What is Machine Learning ?

Machine Learning is a subset of artificial intelligence which focuses mainly on machine, learning from their experience and making predictions based on its experience.

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What does it do?

It enables the computers or the machines to make data-driven decisions rather than being explicitly programmed for carrying out a certain task. These programs or algorithms are designed in a way that they learn and improve over time when are exposed to new data.

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Why Is Machine Learning Important ?

Data is the lifeblood of all business. Data-driven decisions increasingly make the difference between keeping up with competition or falling further behind. Machine learning can be the key to unlocking the value of corporate and customer data and enacting decisions that keep a company ahead of the competition.

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when to use Machine
learning?

when a problem is complex
and can't be solved using
a traditional programming
method

where we use Machine learning?

few applications
1) virtual personal assistant
2) predictions while commuting
3) video surveillance
4) social media services
5) Email spam and malware filtering
6) online customer support
7) search engine
8) product recommendations
9) online fraud detection

What are the types of Machine Learning algorithms?

Types of Machine Learning
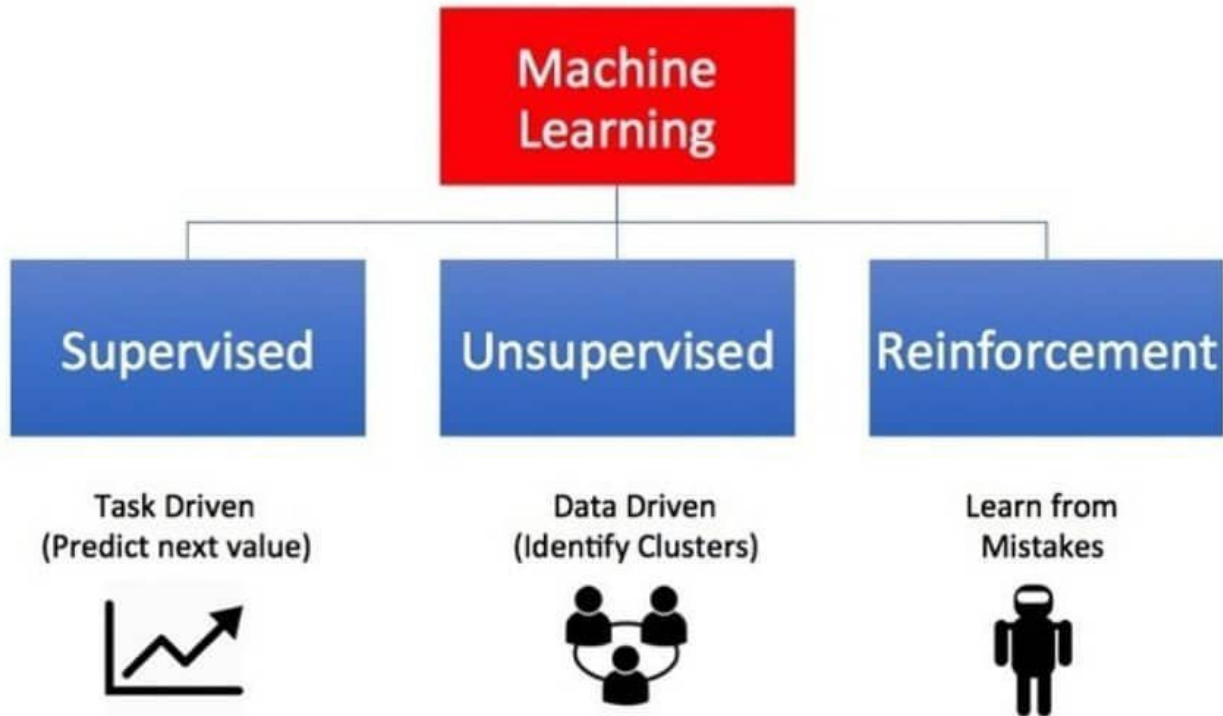
- **Supervised Learning** – Train Me!
- **Unsupervised Learning** – I am self sufficient in learning
- **Reinforcement Learning** – My life My rules! (Hit & Trial)

Supervised Learning / Predictive models

- Predictive model as the name suggests is used to predict the future outcome based on the historical data.
- Predictive models are normally given clear instructions right from the beginning as in what needs to be learnt and how it needs to be learnt.
- This algorithm consist of a target / outcome variable (or dependent variable) which is to be predicted from a given set of predictors (independent variables). Using these set of variables, we generate a function that map inputs to desired outputs. The training process continues until the model achieves a desired level of accuracy on the training data.
- Supervised learning algorithms try to model relationships and dependencies between the target prediction output and the input features such that we can predict the output values for new data based on those relationships which it learned from the previous data sets.
- We mainly solve two types of problems here. Regression and classification.

Supervised Learning / Predictive models

Examples

- Cortana or any speech automated system in your mobile phone trains your voice and then starts working based on this training.
- Based on various features (past record of head-to-head, pitch, toss, player-vs-player) WASP predicts the winning % of both teams.
- Train your handwriting to OCR system and once trained, it will be able to convert your hand-writing images into text (till some accuracy obviously)
- Based on some prior knowledge (when its sunny, temperature is higher; when its cloudy, humidity is higher, etc.) weather apps predict the parameters for a given time.
- Based on past information about spams, filtering out a new incoming email into Inbox (normal) or Junk folder (Spam)
- Biometric attendance or ATM etc systems where you train the machine after couple of inputs (of your biometric identity - be it thumb or iris or ear-lobe, etc.), machine can validate your future input and identify you.

Supervised Learning / Predictive models

Supervised learning problems can be further grouped into regression and classification problems.Add a little bit of body text

- **Classification**: A classification problem is when the output variable is a category, such as "red" or "blue" or "disease" and "no disease".
- **Regression**: A regression problem is when the output variable is a real value, such as "dollars" or "weight".

Some common types of problems built on top of classification and regression recommendation and time series prediction respectively.

Unsupervised learning / Descriptive models

- It is used to train descriptive models where no target is set and no single feature is important than the other.
- 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. Algorithms are left to their own devises to discover and present the interesting structure in the data.
- The model learns through observation and finds structures in the data. Once the model is given a dataset, it automatically finds patterns and relationships in the dataset by creating clusters in it.

Unsupervised learning / Descriptive models

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

- It is in-between that of Supervised and Unsupervised Learning.
- Where the combination is used to produce the desired results and it is the most important in real-world scenarios where all the data available are a combination of labelled and unlabeled data.
- 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.
- 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.

Reinforced Learning

- **The machine is exposed to an environment where it gets trained by trial and error method, here it is trained to make a much specific decision.**
- **The machine learns from past experience and tries to capture the best possible knowledge to make accurate decisions based on the feedback received.**
- **The agent is rewarded or penalized with a point for a correct or a wrong answer, and on the basis of the positive reward points gained the model trains itself. And again once trained it gets ready to predict the new data presented to it.**