Project Design Phase-I
Proposed Solution Template

Date	11 October 2022
Team ID	PNT2022TMID14249
Project Name	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)	• It is easy for the human to perform task accurately by practicing it repeatedly and memorizing it for the next time. Human brain can process and analyse images easily. Also, recognize the different element present in the images. • 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. • In this competition, the goal is to correctly identify digits from a dataset of tens of thousands of handwritten images and experiment with different algorithms to learn what works well and how techniques compare.
2.	Idea / Solution description	• The algorithm used is Convolution Neural Network(CNN). This will prepare the trained model which will be used to classify the digits present in the test data. Thus, we can classify the digits present in the images as: Class 0,1,2,3,4,5,6,7,8,9. • MNIST is a dataset which is widely used for handwritten digit recognition. The dataset consist of 60,000 training images and 10,000 test images.

		• The artificial neural neworks can all most mimic the human brain and are a key ingredient in image processing field.
3.	Novelty / Uniqueness	• This project introduces an operative strategy for dealing with novelty in the handwritten visual recognition domain. A perfect transcription agent would be able to distinguish known and unknown characters in a picture, as well as determine any aesthetic variations that may occur inside or between texts. The existence of novelty has shown to be a major stumbling block for even the most robust machine learning-based algorithms for these activities. • Novelty in handwritten papers might include, among other things, a change in the writer, character properties, writing attributes, or overall document appearance. Instead of examining each element separately, we believe that an integrated agent capable of processing known characters and novelties concurrently is a superior technique. The handwritten digit recognition problem can be seen as a subtask of the optical character recognition (OCR) problem.
4.	Social Impact / Customer Satisfaction	• There are many benefits associated with the handwriting recognition system. 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. As a result, this system fulfills customers' expectations, as it is a novel method for recognizing handwritten digits, ensuring high accuracy for the model and meeting all customer expectations. Users will save a lot of time and effort if the system provides various synonyms for the words recognized. Due to the fact that the users in rural areas will be using their own regional language, this proposed system should be able to detect those digits as well. As the system is being used in socially crowded places such as banks to check amounts, it should be fast and reliable.

		As it is designed to solve real-world problems, it should be highly reliable and trustworthy in every way, and users throughout the world should be able to use it effectively.
5.	Business Model (Revenue Model)	• The applications where these handwritten digit recognition can be used are Banking sector where it can be used to maintain the security pin numbers, it can be also used for blind peoples by using sound output. • Some of the research areas include signature verification, bank check processing, postal address interpretation from envelopes etc.
6.	Scalability of the Solution	• One of the approaches to make the handwritten digit recognition system scalable is to make use of cloud-native methods. For example, one of the cloud solutions for making AI scalable is IBM Cloud. IBM Cloud Build helps run and manage AI models, optimize decisions at scale across any cloud. The advantage of using cloud to make solutions scalable is that we can deploy our AI application on the specific cloud environment that best supports our business needs. We can take advantage of built-in security capabilities and AI model monitoring. We can Automate AI lifecycles with ModelOps pipelines, deploy and run models through one-click integration and also prepare and build models visually and programmatically. Looking at these advantages, we can drive better business outcomes by optimizing our decisions and also make our solution scalable using cloud