

## Ideation Phase

### Define the Problem Statements

Date	15 October 2022
Team ID	PNT2022TMID29441
Project Name	Project - A Novel Method for Handwritten Digit Recognition System
Maximum Marks	2 Marks

#### Customer Problem Statement Template:

Create a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love.

A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

<b>I am</b>	Describe customer with 3-4 key characteristics - who are they?	Describe the customer and their attributes here
<b>I'm trying to</b>	List their outcome or "job" the care about - what are they trying to achieve?	List the thing they are trying to achieve here
<b>but</b>	Describe what problems or barriers stand in the way - what bothers them most?	Describe the problems or barriers that get in the way here
<b>because</b>	Enter the "root cause" of why the problem or barrier exists - what needs to be solved?	Describe the reason the problems or barriers exist
<b>which makes me feel</b>	Describe the emotions from the customer's point of view - how does it impact them emotionally?	Describe the emotions the result from experiencing the problems or barriers

Reference: <https://miro.com/templates/customer-problem-statement/>

### Example:



Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Cashier	See the written digit	I can't able to see it clearly	That digits are not written properly	Difficult
PS-2	Teacher	Correct the mistakes in answer sheet of student	I can't able to view the numbers	That numbers are not written properly	Trouble

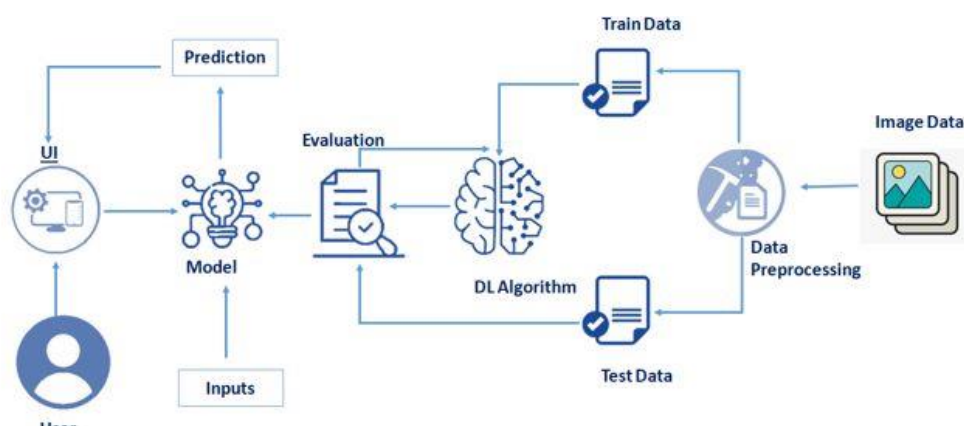
## **ABSTRACT:**

Recently handwritten digit recognition has become impressively significant with the escalation of the Artificial Neural Networks (ANN). Apart from this, deep learning has brought a major turnaround in machine learning, which was the main reason it attracted many researchers. We can use it in many applications. The main aim of this article is to use the neural network approach for recognizing handwritten digits. The Convolution Neural Network has become the center of all deep learning strategies. Optical character recognition (OCR) is a part of image processing that leads to excerpting text from images. Recognizing handwritten digits is part of OCR. Recognizing the numbers is an important and remarkable subject. In this way, since the handwritten digits are not of same size, thickness, position, various difficulties are faced in determining the problem of recognizing handwritten digits. The unlikeness and structure of the compositional styles of many entities further influences the example and presence of the numbers. This is the strategy for perceiving and organizing the written characters. Its applications are such as programmed bank checks, health, post offices, for education, etc.

## **INTRODUCTION:**

Image are easily the human brain easily processes and analyzes images. When we see a particular image, the brain can easily divide it in chunks and recognizes its different parts. The brain goes through this step naturally, which includes analyzing these images as well as comparing and differentiating their multiple Image are easily the human brain easily processes and analyzes images. features and characteristics from what the brain already recognized in order to recognize these characteristics. Image Processing is a branch of computer science that attempts to do the identical thing with computers. The field of image processing entails analyzing images to take out some useful and crucial information from images.

## **TECHNICAL ARCHITECTURE:**



## **PROBLEM STATEMENT:**

Handwritten digit recognition is very important as it will be very helpful to reduce human effort. As each individual has different handwritings for representing digits, the system should have a capability to identify every handwriting with maximum accuracy. Such a system will be useful to reduce human interventions in identification, as everything is being digitized. The main objective of this work is to ensure effective and reliable approaches for recognition of handwritten digits and make banking operations easier and error free. Handwriting recognition has gained a lot of attention in the field of pattern recognition and machine learning due to its application in various fields. Various techniques have been proposed to for digit recognition in handwriting recognition system

## **METHODOLOGY AND CLASSIFICATION**

For developing the deep learning model, we will be using Convolutional Neural Network. Convolutional networks are ingeniously useful in biological psychology since the sequence of connections between neurons mimicked the animal visual cortex's association. In a limited area of the chromatic field known as the receptive field, independent cortical neurons respond to solitary stimuli. Contrary neurons' receptive fields partly overlap, allowing them to occupy the whole visual field. One of the main propositions of OCR is recognizing handwritten digit characters. In this instance, we will emphasize the structure of a mechanism by considering recognizing handwritten digits. We'll read a variety of images containing handwritten digits extracted from the MNIST database and try to figure out which digit is represented by each image. MNIST data is illustrated in the IDX file format.

## **CONCLUSION**

In this project, the Handwritten Digit Recognition using Deep learning methods has been implemented. The most widely used Machine learning algorithms CNN has been trained and tested on the MNIST dataset. With extensive testing using the MNIST data, the current function suggests the role of various hyper parameters. We also confirmed that a good adjustment of hyper parameters is important in improving the performance of Convolutional Neural Network. Utilizing this deep learning technique, a high amount of accuracy can be obtained. This model is able to achieve a recognition rate of 98.85% accuracy and is significantly identifying real world images as well. The effect of increasing the number of convolutional layers on CNN structure in the performance of handwritten digital recognition is clearly demonstrated by experiments. Later it can be expanded to identify the character and a real-time person's handwriting. Digital recognition is the first step in the larger field of Artificial Intelligence and Computer Vision.

## **REFERENCES:**

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