Ideation Phase
Literature Survey

Date	19 September 2022
Team ID	PNT2022TMID18363
Project Name	Project - A Novel Method for Handwritten Digit Recognition System
Maximum Marks	4 Marks

Literature Survey:

A. B. M. Ashikur Rahman, MD. Bakhtiar Hasan, Sabbir Ahmed et all, proposed optical model proved to be efficient in recognizing sequences in images with high noise, discarding irrelevant information around the target text. The evidence of extensive review studies on HDR exists in the literature for languages such as English, Arabic, Indian, Farsi, Chinese, etc. Few surveys on Bengali HDR (BHDR) can be found. BANGLA DIGIT DATASET(NUMTADATASET) is used in recognising of the digit. This paper concluded that this feature performs poorly in digit recognition with an accuracy of around 82% on a self-curated dataset. Celled projection can improve the accuracy up to 92.60% on the same dataset.

Huseyin Kusetogullari, Amir Yavariabdi et all, proposes a new deep learning based framework to resolve the corresponding problem. This paper introduces a novel deep learning architecture named DIGITNET and a large-scale digit dataset named DIDA to detect and recognize handwritten digits in historical document images written in the nineteen century. DIGITNET DATASET is used in recognising of the digit. Three different convolutional neural networks (CNN) architectures are constructed for recognition of the detected digits. The proposed model trained on the DIDA provides the highest detection rate 75.96%. The detection performance of the model trained on the extended MNIST is 52.83%.

Andre G. Hochuli, Alceu S. Britto jr, David A. Saji B et all, proposed comprehensive comparison with a critical analysis of the segmentation-free strategies on five benchmarks commonly used to assess HDSR. CAR & CVL DATASET is to evaluate different end-to-end approaches to solve the HDSR problem. It achieved great result particularly in two verticals: those based on object-detection (e.g., Yolo and RetinaNet) and those based on sequence-tosequence representation (CRNN). Yolo's main advantage is that it has no constraints regarding the number of touching digits in the string. It achieved a 97%, 96%, and 84% recognition rate on the NIST-SD19, CAR, and CVL datasets, respectively.

Hongge Yao, Yuxing Tan, Chunqiu Xu, Jun Yu, Xiaojun Bai et all, proposed the problem of highly overlapping handwritten digit recognition, MNIST DATASETFOD_DCNet, for the recognition and separation of fully overlapping handwritten digits used small sized convolution kernels to extract features whose purpose is to test the performance of the network. FOD_DCNet can recognize the stroke details of overlapping digits and separate the overlapping digits. A capsule vector "reconstruction network" is constructed to separate overlapping digits. The output of the "reconstruction network" is two pictures that are the separated overlapping digits, achieving the purpose of separating overlapping digits. The classification accuracy of FOD_DCNet can reach 93.53%, which is 5.43% higher than CapsNet and its parameter amount is only 55.61% of CapsNet.

Saleh Aly,Sultan Almotairi et all proposed the Deep Convolutional Self-organizing Map (DCSOM) network is a new deep learning architecture which uses multiple convolutional SOM layers. It has a similar structure with common convolutional neural networks. MNIST DATASET is used in recognising of the digit. DCSOM network achieves best performance on handwritten digits datasets contaminated with random and image background noise. This section focuses on the evaluation of various invariance aspects of DCSOM network using MNIST handwritten digit databases and MNIST variations. Exploiting the topological order property of SOM feature map to efficiently represent local patches of the input image using SOM neuron coordinates.