Project Design Phase-I
Proposed Solution Template

Date	07 OCTOBER 2022
Team ID	PNT2022TMID17271
Project Name	AI FOR 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. ❖ 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	❖ To remedy this shortcoming of CCA, in this paper, the class information is incorporated into the framework of CCA for combined feature extraction, and a novel method of combined feature extraction. ❖ multimodal recognition, called discriminative canonical correlation analysis (DCCA), is proposed. ❖ 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. To remedy this shortcoming of CCA, in this paper, the class information is incorporated into the framework of CCA for combined feature extraction, and a novel method of combined featurextraction for multimodal recognition, called discriminative canonical correlation analysis (DCCA), is proposed.

		❖ 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 allcustomer expectations. Users will savea 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 beable 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	❖ As an effective method of combined feature extraction, CCA can extract features between two sets of samples, and the features can be fused for the subsequenrecognition. ❖ The related study verified the usefulness of CCA for recognition. However, the class information of the samples is not exploited by CCA, resulting in the limitation of the recognition performance. ❖ DCCA is a linear feature extraction method. Although the related work [15] show that if it is kernelized using so-called kernel trick, better recognition performance can be achieved, yet the choice of the kernel and kernel parameter(s) are still troublesome, resulting in heavy computational tasks.