Project Design Phase-I
Proposed Solution Template

Date	19 September 2022
Team ID	PNT2022TMID40332
Project Name	Project - A Novel Method For Handwritten Digit Recognition System
Maximum Marks	2 Marks

Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	In this digital world, everything including documents, notes is kept in digital form.The requirement of converting these digital documents into processed information is in demand. 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.
2.	Idea / Solution description	Convolutional Neural Networks (CNN) becomes one of the most appealing approaches and has been an ultimate factor in a variety of recent success and challenging machine learning applications such as challenge ImageNet object Detection image segmentation and face recognition. Therefore, we choose CNN for our challenging tasks of image classification. We can use it for hand writing digits recognition which is one of high academic and business transactions. There are many applications of hand writing digit recognition in our real life purposes. Precisely, we can use it in banks for reading checks, post offices for sorting letter, and many other related works.
3.	Novelty / Uniqueness	Handwritten digit recognition is the capability of computer applications to recognize the human the 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.Handwritten Digit Recognition is the capability of a computer to fete the mortal handwritten integers from different sources like images, papers,touch defenses, etc. And classify them into 10 predefined classes(0-9). This is the existing method along with this we add some features to make our project unique among them. We create a model that recognize multiple-digits present in the image ina offline mode. The future scope of this method is, we can recognize number in License plate,bank cheques and postal mail sorting.We get a predicted result in two manner one is, the recognized digits is showned in the interface and the another manner is, we can get a predicted result through voice mode. This means the model tell the multiple-digit in voice mode. This feature helps the old age people they are difficult in understanding handwritten digits, blind people and who contain eye sight issues.
4.	Social Impact / Customer Satisfaction	Digit recognition plays an role in the modern world. 'Digits' are a part of our everyday life, be it License plate on our cars or bike, the price of a product, speed limit plate on our cars or bike, the price of a product, speed limit on a road, or details associated with a bank account. In the case of a text which is unclear, it is easier to guess the digits in comparison to the alphabets. Machine Learning and Deep Learning are reducing human efforts in almost every field. Moreover, a solution achieved using ML and DL can power various applications at the same time, thereby reducing human effort and increasing the flexibility to use the solution. One such solution is a handwritten digit recognition system that can be used in postal mail sorting, bank check processing, form data entry, etc.
5.	Business Model (Revenue Model)	Digit recognition plays an important roles in many places. It is independent of environment, while using the recognizer we don't need the network. The benefits of hand written digit recognizer is high. In banking sector, it is very useful. It is used to recognize the account number, figure of cash and checks. It is also used to recognize the written digits on cash, deposit /withdrawal. So, the requirement of manpower is less,because the machine done the work of bank employees. So, we can earn the profit by using the hand written digit recognizer.

6.	Scalability of the Solution	To make the path toward digitalization clearer by providing high accuracy and faster computational for recognizing the handwritten digits. The present Neural network as classifier, MNIST as dataset with suitable parameters for training and testing and frame work for hand written digit recognition .The aforementioned system successfully imparts accuracy up to 99.20% which is higher than formally proposed schemes. In addition, the proposed system reduces computational time significantly for training and testing due to which algorithm become efficient. Thus the CNN architecture is proposed in order to achieve accuracy even better than that of ensemble architectures, along with reduced operational complexity and cost. Moreover, we also present an appropriate combination of learning parameters in designing a CNN that leads us to reach a new absolute record in classifying MNIST handwritten digits.