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COMPARATIVE STUDY OF MACHINE LEARNING TECHNIQUES ON HANDWRITING RECOGNITION AND ANALYSIS

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ABSTRACT

This research paper offers a new solution to traditional handwriting recognition techniques using concepts of Machine learning techniques and computer vision. An extension of MNIST digits dataset called the Emnist dataset has been used. It contains 62 classes with 0-9 digits and A-Z characters in both uppercase and lowercase. In this paper, we detect handwritten text and convert it into digital form using Rectified Linear units, for text classification and detection, has been created Prior to that we pre-processed the dataset and applied various filters over it. We linked our handwriting text recognition program using tensor flow libraries. The utilization of ReLU with CNNs has been examined completely, and all around brings about an improvement in results, at first, shockingly so. Here in this paper, a few systems are talked about which are utilized for the acknowledgment and examination of penmanship styles. These procedures help the procedure of digitalization of the archives and facilitate the further handling of the records.

1. INTRODUCTION

Handwritten Text Recognition is a technology that is much needed in this world as of today. Before proper implementation of this technology we have relied on writing texts with our own hands which can result in errors. It's difficult to store and access physical data with efficiency. Modern day technology is letting people store the data over machines, where the storage, organization and accessing of data is relatively easier.

Adopting the use of Handwritten Text Recognition software, it's easier to store and access data that was traditionally stored. Furthermore, it provides more security to the data. One such example of Handwritten text Recognition software is the Google Lens. The aim of our project is to make ease for user in order to recognize the handwriting using concepts of machine learning techniques. We approached our problem using Rectified Linear networks, as they provide better accuracy over such tasks and avoid long training process.

2. EXISTING AND PROPOSED SYSTEM

2.1 Existing System

Markov Models for Handwriting Recognition gives a definite diagram of the utilization of Markov models for stochastic model utilized uncommonly for disconnected penmanship acknowledgement. The system uses Convolutional Neural Network and Support Vector Machines (CNN-SVM) for the handwriting recognition. Different systems have been produced for this reason utilizing various methodologies. In this paper, general design of present day OCR framework with subtitles of every module is talked about. In this Moore neighborhood following for extricating limit of characters and afterward chain rule for highlight extraction. The existing method was validated using ten folds cross-validation, and it shows that the recognition rate for this method is still able to be improved and it can be improved through our proposed model.

2.2 Disadvantages of Existing System:

- Accuracy is less when compared to the proposed model.
- Vanishing Gradient Problem is not achieved through this applied network model.

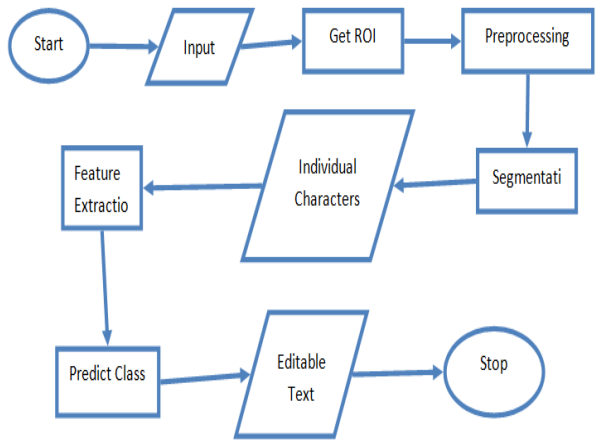
2.3 PROPOSED SYSTEM

The proposed method uses a Rectified Linear network as a powerful feature extraction to extract the feature of input character and a linear rectifier for end classifier. It gives a good performance for local spatial correlation on image and has less training which simplifies the convolutional layer output information**.** Through this model, back propagation for training parameters in convolutional and sub sampling-layers is achieved. The proposed architecture of Rectified linear network to extract the feature of handwritten character recognition. It is a standard architecture of ReLU network. The network contains five layers. The first four are two sets of convolutional and sub- sampling layers, followed output layer which fully connected layer. The output of the first convolutional layer has six feature maps with 24x24 pixels and the second convolutional layer has 12 feature maps with 8x8 pixels**.** Help a model record for non-direct impacts. This fair implies on the off chance that I diagram a variable on the level pivot, and my forecasts on the vertical hub, is anything but a straight line. Or then again said another way, the impact of expanding the indicator by one is distinctive at various estimations of that indicator.

2.4 ADVANTAGES OF PROPOSED SYSTEM:

- It can be used when data is high.
- It can be easily implemented with attributes that are independent of each other. This decreases the computational cost.
- A more efficient output is expected when compared to other methods output.
- It is more accurate and less time consuming.

3. SYSTEM ARCHITECTURE



4. MODULES

Get ROI:

An area of intrigue (ROI) is a part of a picture that you need to channel or work on here and there. The tool kit underpins a lot of ROI protests that you can use to make ROIs of numerous shapes, such circles, ovals, polygons, square shapes, and hand-drawn shapes. After creation, you can utilize ROI object properties to redo their appearance and working. What's more, the ROI items bolster article capacities and occasions that you can use to execute intuitive conduct. For instance, utilizing occasions, your application can execute custom code at whatever point the ROI changes position. As an accommodation, the tool kit incorporates a parallel arrangement of comfort capacities for ROI creation.

Preprocessing

Information Preprocessing alludes to the means applied to make information increasingly appropriate for information mining. The means utilized for Data Preprocessing more often than not fall into two classes: Selecting information items and properties for the investigation. Creating/changing the traits.

Segmentation

Picture division is the way toward apportioning an advanced picture into different fragments (sets of pixels, otherwise called super-pixels). The objective of division is to rearrange as well as change the portrayal of a picture into something that is increasingly significant and simpler to break down. Picture division is regularly used to find items and limits (lines, bends, and so forth.) in pictures.

Feature Extraction:

In AI, design acknowledgment and in picture handling, highlight extraction begins from an underlying arrangement of estimated information and constructs determined qualities (highlights) planned to be instructive and non-excess, encouraging the resulting learning and speculation steps, and sometimes romping better human understandings. Highlight extraction is identified with dimensionality decrease.

Class Prediction (CLASSIFICATION)

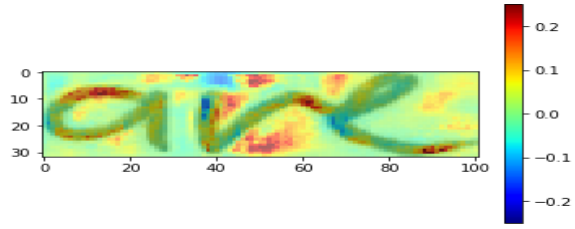
"Expectation" alludes to the yield of a calculation after it has been prepared on a recorded dataset and applied to new information when you're attempting to figure the probability of a specific result. The calculation will create plausible qualities for an obscure variable for each record in the new information, enabling the model developer to recognize what that worth will probably be.

5. ALGORITHMS

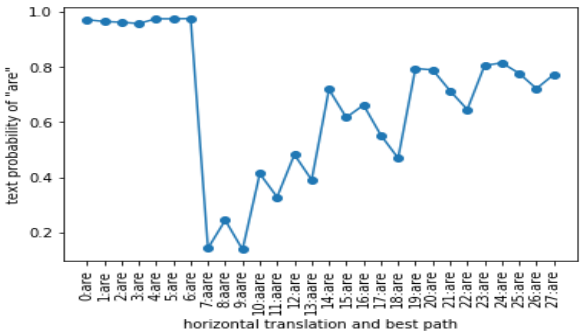
Rectified Linear Units (ReLU)

Rectified Linear Units implements the activation function for transferring the data and converts the digital data between 0 and 1 based on the complexity Connections: Imagine a solitary hub in a neural system model. For straightforwardness, expect it has two data sources, called An and B. The loads from An and B into our hub are 2 and 3 separately. So the hub yield is f(2A+3B) . We'll utilize the ReLU work for our f. Along these lines, if 2A+3B is certain, the yield estimation of our hub is additionally 2A+3B . This is a basic situation where the hub caught an association. As you include more hubs and more layers, the potential intricacy of communications just increments. Yet, you should now perceive how the initiation capacity helped catch an association. Such instances can be solved by Relu networks.

6. RESULTS



Hand written word



Prediction Graph

7. CONCLUSION:

In this paper, CNN as a powerful feature extraction method applied to extract the feature of the handwritten characters and linear SVM using L1 loss function and L2 regularization used as end classifier. Based on the experiment results using data from NIST SD 19 2nd editions, both for training and testing, the proposed method achieves an accuracy rate better than only CNN method. The proposed method was also validated using ten folds cross-validation, and it shows that the recognition rate for this proposed method is still able to be improved. The proposed method achieves a better accuracy rate than another previous study. A system for automatic handwriting recognition on form document has been constructed using the proposed method. Overall, the system can recognize a more challenging handwriting on form document which containing bounding box and some noise. For the next research, the other segmentation method may be explored to address the connected character problem.