Project Design Phase-I
Proposed Solution Template

Date	15 October 2022
Team ID	PNT2022TMID08626
Project Name	Project Title : A Novel Method for Handwritten Digit Recognition System
Maximum Marks	2 Marks

Proposed Solution Template:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Handwriting recognition is one of the compelling research works going on because every individual in this world has their own style of writing. It is the capability of the computer to identify and understand handwritten digits or characters automatically. Because of the progress in the field of science and technology, everything is being digitalized to reduce human effort. Hence, there comes a need for handwritten digit recognition in many real-time applications. MNIST data set is widely used for this recognition process and it has 70000 handwritten digits. We use Artificial neural networks to train these images and build a deep learning model. Web application is created where the user can upload an image of a handwritten digit. this image is analysed by the model and the detected result is returned on to UI.
2.	Idea / Solution description	HANDWRITTEN digit recognition is the ability of a computer system to recognize the handwritten inputs like digits, characters etc. from a wide variety of sources like emails, papers, images, letters Here comes the use of Deep Learning. In the past decade, deep learning has become the tool for Image Processing, object detection, handwritten digit and character recognition etc. A lot of machine learning tools have been developed like scikit-learn, scipy-image etc. and pybrains Keras, Theano, Tensorflow by Google,TFLearn etc. for Deep Learning. These tools make the applications robust and therefore more accurate.

		The Artificial Neural Networks can almost mimic the human brain and are a key ingredient in image processing field. For example, Convolutional Neural Networks with Back Propagation for Image Processing, Deep Mind by Google for creating Art by learning from existing artist
3.	Novelty / Uniqueness	The first layer of the architecture is the User layer. User layer will comprise of the people who interacts with the app and for the required results. The next three layers is the frontend architecture of the application. The application will be developed using Bootstrap which is the open source platform for HTML, CSS and JavaScript. The application is deployed in the localhost which is shown on the browser. Through the app, the user will be able to upload pictures of the handwritten digits and convert it into the digitalized form. The one in between the database and view layer is the business layer which is the logical calculations on the basis of the request from the client side. It also has the service interface. The backend layer consists of two datasets :Training Data and Test Data. The MNIST database has been used for that which is already divided into training set of 60,000 examples and test
4.	Social Impact / Customer Satisfaction	In addition to reading postal addresses and bank check amounts, it is also useful for reading forms. Furthermore, it's used in fraud detection because it makes it easy to compare two texts and determine which one is a copy. The application has been tested using three models: Multi-Layer Perceptron (MLP), Convolution Neural Network (CNN). As a result, this system fulfil customer's expectations ,as it is a novel method for recognizing handwritten digits ,ensuring high accuracy for the model and
5.	Business Model (Revenue Model)	For efficient traffic control, this technology can be connected with traffic surveillance cameras to read licence plates. Pin-code details can be easily identified and recognised by integrating with the postal system. Some of the security areas include signature verification ,bank cheque processing ,postal address interpretation from envelopes etc..

6.	Scalability of the Solution	An implementation of Handwritten Digit Recognition using Deep Learning has been implemented in this paper. Additionally, some of the most widely used Machine Learning algorithms i.e. CNN using Tensor flow have been trained and tested on the same data to draw a comparison as to why we require deep learning methods in critical applications like Handwritten Digit Recognition