IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 6, April 2023

Review on Doctor's Handwriting Recognition using Deep Learning

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Abstract: *Specialists ordinarily compose in incomprehensible handwriting, making it troublesome for both the common public and a few drug specialists to get the drugs they have endorsed. It isn'tperfect for them to compose the prescription discreetly and deliberately since they will be dealing with handfuls of patients each day and will be swamped with work. As a result, their penmanship is illegible. This may result in reports or prescriptions consisting of brief shapes and cursive composing that a typical person or drug specialist won't be able to examine appropriately, which will cause endorsed drugs to be incorrectly spelled. However, some people usually to composing medicines in regional dialects since we all live in a range with a diversity of territorial dialects. It makes examining the content much more challenging. So, in this paper, we'll utilize a recognition framework to construct an apparatus that can interpret the handwriting of doctors into any dialect. This system will be made into an application that's completely independent and functioning. As the client transfers the medicine picture the program will pre-process the picture by performing image-processing, and word segmentations at first before processing the picture for preparation. CRNN which isutilized to train the model. We get the Yield within the shape of a pdf.*

Keywords: Handwriting recognition, Machine learning, Image processing

I. INTRODUCTION

The art of penmanship permits each individual to communicate their ideas on paper in their possess special way. Depending on the individual, it might change significantly. Particularly, when talking about a doctor's action plan, more meetings are scheduled in a brief sum of time, and the determination is given more significance than the prescription's penmanship. As a result, they regularly have destitute penmanship, making it sometimes troublesome to study the medicine and recognize the drugs and their conceivable measurements. It is very challenging for patients and youthful drug specialists to recognize the doctor's handwriting. The range of results from sedate errors ranges from no clear indications to passing. It can sometimes result in an unused affliction that's either temporal or permanent,such as itchiness, rashes, or skin deformation. In spite of being rare, drug botches can truly hurt people. Agreeing to an Egyptian consideration, nearly 96 percent of the open bolstered software application may be utilized to decipher a doctor's handwriting into computerized content. In most cases, specialists only indicate the sort of pharmaceutical, such as tablet, capsule, or syrup, using acronyms and brief shapes. There are frameworks that have been recommended that can utilize the Profound Convolutional RNN approach to recognize the letter set and numerals from written content in English. India is broadly eminent for having a wide assortment of societies and dialects. Depending on the patient's needs, specialists may once in a while allude to the prescription drugs in territorial dialects. So, the application will be distant more broadly utilized by both drug specialists and regular individuals with territorial dialect support.The essential reason for this think about is to form an application that can effectively recognize restorative prescription images or filter them for consequent transformation to computerized text.This is fulfilled by conveying profound learning techniques such as CRNN. for picture acknowledgment. The construction procedure is distant more

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helpful for normal individuals to utilize in order to require their everyday measurements as endorsed by their doctors. This too makes it simpler for unused drug specialists and also consumers to conduct their errands more effectively and legitimately.

II. LITERATURE REVIEW

1] S. Tabassum et al, It is difficult to decipher a doctor's handwriting on a prescription. In this paper, they used neural network techniques such as CNN and BI-LSTM for predicting doctors' handwriting from medical prescriptions. The CTC loss function is used for normalization. This model builds on the IAM dataset. Image acquisition and data augmentation are used for image preprocessing. Furthermore, it is passed as input to 7 convolution layers of a neural network.32 training epochs were used by the training model, which took six hours to complete training and, on a graph, loss values are represented.

2] E. Hassan, H. Tarek, M. Hazem, S. Bahnacy, L. Shaheen and W. H. Elashmwai., The approach established a Convolutional Recurrent Neural Network (CRNN) technology using Python that can interpret handwritten English prescriptions and translate them into digital text. For this, datasets with 66 different classes, including alphanumeric characters, punctuation, and spaces, were used. Since prescriptions generally contain two or three words, the training was carried out using short texts. Normal handwriting and prescriptions from doctors were used to train the model. The system got a 98% accuracy rate after taking training time and data input into account. This paper further stated that in order to enhance the results, more work is needed on input handling techniques.

3] L. J. Fajardo et al, The approach uses the Hidden Markov Model (HMM) to recognize cursive handwritten Malayalam characters. By employing a median filter, the algorithm used here helps to avoid errors caused by noise in the scanned image. Furthermore, Artificial Neural Network (ANN) aids in the acquisition of better classification and provides the best matching class for input. The samples used are of high quality in order to reduce the complexity of the recognition process. This method yields better results in terms of speed and accuracy. As a result, the combination of both English and Malayalam characters can be recognized as future work.

4] K. Gaurav, Bhatia P. K. Et al, this paper deals with the various pre-processing techniques involved in character recognition with different kinds of images ranging from simple handwritten form-based documents and documents containing colored and complex backgrounds and varied intensities. In this, different preprocessing techniques like skew detection and correction, image enhancement techniques of contrast stretching, binarization, noise removal techniques, normalization and segmentation, and morphological processing techniques are discussed. It was concluded that using a single technique for preprocessing, we can't completely process the image. However, even after applying all the said techniques might not be possible to achieve full accuracy in a preprocessing system.

5] Salvador España-Boquera et al, in this paper hybrid Hidden Markov Model (HMM) model is proposed for recognizing unconstrained offline handwritten texts. In this, the structural part of the optical model has been modeled with Markov chains, and a Multilayer Perceptron is used to estimate the emission probabilities.

6] A. Brakensiek, J. Roland, A. Kosmala, J. Rigoll, et al, in this paper a system for off-line cursive handwriting recognition described which is based on Hidden Markov Models (HMM) using discrete and hybrid modeling techniques. Handwriting recognition experiments using discrete and two different hybrid approaches, which consist of discrete and semi-continuous structures, are compared. A segmentation-free approach is considered to develop the system. It is found that the recognition rate performance can be improved by a hybrid modeling technique for HMMs, which depends on a neural vector quantizer (hybrid MMI), compared to discrete and hybrid HMMs, based on tired mixture structure (hybrid - TP), which may be caused by a relatively small data set.

7] R. Bajaj, L. Dey, S. Chaudhari, et al, employed three different kinds of features, namely, the density features, moment features, and descriptive component features for the classification of Devanagari Numerals. They proposed multi-classifier connectionist architecture for increasing the recognition reliability and they obtained 89.6% accuracy for handwritten Devanagari numerals.

8] Sandhya Arora, used four feature extraction techniques namely, intersection, shadow feature, chain code histogram, and straight-line fitting features. Shadow features are computed globally for character images while intersection features, chain code histogram features, and line fitting features are computed by dividing the character image into different segments. On experimentation with a dataset of 4900 samples, the overall recognition rate observed was

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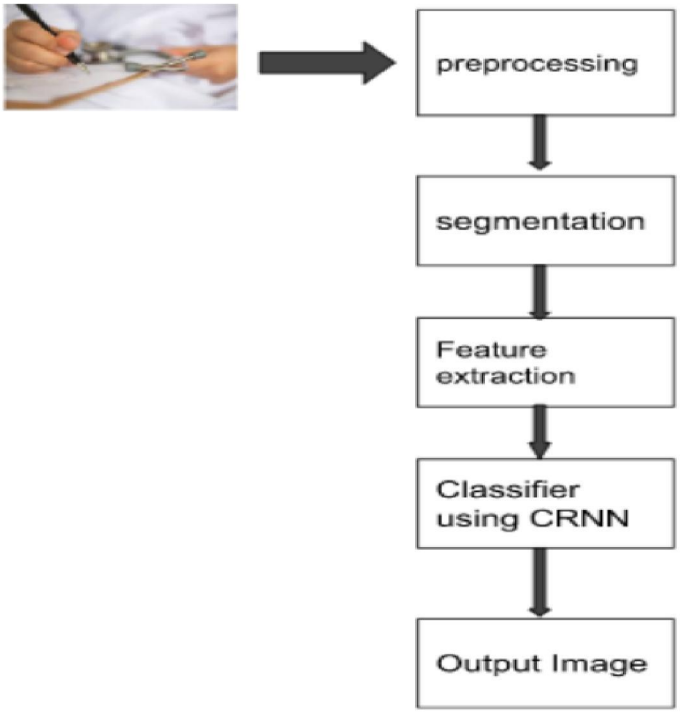
92.80% for Devanagari characters.

III. METHODOLOGY

In this proposed system, we will work on predefined data sets only to train the machine learning model for recognizing doctors' handwriting. We will use a predefined data set. We will use the Python language and its libraries like OpenCV, PIL, and NumPy to preprocess the images. The preprocessing will involve image resizing, normalization, and noise removal to make the image suitable for machine learning algorithms. For recognizing doctors' handwriting, we will use a Convolutional Recurrent Neural Network (CRNN) algorithm. CRNN is a deep learning algorithm that combines convolutional neural networks (CNNs) and recurrent neural networks (RNNs) to extract features from the images and recognize patterns in the sequence of text. We will use the selected datasets to train the CRNN algorithm. During the training process, we will feed the preprocessed images to the algorithm, and it will learn to recognize the handwriting patterns of the doctors. For displaying the output of the proposed system, we will develop a GUI using the Tkinter library in Python. The GUI will have a text box to display the recognized text, and an image selection button to select the image to be processed. Once the algorithm recognizes the handwriting patterns in the selected image, the recognized text will be displayed in the text box of the GUI. Also, the output will be generated in PDF format for easy sharing and storage.

3.1 Block Diagram



IV. SYSTEM REQUIREMENT

Hardware Requirement

1. CPU I3 processor
2. RAM 4GB
3. OS window 8
4. ROM 250 GB

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Software Requirement

1. Python IDE Software.

V. CONCLUSION

Finally, this application interface will make it simple for people to access the model and interact with it through the application. Furthermore, this technique allows the majority of users to verify the notes or prescriptions without any prior knowledge in calligraphy analysis. Therefore, this technology will eliminate human mistakes and pave the way for customers to assess it without the assistance of experts. We might improve the accuracy more in the future by supplying more data for training. Furthermore, the method may be tweaked to produce results even faster. Make this program cross-platform and long-lasting for even the most stringent requirements.

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