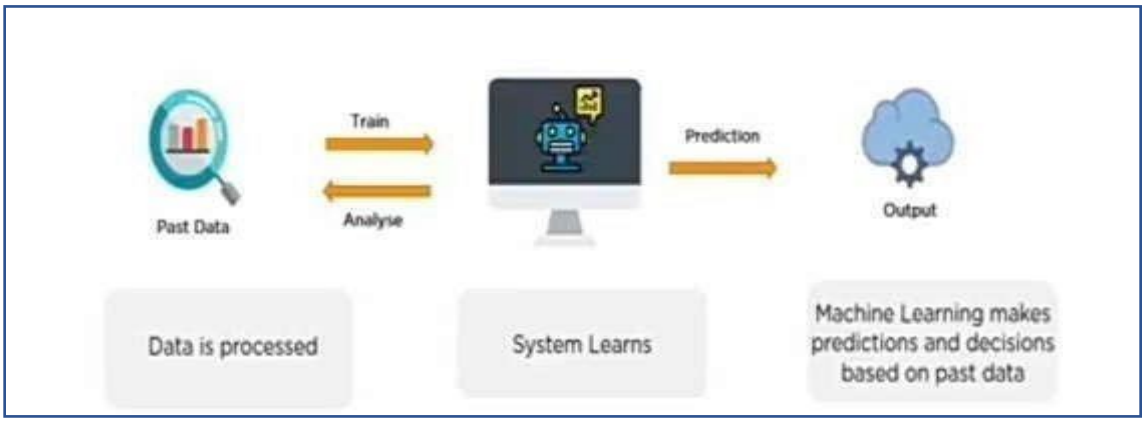
PRIOR KNOWLEDGE

Team ID	PNT2022TMID21878
Project Name	A Novel Method for Handwritten Digit Recognition System

One should have knowledge on the following Concepts:

1. MACHINE LEARNING:

By providing data and information to computers without explicit programming, machine learning is the science of getting them to learn and behave like humans.



Types of Machine Learning:

1. Supervised Machine Learning
2. Unsupervised Machine Learning
3. Reinforcement Learning

Semi-Supervised learning is used in Text Classification.

1. Supervised Learning:

With the use of a labelled dataset, a model can predict in supervised learning. It is founded on oversight. In the supervised learning technique, this means that we train the machines using the "labelled" dataset, and then the machine predicts the output based on the training. Here, the labelled data indicates which inputs have already been mapped to which output. More precisely, we may state that after training the machine with input and related output, we ask it to predict the outcome using test dataset.

Types:

a) Classification

b) Regression

a) Classification:

When a classification problem has a categorical output variable, such as "Yes" or "No," Male or Female, Red or Blue, etc., classification methods are employed to solve the problem. The categories that are present in the dataset are predicted by the categorization algorithms. Spam detection, email filtering, and other examples of categorization systems in use today.

b) Regression:

Regression problems with a linear relationship between the input and output variables are solved using regression techniques. These are employed to forecast variables with continuous outputs, such as market trends, weather forecasts, etc.

2. Unsupervised learning:

Unsupervised learning is distinct from the supervised learning method because, as its name implies, supervision is not required. In unsupervised machine learning, this means that the system is trained on an unlabeled dataset and makes output predictions without any human supervision.

Types:

a) clustering

b) Association

a) Clustering:

The process of grouping objects into clusters that are distinct from one another and have similarities between them.

b) Association:

Determining the likelihood that certain items in a collection will occur together.

2. CLUSTERING, CLASSIFICATION AND REGRESSION

Clustering:

An unsupervised technique is clustering. With clustering, the algorithm looks for patterns in data sets that don't have labels attached. This may be a grouping of customers' purchasing patterns. Age, household income, and customer clusters of various types would be the features for this.

Classification:

Classification, in contrast to clustering, is a supervised method. Using historical data, classification algorithms determine to which category fresh data will belong. For years, spam has been classified, and these algorithms are now more or less capable of recognising something as spam or not. The quality of a material could be predicted using machine data using a number of well-known factors, including humidity, strength, colour, etc. The quality would therefore be the result of the material forecast.

Regression:

Clustering and regression are commonly confused, yet regression is still distinct from clustering. No categorical labels (such as good or terrible, spam or not spam, etc.) are predicted by a regression. Regression produces continuous, frequently unbound quantities instead. It is therefore practical for financial forecasting.

3. ARTIFICIAL NEURAL NETWORKS:

Artificial neural networks, more commonly referred to as neural networks or neural nets, are computer architectures that draw inspiration from the biological neural networks seen in animal brains. Artificial neurons, which are a set of interconnected units or nodes that loosely resemble the neurons in a biological brain, are the foundation of an ANN.

Type of Neural networks:

- Perceptron.
- Feed Forward Neural Network.
- Multilayer Perceptron.
- Convolutional Neural Network.
- Radial Basis Functional Neural Network.
- Recurrent Neural Network.
- LSTM – Long Short-Term Memory.
- Sequence to Sequence Models.

4. CONVOLUTIONAL NEURAL NETWORKS:

Due to its capacity to spot patterns in images, a convolutional neural network (CNN) is a type of artificial neural network that is mostly used for image recognition and processing. Although a CNN is a powerful tool, its training process necessitates millions of tagged data points.

Layers of CNN:

The different layers of a CNN. There are four types of layers for a convolutional neural network: the convolutional layer, the pooling layer, the RLU correction layer and the fully-connected layer.

Components of CNN:

1) Input layer
2) Output layer
3) One or more hidden layer

5. FLASK:

Python-based Flask is a microweb framework. Due to the fact that it doesn't require any specific tools or libraries, it is categorised as a microframework. It lacks any component where previous third-party libraries would normally perform standardised functions, such as a database abstraction layer, form validation, or other.