

# Literature Survey

## A Novel Method for Handwritten Digit Recognition System

S.No	TITLE OF THE PAPER	AUTHOR	YEAR	TECHNOLOGY	JOURNAL NAME
1.	Handwritten Digit Recognition Using CNN	Mayank Jain, Gagandeep Kaur, Muhammad Parvez Quamar , Harshit Gupta	2021	MNIST dataset, Machine Learning, Convolutional Neural Network(CNN)	International Conference on Innovative Practices in Technology and Management (ICIPTM)
2.	Handwritten Digit Recognition of MNIST dataset using Deep Learning state-of-the-art Artificial Neural Network (ANN) and Convolutional Neural Network (CNN)	Drishti Beohar , Akhtar Rasool	2021	Convolutional Neural Network(CNN), Deep learning, MNIST dataset	International Conference on Emerging Smart Computing and Informatics (ESCI) AISSMS Institute of Information Technology, Pune, India
3.	Review on Deep Learning Handwritten Digit Recognition using Convolutional Neural Network	Akanksha Gupta, Ravindra Pratap Narwaria, Madhav Singh	2021	KNN, SVM, CNN, Deep learning	International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878 (Online), Volume-9 Issue-5

4.	Handwritten Digit Recognition System Based on Convolutional Neural Network	Jinze Li, Gongbo Sun, Leiye Yi, QianCao, Fusen Liang, Yu Sun	2020	Deep Learning, Convolutional Neural Network(CNN)	IEEE International Conference on Advances in Electrical Engineering and Computer Applications (AEECA)
5.	Recognition of Handwritten Digit using Convolutional Neural Network in Python with Tensor flow and Comparison of Performance for Various Hidden Layers	Fathma Siddique; Shadman Sakib; Md. Abu Bakr Siddique	2019	Convolutional Neural Network (CNN), Deep learning	
6.	Farsi Handwriting Digit Recognition based on Convolutional Neural Networks	Atefeh Dehghanian, Vahid Ghods	2018	CNN	6th International Symposium on Computational and Business Intelligence (ISCBI)

## **Observation**

### **Handwritten Digit Recognition Using CNN**

This study aimed at many existing arrangement models in an effort to provide robust and efficient methods for acknowledging transcribed numerical data. This paper highlights the Convolutional Neural Network exhibition (CCN). The outcomes show that the CNN classifier outperformed the Neural Network with significantly enhanced computational effectiveness without sacrificing execution. To avoid laborious pre-processing, expensive component extraction, and a confusing ensemble (classifier mix) approach of a typical acknowledgment framework, they investigated various configurations of a convolutional neural organization. Machine learning's Convolutional neural network was used to recognize handwritten digits.

### **Handwritten Digit Recognition of MNIST dataset using Deep Learning state-of-the-art Artificial Neural Network (ANN) and Convolutional Neural Network (CNN)**

Identifying handwritten digits is a challenging process. Computer science assignment that is essential for designing applications. One of the main uses is digit recognition using eyesight. This paper has used two main deep learning algorithms, Artificial Neural Network and Convolutional Neural Network, which have been contrasted in this research with regard to the recognition process's feature extraction and classification phases. The MNIST dataset was used to train the models using categorical cross-entropy loss and the ADAM optimizer. Artificial Neural Networks and Convolutional Neural Network 80% of the MNIST dataset was used to train the network, while 20% of the dataset was used to test it was examined. Using Convolutional Neural networks, improved image categorization performance. The typical Artificial Network's baseline error was 1.31%, and Convolutional Neural Network has a 0.9% efficiency. This definitely demonstrates the benefit of a convolutional neural network. In favor of an artificial neural network. We can perform better with a GPU than a CPU for minimizing the time. The aforementioned for all bodies, the strategy may be the finest component. Focusing on recognizing digits that have been manually written.

### **Review on Deep Learning Handwritten Digit Recognition using Convolutional Neural Network**

The use of classifiers like KNN, SVM, and CNN for handwritten digit recognition (HDR) is explored in this study. These classifiers are used to convert any digitally scanned document into a computer document format after being trained on a preset dataset. The scanned document goes through four separate steps of recognition, including preprocessing, segmentation, and classifier recognition. The MNIST dataset is utilized for training. CNN has shown to be highly accurate for HDR. It uses classifiers like KNN, SVM, and CNN. CNN classifier significantly improves the HDR results, but it is still possible to combine classifiers or use additional algorithms to further reduce complexity, execution time, and result in accuracy.

### **Handwritten Digit Recognition System Based on Convolutional Neural Network**

This study aims to create a handwritten digit recognition system using convolutional neural

networks. The system uses the MNIST data set and the deep learning method as a practice set. The system pre-processes the image using the Opencv toolkit and trains on the MNIST dataset. The handwritten digit picture features are then extracted using LeNet-5 in the convolutional neural network, iteratively convolution pooling, and pulling the output into a one-dimensional vector. Finally, use the Softmax regression model to discover the point with the best probability to predict the outcome and achieve handwritten digit recognition. The accuracy of the recognition results produced by the current recognition technology frequently still needs manual evaluation. The design in this study suffers from the issue of an excessively long recognition time.

## **Recognition of Handwritten Digit using Convolutional Neural Network in Python with Tensor flow and Comparison of Performance for Various Hidden Layers**

The purpose of this study is to compare the classification accuracy of CNN across a range of hidden layer and epoch numbers, and to notice the variance in classification accuracy. We ran our experiment using the Modified National Institute of Standards and Technology (MNIST) dataset to assess how well CNN worked. Additionally, the backpropagation technique and stochastic gradient descent are used to train the network. In this study, 15 epochs were used to observe the fluctuations in hidden layer accuracies for handwritten digits. The highest accuracy of all the observations was determined to be 99.21%, while the lowest accuracy was found to be 97.07%.

## **Farsi Handwriting Digit Recognition based on Convolutional Neural Networks**

This study uses a convolutional neural network (CNN) to recognize Farsi handwritten digits. The HODA dataset, which consists of 80,000 photographs of handwritten Farsi digits, is used. The efficient and distinctive property of Farsi digits, which is to employ just the half-upper part of the digits for identification purposes, was the emphasis of the suggested solution. An accuracy rate of 97.38% was achieved. Despite a 50% reduction in the amount of data provided to the CNN, the suggested technique produced an acceptable reduction in training and evaluation time for the CNN of roughly 50% when compared to when utilizing the complete picture of the digits (full data), and only a 1.5% increase in recognition error.