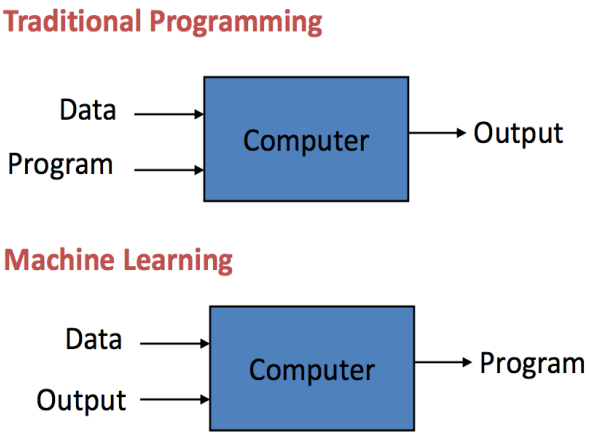
Machine Learning and its own importance

Introduction: In 1959, Arthur Samuel defined machine learning as a “Field of study that gives computers the ability to learn without being explicity programmed”.

“The goal of machine learning is to build computer systems that can adapt and learn from their experience.” - Tom Dietterich

Defination: Machine learning is a field of computer science that uses statistical techniques to give computer statistical techniques to give computer systems the ability to “learn” with data, without being explicity programmed.



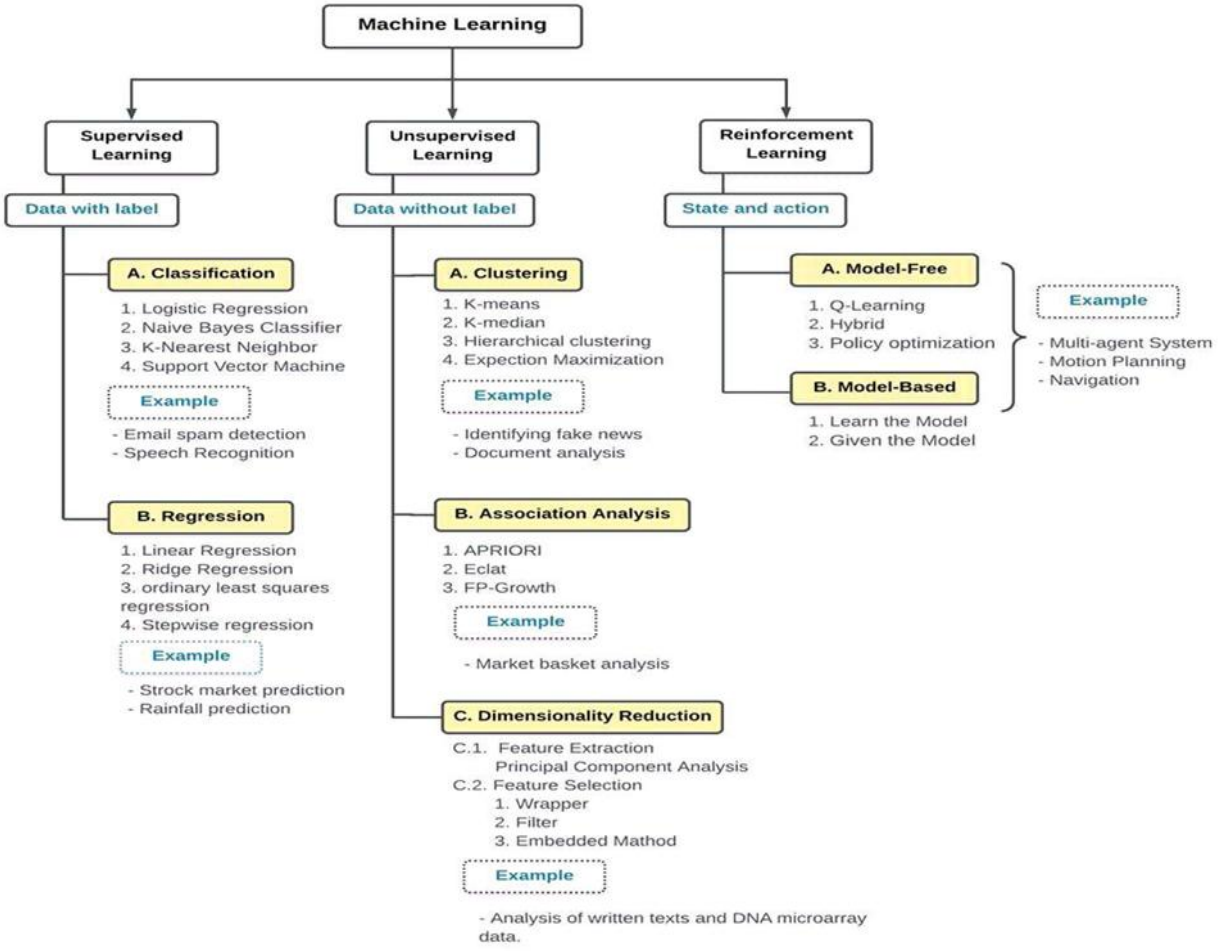
Applications/Use Cases:

- Retail-Inventory Optimization.
- Social Media-Sentiment Analysis.
- Consumer Tech-Face Detection.
- Transportation-Demand Forecasting.
- E Commerce-Recommender Systems.
- Manufacturing-Predictive Maintenance.
- Banking-Fraud Detection.

Why Machine Learning is Important?

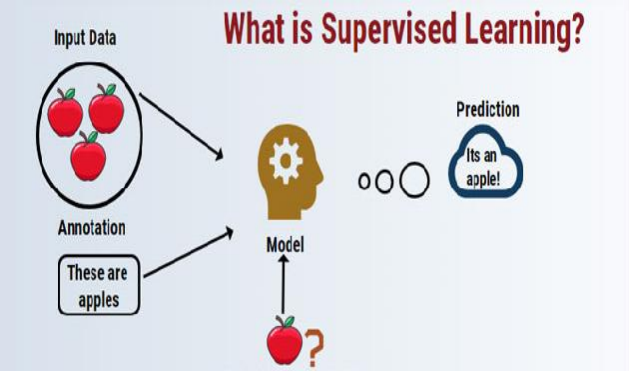
- Some tasks cannot be defined well, except by example (e.g., recognizing people (e.g., recognizing people).
- Relationships and correlations can be hidden within large amounts of data. Machine Learning/Data Mining may be able to find these relationships.
- Human designers often produce machines that do not work as well as desired in the environments in which they are used.

Types of Machine Learning algorithm: In machine learning, tasks are generally classified into broad categories. These categories are based on how learning is received or how feedback on the learning is given to the system developed. Generally machine learning can be classified into 3 types of algorithms.



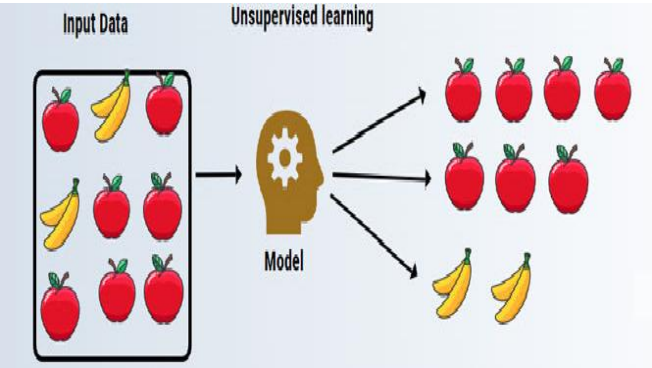
- ## Supervised Learning:

  Supervised learning is where you have input variables (X) and an output variables (Y) and you use an algorithm to learn the mapping function from the input to the output. *Y = f(X)*
  Algorithms are trained on labeled examples, i.e., input where the desired output is known.



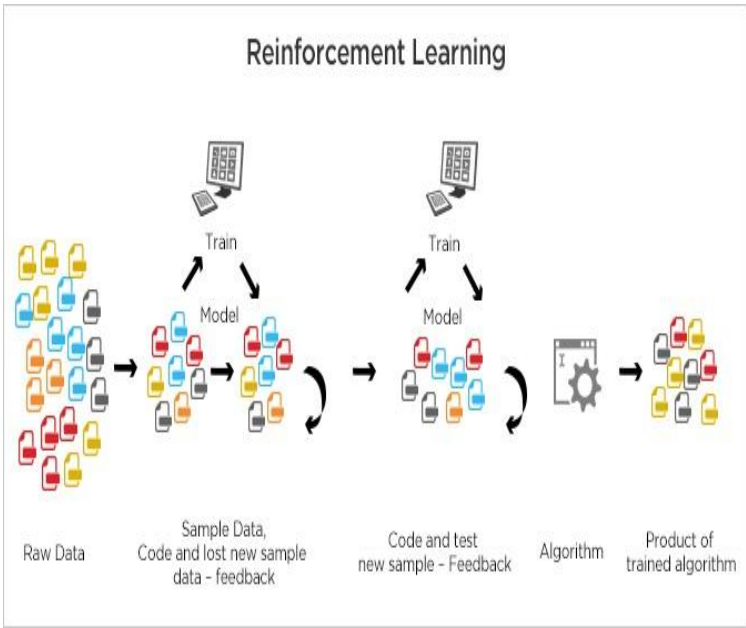
- Unsupervised Learning:

  The training data does not include Targets here so we don't tell the system where to go, the systems has to understand itself from the data we give. Algorithms operate on unlabelled examples, i.e., input where the desired output is unknown.



- Reinforcement Learning (Reacting to Env): Reinforcement learning aims at using observations gathered from the interaction with the environment to take actions that would maximize the reward or minimize the risk. Reinforcement learning algorithm (called the agent) continuously learns from the environment in an iterative fashions.

  Use cases: Self Driving cars, Computer games(Alpha Go)



- Advantages and Disadvantages of Machine Learning Language

  Amidst all the hype around Big Data, we keep hearing the term "Machine Learning". Not only does it offer a remunerative career, it promises to solve problems and also benefit companies by making predictions and helping them make better decisions. In this blog, we will learn the Advantages and Disadvantages of Machine Learning. As

we will try to understand where to use it and where not to use Machine learning.

Advantages and Disadvantages of Machine Learning Language

Every coin has two faces, each face has its own property and features. It’s time to uncover the faces of ML. A very powerful tool that holds the potential to revolutionize the way things work.

- # Advantages of Machine learning

1. Easily identifies trends and patterns

Machine Learning can review large volumes of data and discover specific trends and patterns that would not be apparent to humans. For instance, for an e-commerce website like Amazon, it serves to understand the browsing behaviors and purchase histories of its users to help cater to the right products, deals, and reminders relevant to them. It uses the results to reveal relevant advertisements to them.

2. No human intervention needed (automation)

With ML, you don’t need to babysit your project every step of the way. Since it means giving machines the ability to learn, it lets them make predictions and also improve the algorithms on their own. A common example of this is anti-virus software; they learn to filter new threats as they are recognized. ML is also good at recognizing spam.

3. Continuous Improvement

As ML algorithms gain experience, they keep improving in accuracy and efficiency. This lets them make better decisions. Say you need to make a weather forecast model. As the amount of data you have keeps growing, your algorithms learn to make more accurate predictions faster.

4. Handling multi-dimensional and multi-variety data

Machine Learning algorithms are good at handling data that are multi-dimensional and multi-variety, and they can do this in dynamic or uncertain environments.

5. Wide Applications

You could be an e-tailer or a healthcare provider and make ML work for you. Where it does apply, it holds the capability to help deliver a much more personal experience to customers while also targeting the right customers.

• Disadvantages of Machine Learning

With all those advantages to its powerfulness and popularity, Machine Learning isn't perfect. The following factors serve to limit it:

1. Data Acquisition

Machine Learning requires massive data sets to train on, and these should be inclusive/unbiased, and of good quality. There can also be times where they must wait for new data to be generated.

2. Time and Resources

ML needs enough time to let the algorithms learn and develop enough to fulfill their purpose with a considerable amount of accuracy and relevancy. It also needs massive resources to function. This can mean additional requirements of computer power for you.

3. Interpretation of Results

Another major challenge is the ability to accurately interpret results generated by the algorithms. You must also carefully choose the algorithms for your purpose.

4. High error-susceptibility

Machine Learning is autonomous but highly susceptible to errors. Suppose you train an algorithm with data sets small enough to not be inclusive. You end up with biased predictions coming from a biased training set. This leads to irrelevant advertisements being displayed to customers. In the case of ML, such blunders can set off a chain of errors that can go undetected for long periods of time. And when they do get noticed, it takes quite some time to recognize the source of the issue, and even longer to correct it.

As a result, we have studied Advantages and Disadvantages of Machine Learning. Also, this blog helps an individual to understand why one needs to choose machine learning. While Machine Learning can be incredibly powerful when used in the right ways and in the right places (where massive training data sets are available), it certainly isn't for everyone.

Why is Machine Learning so popular?

Machine learning is an application of artificial intelligence (AI). The system provided by ML has the ability to automatically learn and improve from past experiences. So, they can perform without being explicitly programmed. It focuses on the development of computer programs which can access data and use it to learn for themselves.

In simple terms, this field of computer science provides computer the ability to learn without being explicitly programmed. It provides algorithms which can be trained to perform a task.

Reasons why machine learning is popular

The modern challenges are "high-dimensional" in nature.

With rich data sources, it is important to build models that solve problems in high-dimensional space.

Through it, the models can be integrated into working software. It supports the kinds of products that are being demanded by the industry.

Also, Google Trends that tracks the popularity of search terms, suggests that searches for machine learning are about to out-pace the searches for artificial intelligence. Machine learning is moving beyond the textbooks and is creating a disruption which will revolutionize the future.

1. To sort prolific and unstructured data

A lot of information is available today because of IoT. It is not possible to manage every information or data coming from email, social networking, blogs, podcasts or any other source for that matter. Also,

to keep that information in a structured manner it is also necessary to keep up with the trend and gain a competitive edge.

If blunders like missing useful content occurs then a business might lose a fortune. No one knows where the idea can come from and strike you.

For marketers, the stress of finding and tracking the best content is very real. But Machine Learning methods are a savior for them. It helps them to provide the tools to locate and recommend the most relevant content in order to overcome information overload.

What are the sources of this Data?

Before talking about this, we can thank the Government for Digitalization and Jio for Mobile Data. With so much consumption of data two types of footprints is released.

Passive digital footprints

It is collected without the owner knowing (also known as data exhaust) that data about him is getting collected. This type of footprint is stored in an online database as a “hit”. It tracks the user’s IP address. With that, it keeps a hold on the day and time it got created and from where did the data came. This footprint can be stored in files, which can be accessed by administrators. It helps to view the actions performed on the machine, without seeing who performed them.

Active digital footprints

Active digital footprints are created when personal data is released deliberately which means he is aware that his actions are recorded. This is done for the purpose of sharing information about oneself by means of websites or social media platforms.

Machine learning is smart and it is very simple for the other parties to collect a whole lot of information and come to a conclusion. A lot of information can be gathered of that individual by using simple search engines.

2. Abundant data help in recommendations

“We now have rich data sources to build models that solve problems in high-dimensional space”

We all watch YouTube (Netflix, Hotstar or Television) for that matter. During my childhood days, I used to think that the TV and I have a similar liking and all my favorite shows broadcast on it. Little did I know that data was the reason behind it.

With the abundance of data, people liking and disliking were all kept in mind before the director thought of making a show.

There is an abundance of data right now, and data that is being collected and stored. “Information overload” is happening and quality is the thing which everyone is looking for. So much information spamming us day to day, starting from email, social networking, blogs, podcasts.

It’s impossible to keep up altogether. But, not anymore. Now, there will be no more concerns about missing useful content and the stress of finding and tracking the best content be there. With Machine Learning methods the tools to locate and recommend the most relevant content is present. So now you can overcome the information overload, take a back seat because everything is sorted.

3. Quantified Self?

In the era of smartwatches and Fitbits, a Casio can’t survive.

With quantified self-tracking your health is possible. Your everyday data is getting collected. Your everyday information like starting from the biological information like heartbeats, breaths, steps, to the interactions such as conversations and words spoken by you are taken a record of. Mobiles are covered in sensors that can monitor orientation, location, audio and video of the surrounding area.

These streams of data can meet at confluence points like people, locations, and organizations and questions can be answered that had not even been conceived could be answerable. This is one of the major reasons why machine learning is popular.

4. Need Some Motivation? Your Machine is there for Triggering Intervention!

You might not believe me, but your mental state can be solved. Irrespective of your location (home, office or around the world) you will get triggering interventions. You can't help it because you will get inspiring targeted action. This will help you to optimize your goals like efficiency, effectiveness or productivity.

5. Abundant Computation

A lot of calculation leads to confusion, frustration, and no solution. It's true that computation is abundant and it is cheap. So, you can be Aryabhata too, and with the abundance master the art of structuring.

The world has changed and a lot is there to explore. With the powerful computers, you can rent one at cents and run large experiments on immense data sets.

Now, with this, you don't need to write scripts and programs for long runs of algorithms. You now don't have to think hard about what question you want to answer (like which algorithm is better, and which parameters should be considered). You can write a script or a program and run the experiment overnight.

Machine Learning has made everything so cheap that it can actively design systems to syphon cycles away from core activities. The important fact why machine learning is so popular.

Powerful methods have been developed. The principles are well understood in statistical and probabilistic frameworks.

Technocrats were aware already, but now users are getting aware too. The field has matured a lot in the last decade and has changed a lot in the last few years.

We know that Machine Learning is the brainchild of artificial intelligence. It was a collection of methods that learned from data or experience. Genetic algorithms and swarm intelligence were considered methods that learn from their environment. The maturation promoted a statistical and probabilistic underpinning for the methods in the field.

So, now the gist that maturation of machine learning brings to us is that in no time it will be a mainstream field and people will work and be dependent on Machine learning.