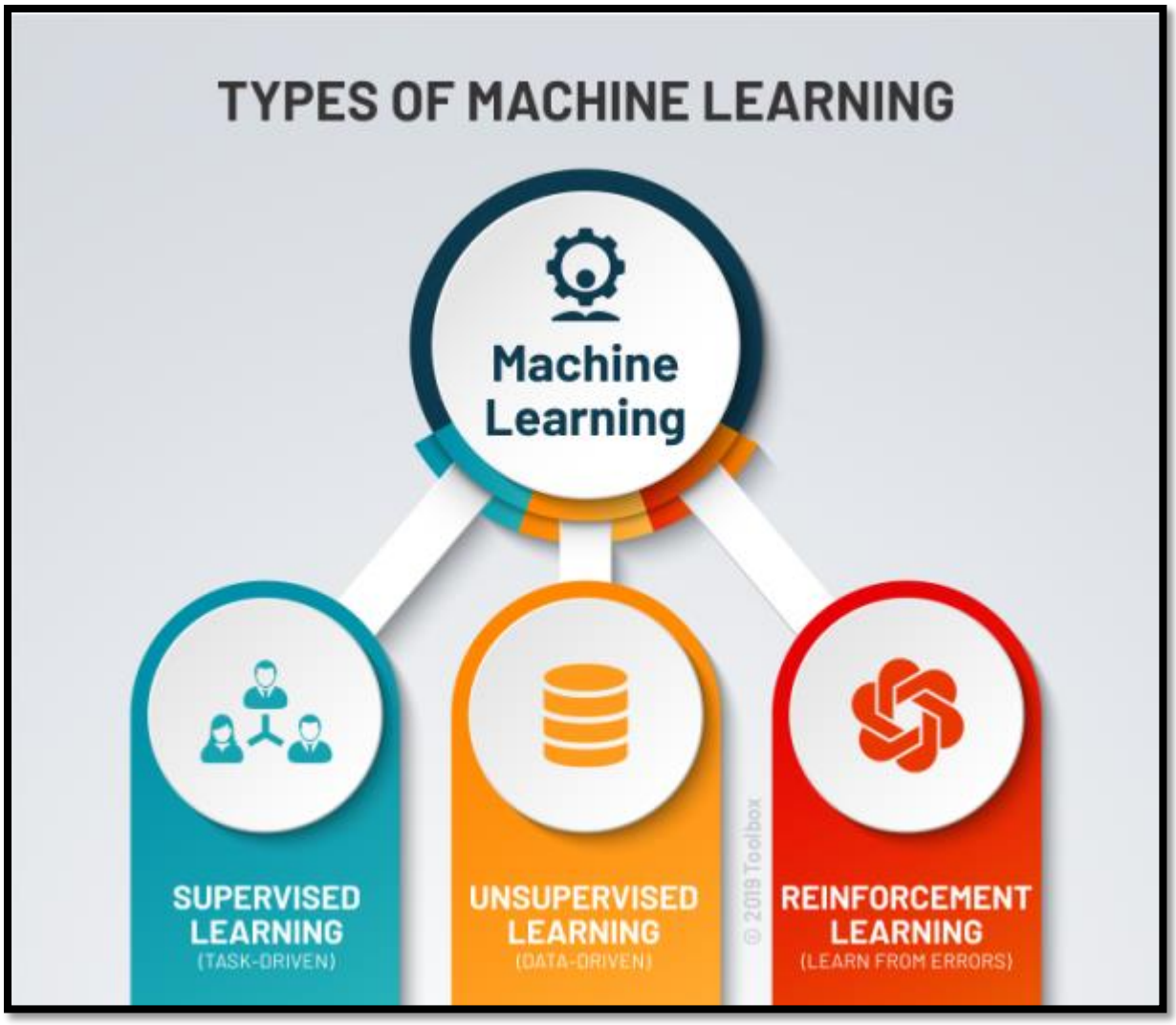
Types of Machine Learning



As with any method, there are different ways to train machine learning algorithms, each with their own advantages and disadvantages. To understand the pros and cons of each type of machine learning, we must first look at what kind of data they ingest. In ML, there are two kinds of data — labelled data and unlabelled data.

Labelled data has both the input and output parameters in a completely machine-readable pattern, but requires a lot of human labour to label the data, to begin with. Unlabelled data only has one or none of the parameters in a machine-readable form. This negates the need for human labour but requires more complex solutions.

There are also some types of machine learning algorithms that are used in very specific use-cases, but three main methods are used today.

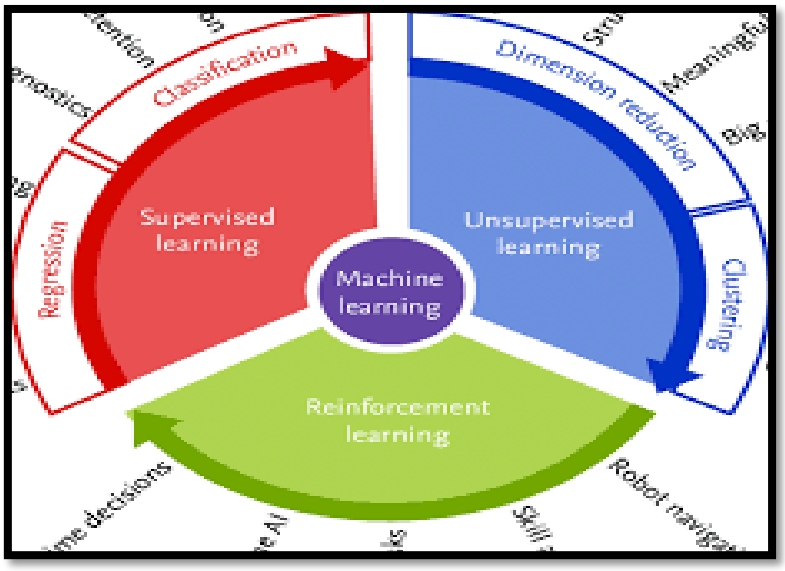
Supervised Machine Learning

Supervised machine learning is one of the most basic types of machine learning. In this type, the machine learning algorithm is trained on labelled data. Even though the data needs to be labelled accurately for this method to work, supervised learning is extremely powerful when used in the right circumstances.

In supervised learning, the ML algorithm is given a small training dataset to work with. This training dataset is a smaller part of the bigger dataset and serves to give the algorithm a basic idea of the problem, solution, and data points to be dealt with. The training dataset is also very similar to the final dataset in its characteristics and provides the algorithm with the labelled parameters required for the problem.

The algorithm then finds relationships between the parameters given, essentially establishing a cause and effect relationship between the variables in the dataset. At the end of the training, the algorithm has an idea of how the data works and the relationship between the input and the output.

This solution is then deployed for use with the final dataset, which it learns from in the same way as the training dataset. This means that supervised machine learning algorithms will continue to improve even after being deployed, discovering new patterns and relationships as it trains itself on new data.



Unsupervised machine learning

Unsupervised machine learning holds the advantage of being able to work with unlabelled data. This means that human labour is not required to make the dataset machine-readable, allowing much larger datasets to be worked on by the program.

In supervised learning, the labels allow the algorithm to find the exact nature of the relationship between any two data points. However, unsupervised learning does not have labels to work off of, resulting in the creation of hidden structures. Relationships between data points are perceived by the algorithm in an abstract manner, with no input required from human beings.

The creation of these hidden structures is what makes unsupervised learning algorithms versatile. Instead of a defined and set problem statement, unsupervised learning algorithms can adapt to the data by dynamically changing hidden structures. This offers more post-deployment development than supervised learning algorithms.

Reinforcement learning

Reinforcement learning directly takes inspiration from how human beings learn from data in their lives. It features an algorithm that improves upon itself and learns from new situations using a trial-and-error method. Favourable outputs are encouraged or ‘reinforced’, and non-favourable outputs are discouraged or ‘punished’.

Based on the psychological concept of conditioning, reinforcement learning works by putting the algorithm in a work environment with an interpreter and a reward system. In every iteration of the algorithm, the output result is given to the interpreter, which decides whether the outcome is favourable or not.

In case of the program finding the correct solution, the interpreter reinforces the solution by providing a reward to the algorithm. If the outcome is not favourable, the algorithm is forced to reiterate until it finds a better result. In most cases, the reward system is directly tied to the effectiveness of the result.

In typical reinforcement learning use-cases, such as finding the shortest route between two points on a map, the solution is not an absolute value. Instead, it takes on a score of effectiveness, expressed in a percentage value. The higher this percentage value is, the more reward is given to the algorithm. Thus, the program is trained to give the best possible solution for

the best possible reward.

Machine learning algorithms are used in circumstances where the solution is required to continue improving post-deployment. The dynamic nature of adaptable machine learning solutions is one of the main selling points for its adoption by companies and organizations across verticals.

Machine learning algorithms and solutions are versatile and can be used as a substitute for medium-skilled human labour given the right circumstances. For example, customer service executives in large B2C companies have now been replaced by natural language processing machine learning algorithms known as chatbots. These chatbots can analyse customer queries and provide support for human customer support executives or deal with the customers directly.

Machine learning algorithms also help to improve user experience and customization for online platforms. Facebook, Netflix, Google, and Amazon all use recommendation systems to prevent content glut and provide unique content to individual users based on their likes and dislikes.

Facebook utilizes recommendation engines for its news feed on both Facebook and Instagram, as well as for its advertising services to find relevant leads. Netflix collects user data and recommends various movies and series based on the preferences of the user. Google utilizes machine learning to structure its results and for YouTube's recommendation system, among many other applications. Amazon uses ML to place relevant products in the user's field of view, maximizing conversion rates by recommending products that the user actually wants to buy.

However, as ML continues to be applied in various fields and use-cases, it becomes more important to know the difference between artificial intelligence and machine learning.