

# **A NOVEL METHOD FOR HANDWRITTEN DIGIT RECOGNITION SYSTEM**

## **LITERATURE REVIEW**

### **TEAM MEMBERS:**

- 1.Mageswari S J - 2019105548
- 2.Gayathiri N – 2019105011
- 3.Prathisha A – 2019105556
- 4.Divya R - 2019105528

This paper attempts to use deep learning tools to train a classifier to recognize handwritten digits. Also, the use of techniques in Computer Vision was explored to investigate the effect of selection image preprocessing, feature extraction and classifiers on the overall accuracy. The dataset used for the experiment is MNIST dataset originally constituted of 60,000 training, and 10,000 testing images which are 28 x 28 grayscale (0-255) labeled and bitmap format. Trained the model in 12 epochs and got accuracy of 99.87% and test loss of 0.043464561576.[\[1\]](#)

Handwritten digit recognition has recently been of very interest among the researchers because of the evolution of various Machine Learning, Deep Learning and Computer Vision algorithms. In this paper the results of some of the most widely used Machine Learning Algorithms like SVM, KNN & RFC and with Deep Learning algorithm like multilayer CNN using Keras with Theano and Tensor flow are compared. [\[2\]](#)

CNN is able to the learning full architecture CNN (for example, LeNet5) to provide remarkable recognition accuracy in the MNIST handwritten digit recognition. LeNet5 - simple convolutional neural network its recognizing simple digit images. n. For all experimental images, the pixel's values also have been normalized to a range. Where the black pixels are pixels with negative value, the white pixels are pixel with positive value, and the grey pixels are pixels with zero.[\[3\]](#)

Mahmoud M. Abu Ghosh and Ashraf Y. Maghari compared DNN, CNN and DBN to determine the best algorithm for recognition by considering accuracy, performance and execution time. After experimentations the results were summarized as DNN to be the best algorithm in terms of

accuracy and performance, CNN and DNN algorithms were almost equal in terms of accuracy and DNN algorithm was better than CNN and DBN in terms of execution time.[\[4\]](#)

'Unconstrained Handwritten Numeral Recognition Using Majority Voting Classifier', the authors, Rajiv Kumar, Pervez Ahmed, Mayank Kumar Goyal, Amresh Kumar presented a simple profile, combined local & global features and majority voting scheme classifier for unconstrained handwritten numeral recognition. Linear discriminant analysis and KNN classifiers are used for classifying these features. A majority voting scheme has been performed with three neural network classifiers and KNN classifiers. The performance is tested on MNIST dataset. The network was trained on 60,000 and tested on 10,000 numeral samples of which 98.05 % test samples are correctly recognized.[\[5\]](#)