Ideation Phase

LITERATURE SURVEY

Date	18 October 2022
Team ID	PNT2022TMID51505
Project Name	A Novel Method For Handwritten Digit Recognition System
Maximum Marks	2 Marks

Handwritten digit recognition is the ability of a computer to recognize the human handwritten digits from different sources like images, papers, touch screens, etc, and classify them into 10 predefined classes (0-9). Character recognition is becoming more and more important in the modern world. It helps humans ease their jobs and solve more complex problems. This system is developed for zip code or postal code recognition that can be employed in mail sorting. This can help humans to sort mails with postal codes that are difficult to identify.

Year	Title	Link	Inference
2017	A novel hybrid CNN–SVM classifier for recognizing handwritten digits	https://www.sciencedirect.com/science/article/pii/S0031320311004006?via%3Dihub	It is a hybrid CNN–SVM model for handwritten digit recognition. This model automatically retrieves features based on the CNN architecture, and recognizes the unknown pattern using the SVM recognizer.
2018	Spiking neural networks for handwritten digit recognition—Supervised learning and network optimization	https://www.sciencedirect.com/science/article/pii/S0893608018301126?via%3Dihub	This model a highly compact and efficient 3-layer spiking neural network for identifying handwritten digits. It has an accuracy of 98.17% on the MNIST dataset using the NormAD learning algorithm.
2018	An adaptive deep Q-learning strategy for handwritten digit recognition	https://www.sciencedirect.com/science/article/abs/pii/S0893608018300492?via%3Dihub	To increase the accuracy and decrease the running time, we employ adaptive deep Q-learning strategy. The mentioned strategy uses feature extraction and decision making to form a Q-deep belief Network(Q-ADBN). Q-ADBN is responsible for the feature extraction from the handwriting.

2019	Recognition of Handwritten Digit using Convolutional Neural Network (CNN)	https://globaljournals.org/GJCST_Volume19/4-Recognition-of-Handwritten-Digit.pdf	This model can be used to recognise the handwritten digits. The model is done using CNN, MNIST and is well trained with an accuracy of 99.15%.

2019	MDig: Multi-digit Recognition using Convolutional Neural Network on Mobile	http://web.stanford.edu/class/cs231m/projects/final-report-yang-pu.pdf	CNN tends to be the solution for any handwriting recognition. To reduce the workload, the shallow CNN is trained. Segmentation and processing are done to reduce input size fed into CNN. On NVIDIA SHIELD tablet, the application processes a frame and extracts 32 digits in approximately 60ms, and batching the fully-connected layers reduces the CNN runtime by another 12%.
2019	An efficient and improved scheme for handwritten digit recognition based on convolutional neural network	https://link.springer.com/article/10.1007/s42452-019-1161-5	The conventional algorithms used for handwriting recognition uses character recognition and feature extraction, but has very low accuracy and low computational speed. With the use of CNN(Convolutional Neural Networks) as classifier, MNIST as data set and DL4J for testing, the above system has proven to increase the accuracy of the system by 99.21% and also increases the computational speed.
2020	Hybrid CNN-SVM Classifier for Handwritten Digit Recognition	https://www.sciencedirect.com/science/article/pii/S1877050920307754?via%3Dihub	This is a hybrid model of CNN-SVM is proposed for handwritten digit recognition that involves automatic feature generation using CNN and output prediction using SVM. The model combines the advantage of CNN and SVM classifiers in recognizing handwritten digits with an accuracy of 99.28%.