Prior Knowledge

Team ID	PNT2022TMID03792
Project Name	Project - A Novel Method for Handwritten Digit Recognition System

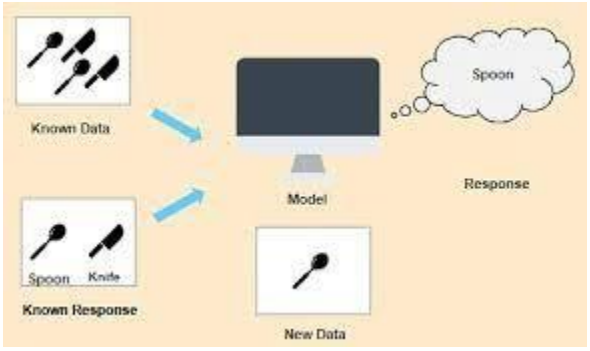
One should have knowledge on the following Concepts :

1. **Supervised and unsupervised learning**

   Machine Learning: Machine learning is a subfield of artificial intelligence (AI) and computer science that emphasizes on using statistics and algorithms to replicate human learning processes and progressively increase precision.

   Types of Machine Learning:

   1. **Supervised learning:**
      - In supervised learning, the model may make predictions with the aid of a labelled dataset.
      - Using the "labelled" dataset, we train the machines, and after the training, the machines forecast the results. In this case, the labelled data indicates which inputs have already been mapped to which output.
      - We first use the input and output to train the machine, and then we use the test dataset to ask the machine to predict the output.



   Categories of Supervised Learning:

   1. **Classification:** The classification problems with a categorical output variable are solved using classification methods. The categories that are present in the dataset are predicted by the categorization algorithms.
   2. **Regression:** Regression problems with a linear relationship between the input and output variables are solved using regression techniques. These are employed to forecast continuously varying output.

   2. **Unsupervised learning**

- In unsupervised learning, the model may make predictions with the aid of a unlabelled dataset.
- The unlabeled dataset is used to train the machine, which then predicts the results independently of human intervention.
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2. Regression Classification and Clustering

Clustering:

Categorization model given one or more inputs. The model analyses the existing data and predicts the new data it belongs to.

Classification:

A classification model tries to infer some inferences from values that have been observed. The value of one or more outputs can be predicted using a categorization model given one or more inputs. The model analyses the existing data and predicts the new data it belongs to.

Regression:

Regression models are used to predict a continuous value. Example: Predicting prices of a house given the features of house like size, price etc.

3. Artificial Neural Networks

Artificial neural networks are a branch of artificial intelligence inspired by biology and fashioned after the human brain. An artificial neural network is often a computational network based on biological neural networks that create the structure of the human brain. Artificial neural networks also feature neurons that are linked to each other in different layers of the networks, just like a real brain does. Nodes are the name given to these neurons. Artificial neural networks are used in artificial intelligence to simulate the network of neurons that make up the human brain, giving computers the ability to comprehend information and make decisions in a manner similar to that of a person. Computers are programmed to function exactly like a network of interconnected brain cells to create an artificial neural network. Artificial Neural Network primarily consists of three layers:

Input Layer:

As suggested by the name, it accepts inputs from the programmer in a variety of formats.

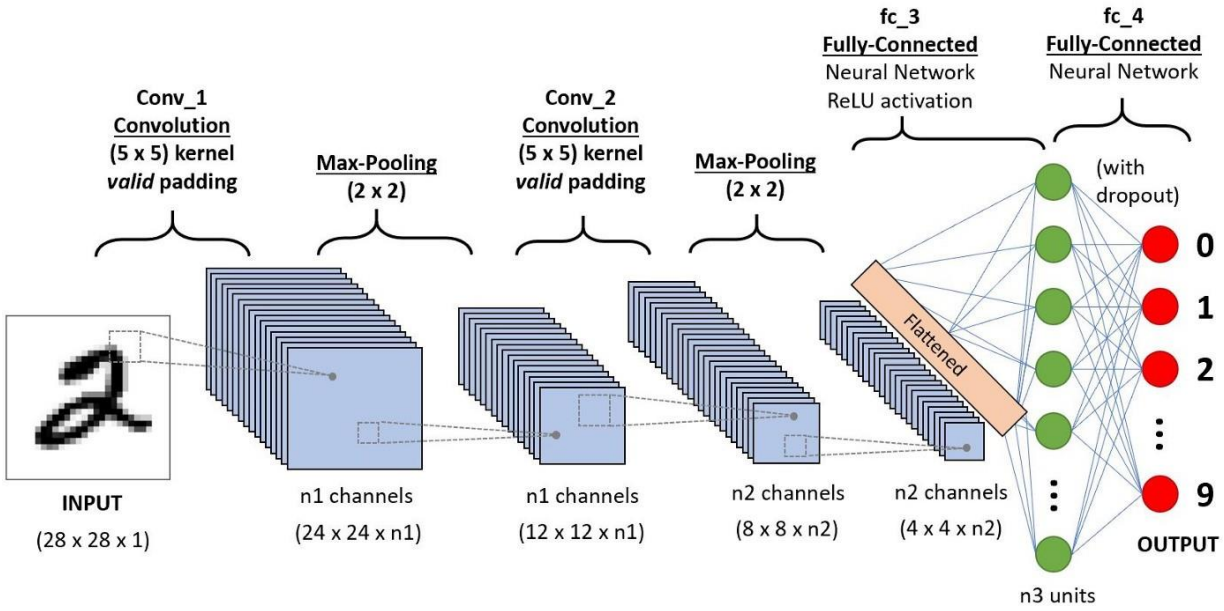
Hidden Layer:

Input and output layers are displayed before the concealed layer. To uncover hidden features and patterns, it runs all the calculations.

Output Layer:
The hidden layer is used to transform the input into a variety of outputs, which are then communicated through this layer.

4. Convolution Neural Networks

A Convolutional Neural Network is a Deep Learning system that can take in an input picture, give various characteristics and objects in the image importance (learnable weights and biases), and be able to distinguish between them.



5. Flask

Flask is a web framework, it's a Python module that lets you develop web applications easily. It's has a small and easy-to-extend core: it's a microframework that doesn't include an ORM (Object Relational Manager) or such features. Flask is based on the Werkzeg WSGI toolkit and the Jinja2 template engine.

WSGI:

The Web Server Gateway Interface (Web Server Gateway Interface, WSGI) has been used as a standard for Python web application development. WSGI is the specification of a common interface between web servers and web applications.

Werkzeug:

Werkzeug is a WSGI toolkit that implements requests, response objects, and utility functions. This enables a web frame to be built on it. The Flask framework uses Werkzeg as one of its bases.

jinja2:

jinja2 is a popular template engine for Python. A web template system combines a template with a specific data source to render a dynamic web page.