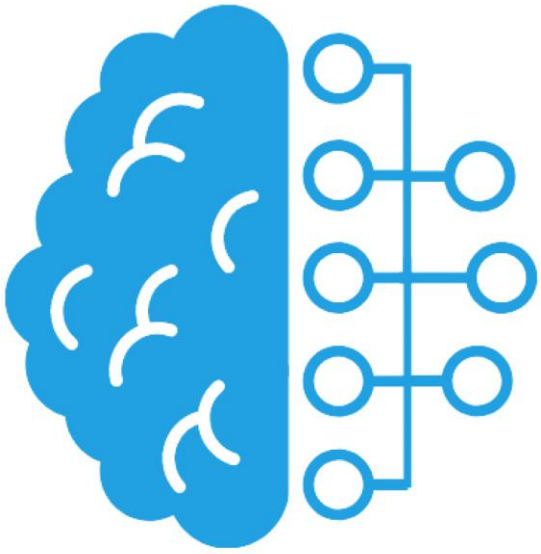


Machine learning (ML) is part of Computer Science that is focused on making Algorithms that, can be useful, depending on a set of examples from our daily life from nature or made by humans or any other algorithm or machine.

ML can be defined as solving or processing a practical problem by collecting or gathering a dataset and algorithmically making a statistical model based on these datasets. That statistical model is assumed or supposed to be used somehow to solve practical problems in our daily lives by deploying it on a device, website, or any other application.

In supervised learning, the dataset is the set of labeled examples and our goal is to produce a model that takes input features and outputs information to deduce the identical label.

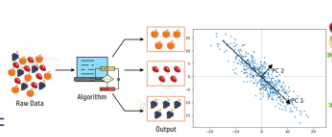
For Example:

classification

Regression

In unsupervised learning, the dataset contains unlabeled examples and The purpose of the algorithm is to transform input feature vectors into new vectors or values that can be used to solve practical problems.

For Example:



Clustering

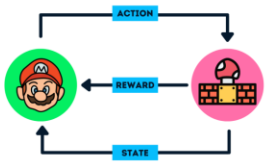
Dimensionality Reduction

In semi-supervised learning, the dataset is both labeled and unlabeled examples and sometimes unlabeled is higher than labeled examples and it has the same goal of supervised.

for Example :

Reinforcement learning is a part of ML where the machine "lives" in an environment and can perceive the state of that environment as a vector of features and learning by rewards or penalties and the purpose is to learn a policy.

For Example :



Note: A policy is a function that takes a state's feature vector as input and outputs the optimal action.

How Supervised Learning Works:

The data for supervised learning is a set of pairs (input, output). Input can be anything, for example, email messages, pictures, or sensor measurements. Outputs are usually real numbers, or labels (e.g. “spam”, “not_spam”, “cat”, “dog”, “mouse”, etc). In some cases, outputs are vectors (e.g., four coordinates of the rectangle around a person on the picture), sequences (e.g. [“adjective”, “adjective”, “noun”] for the input “big beautiful car”), or have some other structure.

Why the Model Works with New Data

If the examples used for training were selected randomly, independently of one another, and following the same procedure, then, statistically, it is more likely that the new negative example will be located on the plot somewhere not too far from other negative examples. The same concerns the new positive example: it will likely come from the surroundings of other positive examples