Project Design Phase-I
Proposed Solution

Date	24 September 2022
Team ID	PNT2022TMID19491
Project Name	Project - A Novel Method for Handwritten Digit Recognition System
Maximum Marks	2 Marks

Proposed Solution :

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The handwritten digit recognition is the capability of computer applications to recognize the human handwritten digits. It is a hard task for the machine because handwritten digits are not perfect and can be made with many different shapes and sizes. The handwritten digit recognition system is a way to tackle this problem which uses the image of a digit and recognizes the digit present in the image. Convolutional Neural Network model created using PyTorch library over the MNIST dataset to recognize handwritten digits.
2.	Idea / Solution description	MNIST database contains 60,000 training images of handwritten digits from zero to nine and 10,000 images for testing. We will create our CNN model. It works better for data that are represented as grid structures; this is the reason why CNN works well for image classification problems
3.	Novelty / Uniqueness	Handwritten digit recognition using MNIST dataset is a major project made with the help of neural network. It basically detects the scanned images of handwritten digits. We have taken this a step further where are handwritten digit recognition system not only detects the scanned images of handwritten digits but also allows writing digits on the screen with the help of an Integrated GUI for recognition.
4.	Social Impact / Customer Satisfaction	Digital Recognition is nothing other than recognizing or identifying digits in any document. The framework of digital recognition is simply the operation of the machine to prepare or interpret digits. Handwritten Digit Recognition is the power of computers to translate handwritten digits from a variety of sources such as text messages, bank checks, papers, photos, etc. method

		With the use of in-depth learning methods, human efforts can be reduced in perception, learning, perception and in too many regions. Using in-depth learning, the computer learns to perform distinctive functions in images or content anywhere accuracy, in addition to the performance of the human level. The digital recognition model uses large data sets to detect digits from different sources.
5.	Business Model (Revenue Model)	Handwritten digit recognition refers to a model's (machine's) capacity to detect any handwritten digits from various sources, such as photographs, papers, and touch displays, and classify them into ten specified categories 0-9. Several ways and algorithms are used to recognize handwritten digits, such as Deep Learning/CNN, SVM (Support Vector Machine), Gaussian Naive Bayes, KNN (K-Nearest Neighbour), Decision Trees, Random Forests, etc. We used the CNN (Convolutional Neural network) algorithm to recognize handwritten digits in this project.
6.	Scalability of the Solution	The variations of accuracies for handwritten digit were observed for 15 epochs by varying the hidden layers using CNN model and MNIST digit dataset. The maximum accuracy in the performance was found 99.64% and the total lowest test loss is 0.0239 approximately. This technology will also extend to recognizing the characters in the future.