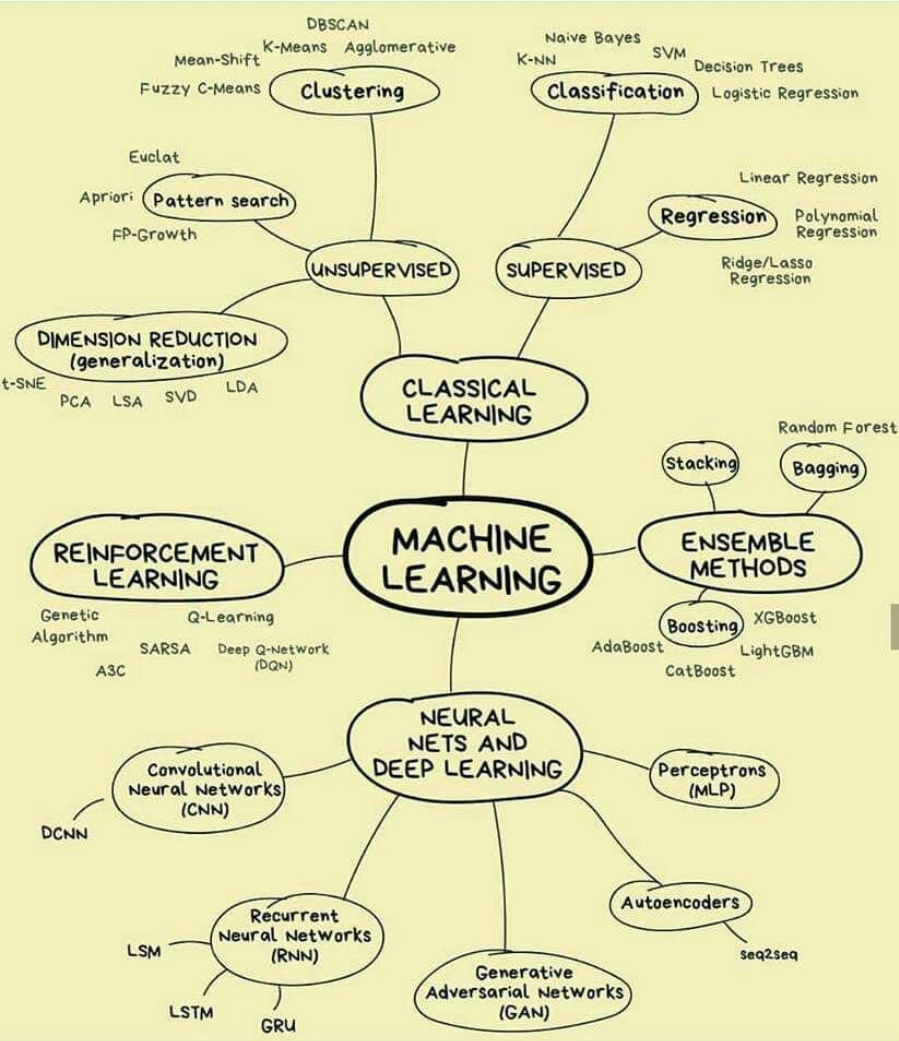
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# What is Machine learning?

It is a type of **Artificial Intelligence** that allows software applications to learn from the data and become more accurate in predicting outcomes without **human intervention.**

- **Supervised**
  his is a process of an algorithm learning from the training dataset.

- **Unsupervised**
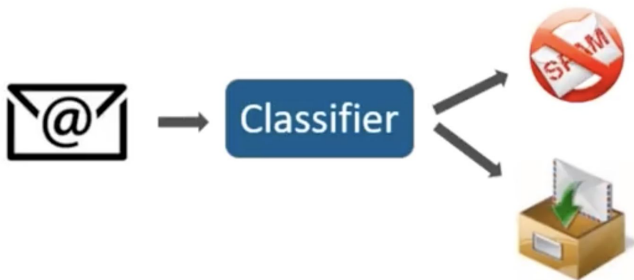  This is a process when a model is trained using an information which is not labelled.
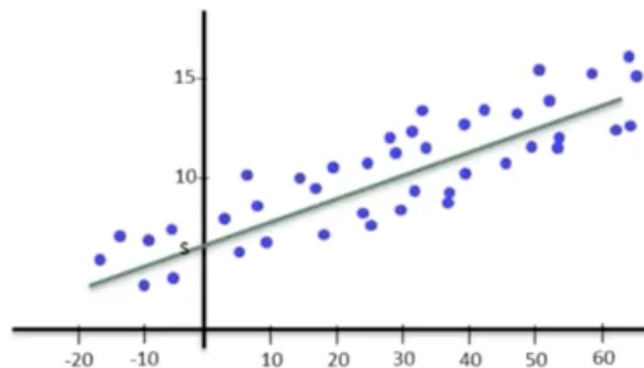
# Supervised learning : Classification & Regression

Classification is the problem identifying to which set of **categories** a new observation belongs.

Regression is the prediction of a numeric value and often takes input as a **continuous** value. Example : house prices

# Naive Bayes Classifier

$$p(C_k \mid \mathbf{x}) = \frac{p(C_k)\, p(\mathbf{x} \mid C_k)}{p(\mathbf{x})}$$

Is the simplest classifier in the library, it is fast and efficient.

You can find technical description in the documentation:

https://scikit-learn.org/stable/modules/classes.html#module-sklearn.naive_bayes

You can predict a parameter based on observed data on parameters. X is the data e C è la label che vogliamo classificare.
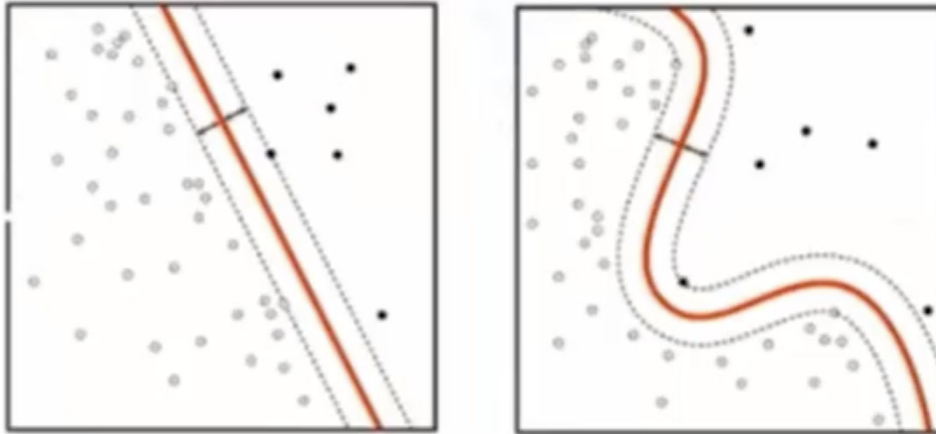
**https://scikit-learn.org/stable/modules/naive_bayes.html**

# Support Vector Machine (SVM)

- is a supervised machine learning algorithm which can be used for both classification and regression challenges.
- It tries to define an hyperplane which can **split** the data in the most optimal way.
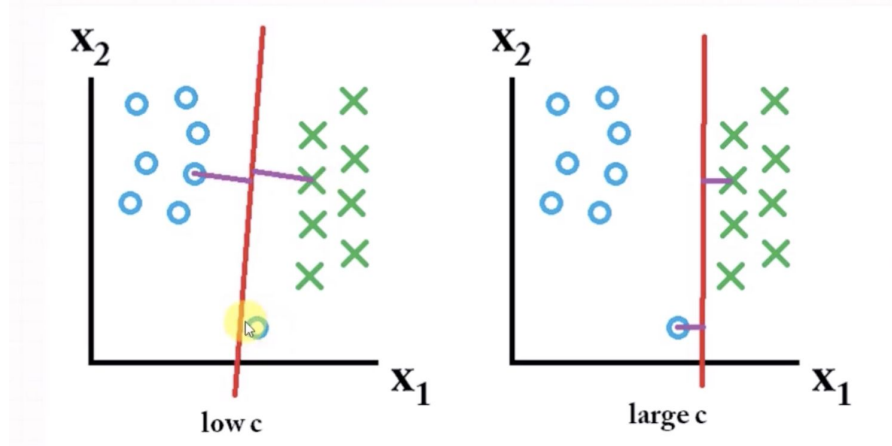
# Linear SVM - let's see the parameters

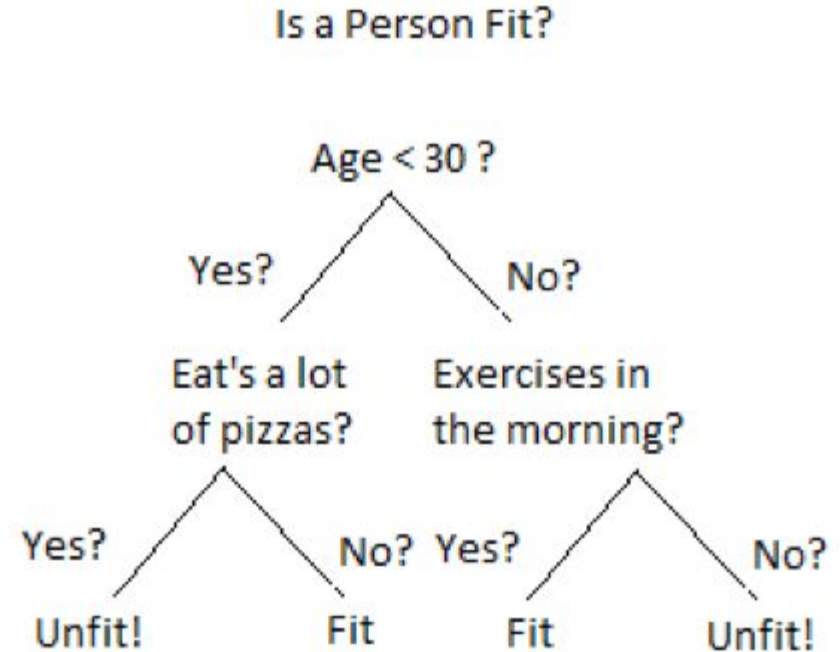**C factor** = how much you care about misclassification.

# Decision Tree

Is method to take decision according to the data.

Is something very similar to a if/else structure.

The class is on the leaves.



Is a Person Fit?

Age < 30 ?

Yes?  No?

Eat's a lot of pizzas?  Exercises in the morning?

Yes?  No?  Yes?  No?

Unfit!  Fit  Fit  Unfit!