Machine learning

- ✓ Machine Learning is a class of algorithms which is data-driven, i.e. unlike "normal" algorithms it is the data that "tells" what the "good answer" is.

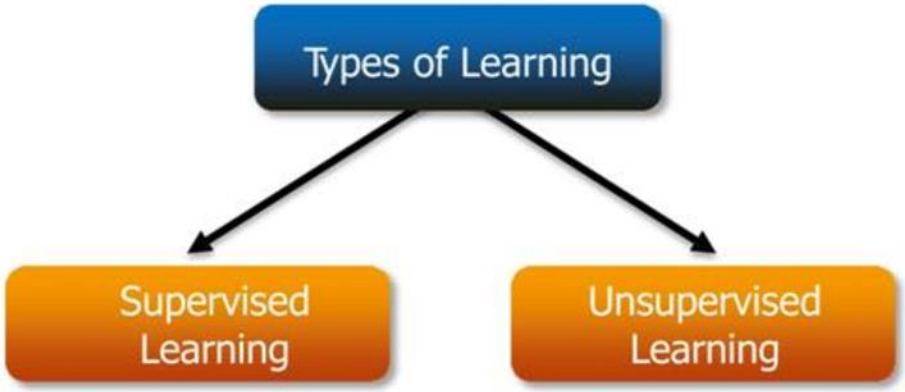
- ✓ **Example:**

  An hypothetical non-machine learning algorithm for face recognition in images would try to define what a face is (round skin-like-colored disk, with dark area where you expect the eyes etc).

  A machine learning algorithm would not have such coded definition, but will "learn-by-examples": you'll show several images of faces and not-faces and a good algorithm will eventually learn and be able to predict whether or not an unseen image is a face.

Learning Techniques

Attain knowledge by study, experience, or by being taught.

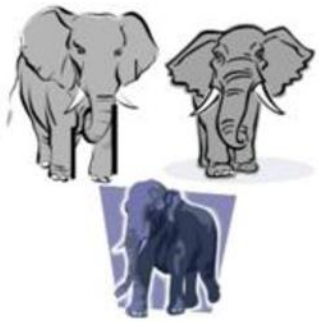


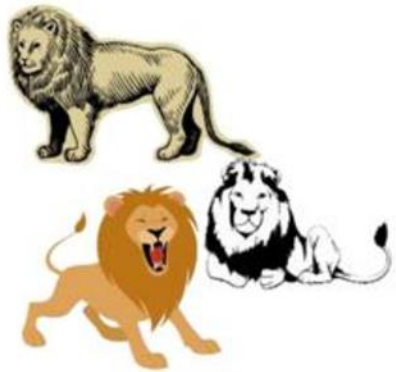
Supervised Learning

Supervised learning : Training data includes both the input and the desired results.

- ✓ For some examples, the correct results (targets) are known and are given in input to the model during the learning process.
- ✓ The construction of a proper training, validation and test set (Bok) is crucial.
- ✓ These methods are usually fast and accurate.
- ✓ Have to be able to generalize: give the correct results when new data are given in input without knowing a priori the target.

Supervised Learning



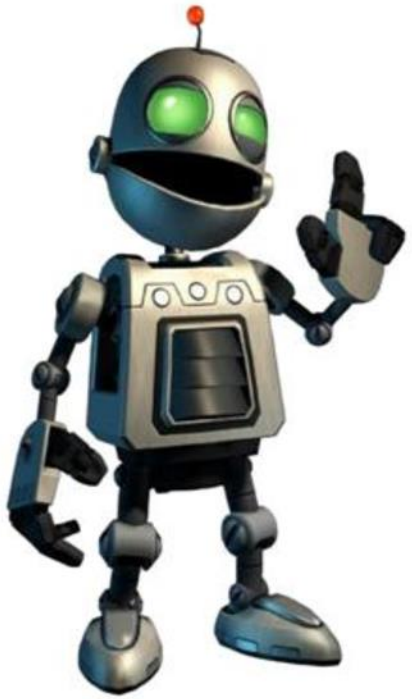


Unsupervised learning

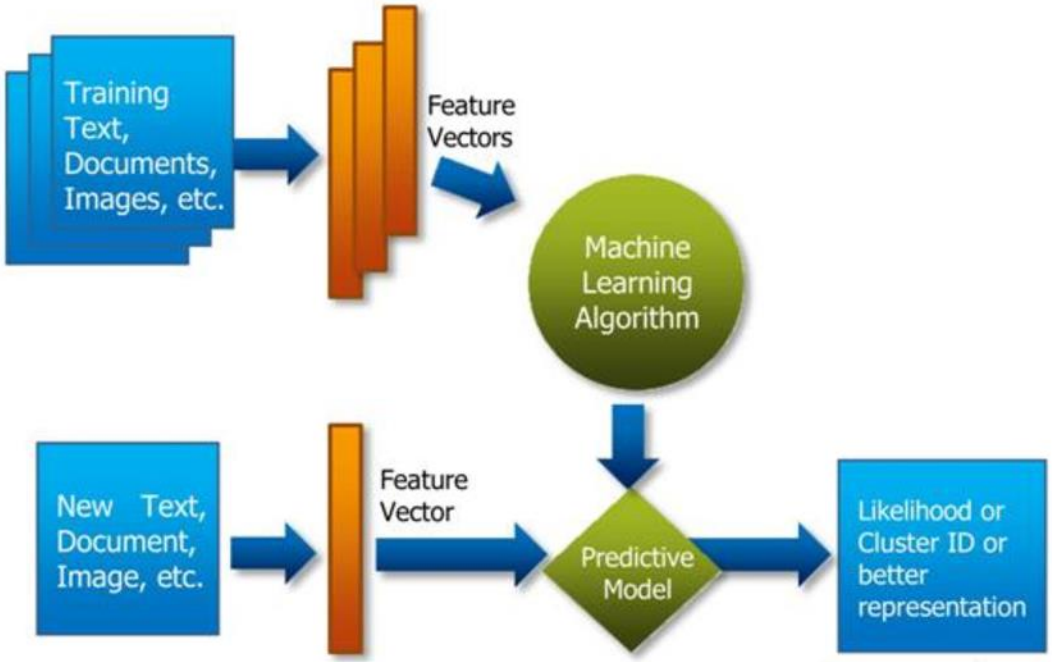
Unsupervised Learning:

- ✓ The model is not provided with the correct results during the training.
- ✓ Can be used to cluster the input data in classes on the basis of their statistical properties only Cluster significance and labeling.
- ✓ The labeling can be carried out even if the labels are only available for a small number of objects representative of the desired classes.

Examples



Example – Unsupervised Learning Model



Machine Learning Use Cases – You Tube

YouTube utilizes recommendation systems to bring videos to a user that it believes the user will be interested in.

They are designed to:

- ✓ Increase the numbers of videos the user will watch
- ✓ Increase the length of time he spends on the site, and
- ✓ Maximize the enjoyment of his YouTube experience.

Use Case – You Tube (Contd.)

User Activity:

In order to obtain personalized recommendations, YouTube's recommendation system combines the related videos association rules with the user's personal activity on the site.

This includes several factors:

- ✓ There are the videos that were watched - along with a certain threshold, say by a certain date. After all, you don't want to count videos watched from 2 years ago if the user has watched enough videos, most likely.
- ✓ Also, YouTube factors in with emphasis any videos that were explicitly "liked", added to favourites, given a rating, added to a playlist. The union of these videos is known as the seed set.
- ✓ Then, to compute the candidate recommendations for a seed set, YouTube expands it along the related videos.

Use Case – Wine Recommendation

Use Case – Wine Recommendation (Contd)

What wine will I enjoy? More than 2 million consumers turn to the Internet for the answer to this question every day

Problem

- Mysterious ratings and adjective-based reviews do little to help consumers decide which wine to buy
- They can't even agree amongst themselves

Solution

- Next Glass solves this problem by removing subjectivity and applying science to deliver recommendations based on your previous ratings

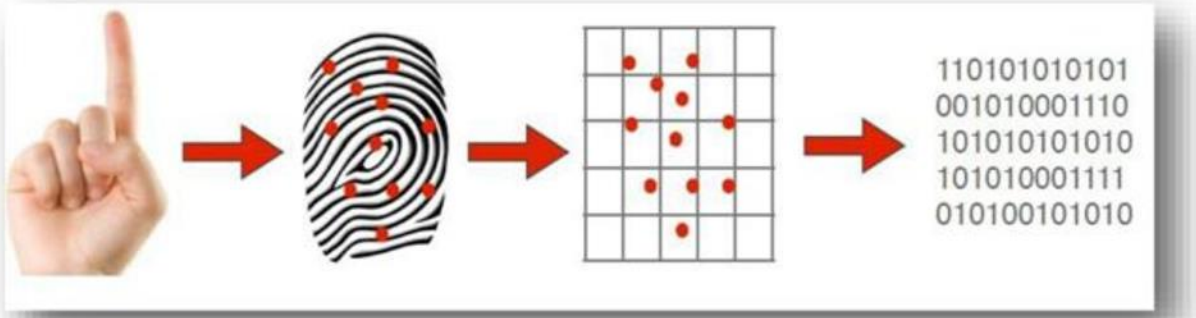
Use Case - Biometrics

Biometrics : The Science of establishing the identity of an individual based on the physical, chemical or behavioral attributes of the person.

Why is it Important?

- ✓ Identify Individual credentials
- ✓ Identify and prevent banking fraud
- ✓ Enforcement of law and security

How Does a Fingerprint Optical Scanner Work?



A fingerprint scanner system has two basic jobs

- ✓ Get an image of your finger
- ✓ Determine whether the pattern of ridges and valleys in this image matches the pattern of ridges and valleys in pre-scanned images

Process:

- ✓ Only specific characteristics, which are unique to every fingerprint, are filtered are saved as an encrypted biometric key or mathematical representation.
- ✓ No image of a fingerprint is ever saved, only a series of numbers (a binary code), which is used for verification. The algorithm cannot be reconverted to an image, so no one can duplicate your fingerprints

Use Case – Aadhaar

India is reportedly creating a biometric database to hold the fingerprints and face images for each of 1.2 Billion citizens as part of its Unique Identification Project.

Use Case – Paycheck Secure System

All Trust Network Paycheck Secure System has enrolled over 6 Million users and over 70 Million Transactions.