

Project Objectives

Team ID	PNT2022TMID14753
Project name	A Novel Method for Handwritten Digit Recognition System

The objective of this project is as follows:

- To know the fundamental concepts and techniques of Artificial intelligence and Convolution Neural networks.
- To understand the Deep learning algorithms.
- To gain a broad understanding of image data.
- To work with a Sequential type of modelling
- To work with Kera's capabilities
- To work with image processing techniques
- To know how to build a web application using the Flask framework.

CNN in handwritten digit recognition

Convolutional Neural Network

For those of you knew to this concept, CNN is a deep learning technique to classify the input automatically (well, after you provide the right data).

An enormous number of CNN classification algorithms have been proposed in the literature.

Nevertheless, in these algorithms, appropriate filter size selection, data preparation, limitations in datasets, and noise have not been taken into consideration. As a consequence, most of the

algorithms have failed to make a noticeable improvement in classification accuracy. To address the shortcomings of these algorithms, our paper presents the following contributions: Firstly,

after taking the domain knowledge into consideration, the size of the effective receptive field (ERF) is calculated. Calculating the size of the ERF helps us to select a typical filter size which

leads to enhancing the classification accuracy of our CNN. Secondly, unnecessary data leads to misleading results and this, in turn, negatively affects classification accuracy. To guarantee the

dataset is free from any redundant or irrelevant variables to the target variable, data preparation is applied before implementing the data classification mission. Thirdly, to decrease the errors of

training and validation, and avoid the limitation of datasets, data augmentation has been

proposed. Fourthly, to simulate the real-world natural influences that can affect image quality,

we propose to add an additive white Gaussian noise with $\sigma = 0.5$ to the MNIST dataset. As a

result, our CNN algorithm achieves state-of-the-art results in handwritten digit recognition, with a recognition accuracy of 99.98%, and 99.40% with 50% noise.