**IBM Team 2**

**Team Leader :** R.ADITYA(311519104004)

**Team mates:** B.HARISH KUMAR (311519104022)

AKASH KV (311519104301)

RAJAI SHANKAR P (311519104302)

**Domain Name**: Education

**Use case Name**: A novel method for handwritten digit recognition system

***Paper 1***

*Authors:*GAGANDEEP KAUR,MUHAMMAD PARVEZ QUAMAR.

*Year :* 2021

*Title:*Handwritten Digit Recognition Using CNN

*Methodology:*This paper theconvolutional neural network used . Convolutional neural networkis a type of artificial neural network, which is widely used for image/objectrecognition and classification. Deep Learning thus recognizes objects in an image by using a CNN.

*Advantage:* IN CNN Very High accuracy in image recognition problems.Automatically detects the important features without any human supervision.

*Disadvantage:*CNN do not encode the position and orientation of object. Lack of ability to be spatially invariant to the input data. Lots of training data is required.

***Paper 2***

*Authors:*Peiyu Ma.

*Year :* 2020

*Title:*RECOGNITION OF HANDWRITTEN DIGIT USING CONVOLUTIONAL NEURAL NETWORK (CNN)

*Methodology:*Although the application of CNN has greatly improved the accuracy of handwriting recognition ,there is no model make the accuracy reach 100% and there are also some restrictions on the recognized sample ,such as the requirements of clarity. Therefore, there is still some space of future update on the CNN

*Advantage:* faster and easily recognize the digits with a good accuracy

*Disadvantage:* Lack of ability to be spatially invariant to the input data. Lots of training data is required and the time also is taken more .

***Paper 3***

*Authors:*FathmaSiddique ,ShadmanSakib , Md. Abu Bakr Siddique

*Year :* 2020

*Title:*REAL TIME HANDWRITTEN DIGIT RECOGNITION USING CONVOLUTIONAL NEURAL NETWORK

*Methodology:*CNN is playing an important role in many sectors like image processing. It has a powerful impact on many fields.Even, in nano-technologies like manufacturing  
semiconductors, CNN is used for fault detection andclassification . Handwritten digit recognition hasbecome an issue of interest among researchers. There are a  
large number of papers and articles are being published thesedays about this topic. In research, it is shown that DeepLearning algorithm like multilayer CNN using Keras with  
Theano and Tensorflow gives the highest accuracy incomparison with the most widely used machine learningalgorithms like SVM, KNN & RFC

*Advantage:* faster and easily recognize the digits with a good accuracy

*Disadvantage:.*Although AI is creating millions of new jobs, the banking institutions does the substitution of workforces with intelligent robots that could increase the inequality among the highly skilled workforce.

***Paper 4***

*Authors:* Kaveti upender , venkata siva kumar pasupuleti

*Year :* 2021

*Title:* Real time handwritten digits recognition using convolutional neural network

*Methodology:* the images are first trained and the test images are sent to the machine and the machine detects the digit with the help of the digits that are present in the data and the output is visible on the screen

*Advantage:* reading handwritten information like examination answer sheets is still a difficult task for many of us because each one have different interpretation style .As the world is moving towards digitalization . converting it to human readable format .

Disadvantage: They have some disadvantages that include the accuracy is not enough and the system needs to improved for better accuracy

***Paper 5***

*Authors:* chao zhang , zhiyao zhou , lan lin

*Year :* 2020

*Title:* handwritten digits recognition based on convolutional neural network

*Methodology:* when the image is uploaded and the digit is recognized . the output is shown on the screen .CNN is playing an important role in many sectors like image processing. It has a powerful impact on many fields.Even, in nano-technologies like manufacturing  
semiconductors, CNN is used for fault detection andclassification . Handwritten digit recognition hasbecome an issue of interest among researchers. There are a  
large number of papers and articles are being published these days about this topic.

*Advantage:* faster and easily recognize the digits with a good accuracy

Disadvantage: blurred images cannot be scanned

| **S.No** | **Author** | **Title of the Paper** | **Methodology** | **Pros (Advantage)** | **Cons**  **(Disadvantage)** |
| --- | --- | --- | --- | --- | --- |
|  | GAGANDEEP KAUR  MUHAMMAD PARVEZ QUAMAR.  **(IEEE paper 1)** | Handwritten Digit Recognition Using CNN | This paper theconvolutional neural network used . Convolutional neural networkis a type of artificial neural network, which is widely used for image/objectrecognition and classification. Deep Learning thus recognizes objects in an image by using a CNN | IN CNN Very High accuracy in image recognition problems.Automatically detects the important features without any human supervision. | CNN do not encode the position and orientation of object. Lack of ability to be spatially invariant to the input data. Lots of training data is required |
|  | Peiyu Ma. **(IEEE paper 2)** | Recognition of handwritten digit using convolutional neural network (cnn) | Although the application of CNN has greatly improved the accuracy of handwriting recognition ,there is no model make the accuracy reach 100% and there are also some restrictions on the recognized sample ,such as the requirements of clarity. Therefore, there is still some space of future update on the CNN | faster and easily recognize the digits with a good accuracy | Lack of ability to be spatially invariant to the input data. Lots of training data is required and the time also is taken more . |
|  | FathmaSiddique ,ShadmanSakib , Md. Abu Bakr Siddique  **(IEEE paper 3)** | Real time handwritten digit recognition using convolutional neural network | CNN is playing an important role in many sectors like image processing. It has a powerful impact on many fields.Even, in nano-technologies like manufacturing semiconductors, CNN is used for fault detection andclassification . Handwritten digit recognition hasbecome an issue of interest among researchers. There are a large number of papers and articles are being published thesedays about this topic. In research, it is shown that DeepLearning algorithm like multilayer CNN using Keras with Theano and Tensorflow gives the highest accuracy incomparison with the most widely used machine learningalgorithms like SVM, KNN & RFC | faster and easily recognize the digits with a good accuracy | Inability of the machine to indicate the blurred and bizarre images and it reduces accuracy |
|  | Kaveti upender , venkata siva kumar pasupuleti | Real time handwritten digits recognition using convolutional neural network | The images are first trained and the test images are sent to the machine and the machine detects the digit with the help of the digits that are present in the data and the output is visible on the screen | Reading handwritten information like examination answer sheets is still a difficult task for many of us because each one have different interpretation style .As the world is moving towards digitalization . Converting it to human readable format | They have some disadvantages that include the accuracy is not enough and the system needs to improved for better accuracy |
|  | Chao zhang , Zhiyao zhou , Lan lin | Handwritten digits recognition based on convolutional neural network | When the image is uploaded and the digit is recognized . the output is shown on the screen .CNN is playing an important role in many sectors like image processing. It has a powerful impact on many fields.Even, in nano-technologies like manufacturing semiconductors, CNN is used for fault detection andclassification . Handwritten digit recognition hasbecome an issue of interest among researchers. There are a large number of papers and articles are being published these days about this topic. | Faster and easily recognize the digits with a good accuracy | Blurred images cannot be scanned  Rtraining was not done properly  The accuracy was not sufficient |