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Handwritten Script Detection and Translation

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***Abstract*—Humans are aware about English language which has been prevalent since the times of British era. But still difficulty is faced in by the people who only stick to their native language or are so proud of their native language that they tend to use them everywhere be it in marketing, teaching, business deals etc. English has established its percentage to around twenty in total languages that is spoken and that is used for business purpose only. But in country like India the use of native language seems to play a role on a wider scale. Use cases of recognizing and translating has reached into the fields like healthcare and pharmaceutical, insurance, banking, online libraries. This led people to understand the need for translating a particular text into their preferred language for better understanding be it any field. An attempt is made to recognize the given text and followed by its translation into preferred language using a designed dataset. Wherein the detection of the text is performed by using Convolutional Neural Network (CNN), and other neural networks that is required for full processing of the text recognized image and led to the desired output. The model detects the language of the given text and next leads to translation of the given text into the native language. This flow will ease down the recognition of handwritings written in different way and will help to reduce labor cost and save precious human time.**

***Index Terms*— Handwritten script recognition, Handwritten script translation, Feature extraction, etc.**

I. INTRODUCTION

Today's world is world of rapid Digitization of businesses and this arises the need for system translation of script and its translation to reduce labor cost and save human time. Although handwritten script recognition and translation systems has been considered but still it's a problem still prevailing nowadays and majorly in areas like healthcare, insurance, banking, online libraries. Recent advances in image processing and pattern recognition technology have made handwritten script identification and translation some of the most exciting and difficult fields to study. It makes a significant contribution to the development of automated processes and enhances the interface between machines and humans in many applications. New strategies and methods that would speed up processing time while improving recognition accuracy and translation rate have been the subject of numerous research studies. In this work we propose a scalable system which will ease out the detection and translating it preferred language. The system begins by uploading a screenshot of the script onto the interface, where it is then translated into the user's preferred language. The application not only translates but also introduces users to a new universe through this spotting and translation process.The advantages of this application are that users can now go to new locations whenever they want or begin reading a new book in any language they choose. The user can travel to a new area and instantly have translation available by pointing their

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phone at a street sign! Both the Android and Windows operating systems were used in the creation of this system due to their availability and wide range of characteristics, including user-friendliness, ease of use, and market presence. Jupyter Notebook was the IDE used to construct this application.

II. Review of Literature

In this proposed model, the recognition is done by extracting different features from the input image with the help of Chain Code Histogram (CCH) and Discrete Fourier Transform (DFT) methods [fig 1]. As per the practical records, the SVM classifier achieves rate of accuracy of 97%, on a dataset of 8 different scripts only. This is much better, considering the complexity of the scripts & the different shapes in the scripts. In order to fit in more variations, addition of further more languages must be done and also the size of database must be increased along with more variety of writing styles. This research provided a reliable method for text line-level script identification in handwritten manuscripts. On around 800 lines of manually written text in seven different Indic scripts, the suggested method is experimented.[1].

Scripts	TP rate	FP rate	Precision	Recall	F-measure	MCC	AUC
Gujarati	1.000	0.000	1.000	1.000	1.000	1.000	1.000
Kannada	0.970	0.025	0.845	0.970	0.903	0.891	0.972
Malayalam	0.950	0.000	1.000	0.950	0.975	0.972	0.975
Oriya	1.000	0.000	1.000	1.000	1.000	1.000	1.000
Tamil	0.990	0.000	1.000	0.990	0.995	0.994	0.995
Telugu	0.980	0.000	1.000	0.980	0.990	0.989	0.990
Urdu	0.941	0.004	0.969	0.941	0.955	0.949	0.968
Roman	0.931	0.004	0.969	0.931	0.949	0.943	0.963
Weighted Average	**0.970**	**0.004**	**0.973**	**0.970**	**0.971**	**0.967**	**0.983**

Figure 1: Experimented Result

Gujarati script detection is kind of hard because of the different ways of contours that occur in their language. So, to ease out this an offline handwritten Gujarati script detection has been used.

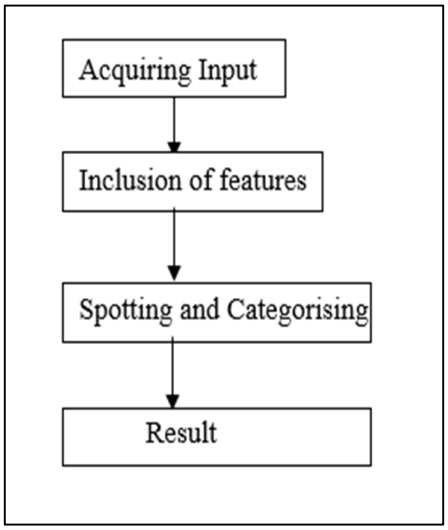

Figure 2: Proposed methodology

The system designed is efficient and accurate which converts the text into machine editable format in knack of time. The system workflows are as follows an image is being inputted through desktop and then YOLO v3 algorithm (a fully convolutional network) works on this which produces a recognizable image on the screen. Though it is quite challenging to work with a script like Gujarati with high structural complexity but the preferred algorithm provides far greater accuracy not at all. [Fig 2][2].

In this application, the user does not have to manually feed the data. It automatically recognizes the text and translates it into the language the user wants. It supports huge number of languages and has higher accuracy compared to Google Translate, Microsoft translate, iTranslate voice. It will also help visually impaired people to get voice over translated text. Tesseract is used for text recognition and Android is used as the platform as it is widely used and has benefits like being user friendly, wide availability, cost-effective. Android Studio along with Software Development Kit is used. The image to be translated using a phone device. It is further processed and analyzed using Leptonica Algorithm. Image is then converted to text using Tesseract which follow segmentation algorithm based on Viterbi algorithm [3].

In another model, the EMNIST dataset has been used; which contains over 1,30,000+ pictures of 47 characters that were used to train the model. To achieve greater accuracy, the EMNIST dataset was trained using Convolutional Neural Network. The image is given to the classifier as input; which further undergoes through pre-processing, standardization, and normalization techniques in order to predict the handwritten character. Due to this model, the false positive rate has been reduced, thus increasing the real positive rate. The EMNIST dataset contained English alphabets and numbers, which has been expanded with Tamil characters. The input image is changed to a grayscale version. It has been normalized so that it has the same resolution as the EMNIST dataset, i.e., 28 x 28. When compared to other machine learning algorithms, CNN produces much better results because it is trained on the EMNIST dataset. The trained model of the Convolutional Neural Network receives the feature vectors from the input image and uses them to recognize and produce the desired results [Fig 3] [4].

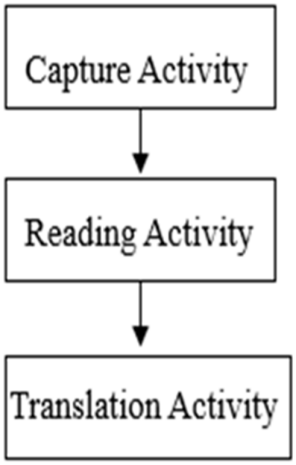

Figure 3. Block diagram illustration

In this application, data is pre-processed and during this, attention is paid to spacing between strokes which are then smoothened out.

This reduces noise and ambiguity and difference in strokes because of writing speed. Word level classification is carried out. Unique features of every selected script are identified. Various classifier algorithms are tried and tested. It has minimal error rate and the accuracy achieved is much higher. This is because if various decisive features applied during the identification process. [Fig 4] [5].

III. CONCLUSION

Here, we've put forth a model that can be used to photograph text on a sign, a screen, a piece of paper, or anywhere else, and the model will immediately translate it after identifying the script. The objective is to be able to comprehend any text in any language and translate it instantly into any other preferred language. To make this possible we are going to use image processing to detect the text and then algorithm to translate it into desired language. This model will add up to existing system. Proposed model will be able to identify text with better accuracy than that of existing systems/models.

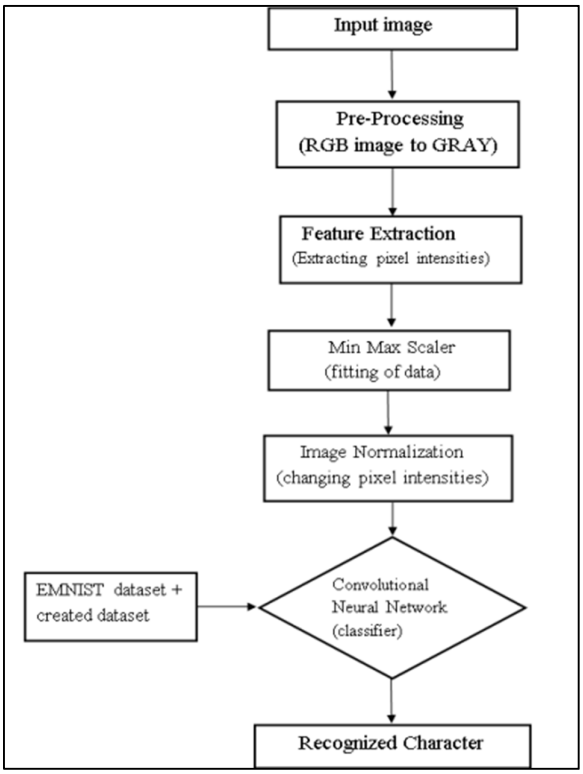

Figure 4: Flow diagram for script detection

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