

What is ML ?

Machine learning (ML) is the scientific study of algorithms and statistical models that computer systems use to effectively perform a specific task without using explicit instructions, relying on patterns and inference instead. It is seen as a subset of artificial intelligence. Machine learning algorithms build a mathematical model of sample data, known as "training data", in order to make predictions or decisions without being explicitly programmed to perform the task.

BUZZ WORD Confusion:

Three current buzzwords are AI, Machine Learning, and Deep Learning and to the average journalist they are all the same

However,

$$AI \supsetneq Machine\ Learning \supsetneq Deep\ Learning$$

Machine Learning is a subfield of AI

- there is lots of non-learning AI and Deep Learning is a subfield of Machine Learning
- there is lots of non-deep (and/or non-neural) learning

Machine learning can refer to:

- the branch of artificial intelligence;
 - the methods used in this field (there are a variety of different approaches).
- Overall, if talking about the latter, Tom Mitchell, author of the well-known book “Machine learning”, defines ML as “improving performance in some task with experience”. However, this definition is quite a broad one, so we can quote another more specific description stating that ML deals with systems that can learn from data.

ML works with data and processes it to discover patterns that can be later used to analyse new data. ML usually relies on specific representation of data, a set of “features” that are understandable for a computer. For example, if we are talking about text it should be represented through the words it contains or some other characteristics such as length of the text, number of emotional words etc. This presentation depends on the task you are dealing with and is typically referred to as “feature extraction”.

Types of ML:

All ML tasks can be classified in several categories, the main ones are:

- supervised ML;
- unsupervised ML;
- reinforcement learning.

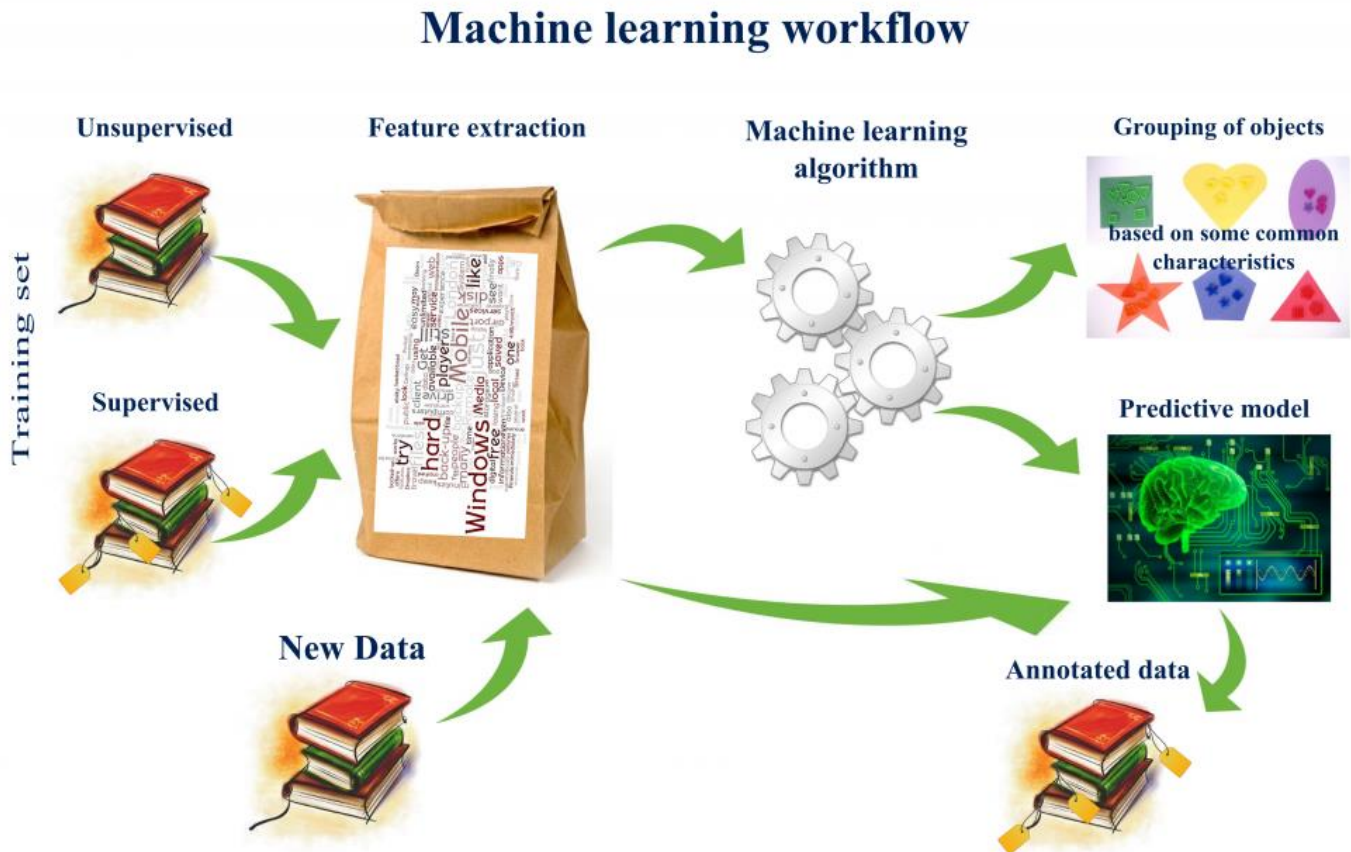
Now let us explain in simple words the kind of problems that are dealt with by each category. Supervised ML relies on data where the true label/class was indicated. This is easier to explain using an example. Let us imagine that we want to teach a computer to distinguish pictures of cats and dogs. We can ask some of our friends to send us pictures of cats and dogs adding a tag ‘cat’ or ‘dog’. Labelling is usually done by human annotators to ensure a high quality of data. So now we know the true labels of the pictures and can use this data to “supervise” our algorithm in learning the right way to classify images. Once our algorithm learns how to classify images we can use it on new data and predict labels (‘cat’ or ‘dog’ in our case) on previously unseen images.



As the reader can guess from the name, **unsupervised ML** means that we deprive a learning algorithm of the labels we used in supervised learning. We just provide ML with a large amount of data and characteristic of each observation (single piece of data). As an example, imagine your friends were not very helpful and forgot to label the images of cats and dogs that they have sent. However, you still want to split this data into 2 categories. You can employ

unsupervised ML (in this case a technique called clustering) to separate your images in two groups based on some inherent features(characteristics) of the pictures.

A graph below presents a simplified workflow of a typical ML task (it is a general graph that shows the processing both in terms of supervised and unsupervised ML).



References:

- <http://nkonst.com/machine-learning-explained-simple-words/>
- https://en.wikipedia.org/wiki/Machine_learning