

Team ID	PNT2022TMID51007
Project Name	Efficient water quality analysis and prediction using machine learning

Prior Knowledge

Supervised and Unsupervised learning

Supervised learning, as the name indicates, has the presence of a supervisor as a teacher. Basically supervised learning is when we teach or train the machine using data that is well labelled. Which means some data is already tagged with the correct answer. After that, the machine is provided with a new set of examples(data) so that the supervised learning algorithm analyses the training data(set of training examples) and produces a correct outcome from labelled data.

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



Advantages:-

- Supervised learning allows collecting data and produces data output from previous experiences.
- Helps to optimize performance criteria with the help of experience.
- Supervised machine learning helps to solve various types of real-world computation problems.

Disadvantages:-

- Classifying big data can be challenging.
- Training for supervised learning needs a lot of computation time. So, it requires a lot of time.

Unsupervised learning

- Unsupervised learning is the training of a machine using information that is neither classified nor labeled and allowing the algorithm to act on that information without guidance. Here the task of the machine is to group unsorted information according to similarities, patterns, and differences without any prior training of data.
- Unlike supervised learning, no teacher is provided that means no training will be given to the machine. Therefore the machine is restricted to find the hidden structure in unlabeled data by itself.

Unsupervised learning is classified into two categories of algorithms:

- **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.

Regression

Regression is a technique for investigating the relationship between independent variables or features and a dependent variable or outcome. It's used as a method for predictive modelling in [machine learning](#), in which an algorithm is used to predict continuous outcomes.

Solving regression problems is one of the most common applications for machine learning models, especially in supervised machine learning. Algorithms are trained to understand the relationship between independent variables and an outcome or dependent variable. The model can then be leveraged to predict the outcome of new and unseen input data, or to fill a gap in missing data.

Data Visualization

Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data.

The utility of data visualization can be divided into three main goals: to explore, to monitor, and to explain. While some visualizations can span more than one of these, most focus on a single goal.

Flask framework

Flask is a web framework. This means flask provides you with tools, libraries and technologies that allow you to build a web application. This web application can be some web pages, a blog, a wiki or go as big as a web-based calendar application or a commercial website.

Flask is a small and lightweight Python web framework that provides useful tools and features that make creating web applications in Python easier. It gives developers flexibility and is a more accessible framework for new developers since you can build a web application quickly using only a single Python file.