

# Project Design Phase-1 - Solution Fit Template

**Project title : A novel method for Handwritten Digit Recognition System**

**Team ID : PNT2022TMID14249**

## **1. Import the libraries and load the dataset :**

- First, we are going to import all the modules that we are going to need for training our model.
- The Keras library already contains some datasets and MNIST is one of them.
- So we can easily import the dataset and start working with it.

## **2. Preprocess the data :**

- The image data cannot be fed directly into the model so we need to **perform some operations and process the data** to make it ready for our neural network.

## **3. Create the model :**

- Now we will **create our CNN model** in Python data science project. A CNN model generally consists of convolutional and pooling layers.
- It works better for data that are represented as grid structures, this is the reason why CNN works well for image classification problems.
- The dropout layer is used to deactivate some of the neurons and while training, it reduces over fitting of the model. We will then compile the model with the Adadelta optimizer.

## **4. Train the model :**

- The **model.fit()** function of Keras will start the training of the model. It **takes the training data, validation data, epochs, and batch size**.
- It takes some time to train the model.

## **5. Evaluate the model :**

- We have 10,000 images in our dataset which will be used to **evaluate how good our model works**.

- The testing data was not involved in the training of the data therefore, it is new data for our model.
- The MNIST dataset is well balanced so we can get around 99% accuracy.

## 6. Create GUI to predict digits :

- Now for the GUI, we have created a new file in which we **build an interactive window to draw digits on canvas** and with a button, we can recognize the digit.
- The Tkinter library comes in the Python standard library. We have created a function **predict\_digit()** that takes the image as input and then uses the trained model to predict the digit.
- Then we **create the App class** which is responsible for building the GUI for our app.
- We create a canvas where we can draw by capturing the mouse event and with a button, we trigger the predict\_digit() function and display the results.