**SUPERVISED LEARNING ,UNSUPERVISED LEARNING,SEMI-SUPERVISED LEARNING ,REINFORCEMENT LEARNING**

**SUPERVISED LEARNING**

Supervised Machine Learning Algorithm are those which have Input Variable (x) and Output variable and you use this input variable or algorithm to learn the mapping from input to output

y=f(x)

The Goal in Supervised learning algorithm is such that mapp the variable so accurate that when new data is given as input to model it should be able to predict the output of data

It is called Supervised Learning Algorithm because in this algorithm is learning from traning dataset which can be thpought as a teacher supervising learning process.

Supervised Machine Learning algorithm are further classfied into :

1.Classification

2.regression

**UNSUPERVISED LEARNING**

Unsupervised learning is where you only have input data (X) and no corresponding output variables.

The goal for unsupervised learning is to model the underlying structure or distribution in the data in order to learn more about the data.

These are called unsupervised learning because unlike supervised learning above there is no correct answers and there is no teacher. Algorithms are left to their own devises to discover and present the interesting structure in the data.

Unsupervised learning problems can be further grouped into clustering and association problems.

* **Clustering**: A clustering problem is where you want to discover the inherent groupings in the data, such as grouping customers by purchasing behavior.
* **Association**: An association rule learning problem is where you want to discover rules that describe large portions of your data, such as people that buy X also tend to buy Y.

**SEMI-SUPERVISED MACHINE LEARNING**

Problems where you have a large amount of input data (X) and only some of the data is labeled (Y) are called semi-supervised learning problems.

These problems sit in between both supervised and unsupervised learning.

A good example is a photo archive where only some of the images are labeled, (e.g. dog, cat, person) and the majority are unlabeled.

Many real world machine learning problems fall into this area. This is because it can be expensive or time-consuming to label data as it may require access to domain experts. Whereas unlabeled data is cheap and easy to collect and store.

You can use unsupervised learning techniques to discover and learn the structure in the input variables.

You can also use supervised learning techniques to make best guess predictions for the unlabeled data, feed that data back into the supervised learning algorithm as training data and use the model to make predictions on new unseen data.

**REINFORCEMENT MACHINE LEARNING**

Let’s imagine that a new born baby comes across a lit candle. Now, the baby does not know what happens if it touches the flame. Eventually, out of curiosity, the baby tries to touch the flame and gets hurt. After this incident, the baby learns that repeating the same thing again might get him hurt. So, the next time it sees a burning candle, it will be more cautious.

That is exactly how Reinforcement learning works. Reinforcement learning is a kind of Machine Learning where in the system that is to be trained to do a particular job, learns on it’s own based on its previous experiences and outcomes while doing a similar kind of a job. The most common application of reinforcement learning are-

1. PC Games

2. Robotics: