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Implementation of Image to Text Conversion using Android App

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ABSTRACT: The paper aims to recognize the image and translate it into an editable text using Optical Character Recognition (OCR) method through an android app. This paper presents a efficient use of the android platform to extract the text from an already existing image as well as from any real time image, providing the user with multiple time cropping option for expeditious recognition of text.. The android app developed will have no remote computing as it is developed using Tesseract, an OCR engine which along with all image processing suite, is installed in the android app.

KEYWORDS: OCR, android, Tesseract, cropping.

I.INTRODUCTION

As we read the words, our eyes and brain continuously carry out optical character recognition in such a way that we are not able to recognize it. Our eyes are recognizing the luminous pattern of printed character and our brain is using this to figure out what we are trying to say. Apart from humans, nowadays even the computer are capable of performing this task using the technique called OCR. OCR helps in bringing the text available in analog format into a digital form.[2] Nowadays many organizations are depending on OCR systems to eliminate the human interactions for better performance and efficiency.[1]

The objective of the paper is to utilize this feature of the computer through an android app. This visual capability is brought out using a android mobile phone working on Tesseract OCR engine. The android app provides the user to recognize the text from either an image stored in the gallery, image taken with a camera, from a stored document in mobile or allows to store a name of the locations from the map application available in mobiles. This app can be used for automatic number plate recognition, extracting business card information into the contact list, Automatic insurance documents key information extraction, the converted text can then be fed to the text to speech application and can be used as a assertive technology for visually impaired users.

II.LITERATURE REVIEW

Shalin A. Chopra[1] This paper tells about OCR system for offline handwritten character recognition. Preprocessing techniques used in document images as an initial step in character recognition systems were presented. The feature extraction step of optical character recognition is the most important. It can be used with existing OCR methods, especially for English text.

Dishank Rajesh Palan [2] In this paper it presents an android application for accurate recognition and translation of text in varying environmental conditions, given an Android mobile having a camera.



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Jin Jin[3] In this paper, OCR technology was applied to build a flash card Android application for memorizing new words. It integrates the Tesseract OCR engine into the application, as it is open-source and free to use, released under the Apache License.

Line Eikvil[4] This paper presents a review on OCR techniques. It also tells about the OCR process that converts text, present in digital image, to editable text and how it recognizes characters through optical mechanisms.

N. Venkata Rao[5] In this paper a large number of methods of optical character recognition are presented. It analyses the advantages and drawbacks of various OCR methods and also proposes a modified back propagation method. The proposed method computes error rate efficiently, it results in increasing the accuracy.

Chirag Patel[6] In this paper, it provides information about Optical Character Recognition (OCR) method, history of Open Source OCR tool Tesseract, architecture of it and experiment result of OCR performed by Tesseract on different kinds images

Sonia Bhaskar [7] This report presents an algorithm for accurate recognition of text on a business card, given an Android mobile phone camera image of the card in varying environmental conditions such as variable lighting, reflection, rotation, and scaling, among others

José C. Principe[8] This report unifies the concepts of neural networks and adaptive filters into a common framework. It begins by explaining the fundamentals of adaptive linear regression and builds on the concepts to explore pattern classification, function approximation, feature extraction, and time-series modeling/prediction

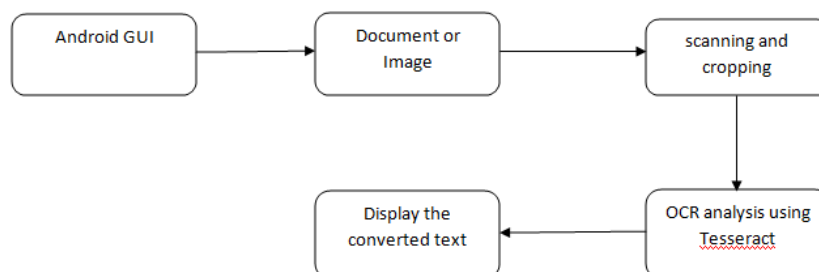
Rohit Verma[9] This paper presents an overview of feature extraction methods for recognition of segmented(isolated)characters. Selection of feature extraction method is probably the single most important fact or in achieving high recognition performance in character recognition systems. Different feature extraction methods are designed for different presentations of the characters

Ms. M. Shalini[10]This paper presents a brief survey of earlier research work related to all Indian languages. A brief history of OCR, various approaches to character recognition along with some applications of character recognition is also discussed in this paper

Richa Goswami[11]This paper presents detailed review in the field of Optical Character Recognition. Various techniques are determine that have been proposed to realize the center of character recognition in an optical character recognition system. .

Pranob K Charles[12] In this paper various approaches used for the design of OCR systems are discussed.It presents the techniques that are slow which provide better results in nature and also the fast techniques that provide inefficient results. In this it is found that the OCR techniques based on neural network provide more accurate results than other techniques.

III.STRUCTURAL MODEL



.Fig 1.- Block diagram

The above figure Fig 1. shows the basic steps involved in recognising the text from an image using an android app. The Image to text recognition consist of first developing an android app in android studio for loading and cropping of image. The GUI provides two options for user -first is to loading an image and second is cropping of image. As shown in Fig 2.



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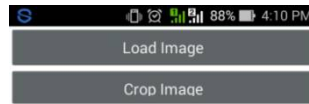


Fig 2.- Home screen of App

The user uses the android GUI for capturing or loading an image ,from which the text needed to be extracted. The user can load the image from gallery intent or camera intent. So, on clicking the load image the user is provided with the option of all the apps installed in the mobile having some image stored along with the option of camera. In this app the user is given the freedom of choosing the portion of the image to be converted by changing the cropping area ,which can be done by dragging the edges of the cropping box as shown in the Fig 4.. Once the crop button is pressed the image is send to the Tesseract OCR engine module.



Fig 4.- Selecting cropping area



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Tesseract is an offline and open source OCR engine. Tesseract treats the input image as polygonal binary area. The image is converted to bitmap by locally adaptive Otsu threshold binarization. This allows to define single locally adapted threshold to be defined for each tile, which produces noisy binarization. Thus, it is followed by smoothing to reduce the noise. The words are segmented into characters and Sobel edge detection is performed to extract the edges. The extracted data is matched with the templates stored in the system and the matched character is displayed on the android GUI screen. The below figure Fig 5.shows the text extracted from the selected region.

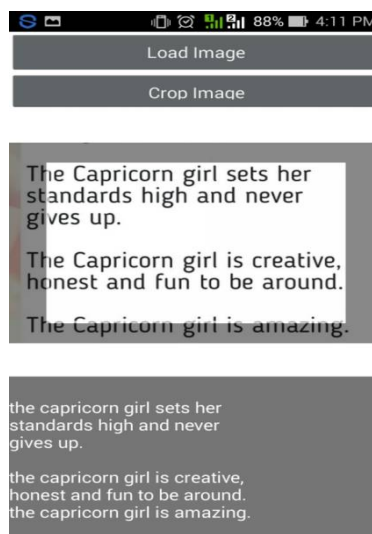


Fig 5.- Displaying the converted text

The below figure Fig 6 shows that the user is further provided with the option of limiting their extracting text process by further minimising their cropping window, that is the user can make the cropping window smaller to recognise a single line rather than a paragraph .



Fig 6.- Multiple cropping Option



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The below figure Fig 7. shows the result of recognising the text from the image after the user has changed the cropping window size. The text displayed can be copied and edited as per the requirement of the user.



Fig 7.- Result of multiple cropping

IV. CONCEPTUAL MODEL

A typical OCR system consists of several components. In figure 8 common setup is illustrated

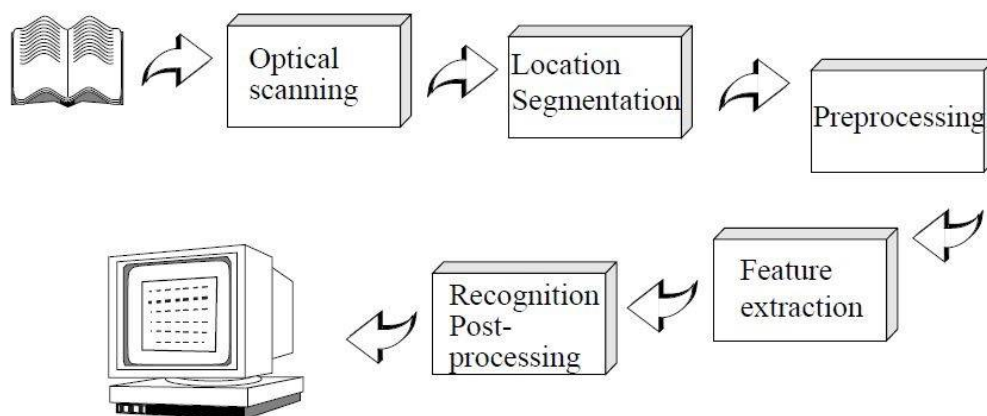


Fig 8. - OCR phases [4]

The first step in the process is to digitize the analog document using an optical scanner. When the regions containing text are acquired, each symbol is extracted through a segmentation process. The extracted symbols may then be preprocessed, for elimination of noise, to facilitate the extraction of the text features in the next step. The identity of each symbol is found by comparing the extracted features with descriptions of the symbol classes obtained through a previous learning phase. Finally contextual information is used to reconstruct the words and numbers of the original text. In the next sections these steps and some of the methods involved are described in more detail.

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Optical scan: In this phase the digital form of document is created. The scanning unit consist of a transportation mechanism and a sensing unit to convert the light intensity received into gray level. The image captured is firstly converted to binary format with the help of thresholding. [6]

Location and Segmentation : This phase is used to recognize the constitute of the image. Segmentation process helps to distinguish between the text part in the image from the graph and other non text part present.[6]

Preprocessing: The image resulting after the scanning procedure may contain some noise due to the scanner or the technique applied for thresholding. This noise may cause broken letter which may hamper the text recognition accuracy. Thus, in this phase we remove the noise which is also known as smoothing of digital image.[6]

Feature Extraction: The Image is then matched with the templates preloaded in the system and the template with the highest correlation is selected and declared as the character.[1]

Post Processing: After the extraction stage if there is any word which is unrecognized then the word of letter is given a meaning in this stage .This can be done by importing extra template into the system.[2]

2.Tesseract

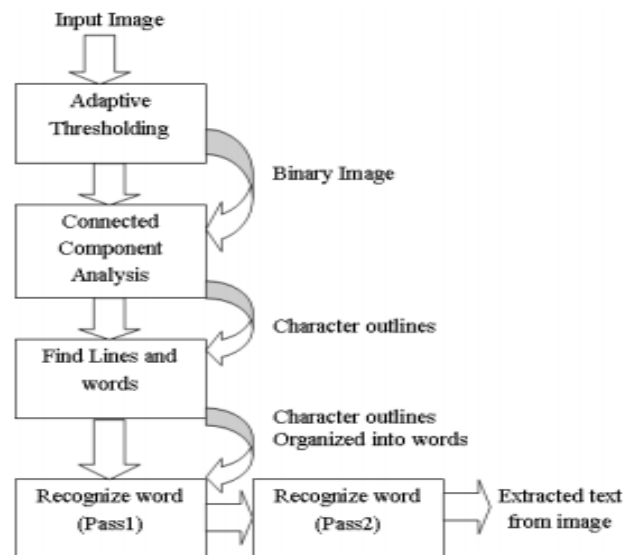


Fig 9.- Tesseract phases [6]

The Tesseract phases as shown in the above figure Fig 9 are:

Input image: The image given as the input is a gray or rgb image. The input image must be a flat image that is a parallel image capture. It doesn't have any capability to rectify the errors caused due to perspective distortion.[7]

Adaptive thresholding: It converts the gray scale image to binary image and calculates the optimal threshold so that there is minimal variance difference between the background and foreground pixels.[7]

Connected component analysis: It searches for the foreground image and treats them as blob. Blob refers to the region in the digital image which differ in comparison to the surrounding due to different colour or brightness[3]

Line finding algorithm: Lines are found by analysing the image space adjacent to the potential character. If the pixel count is below a specified threshold level then it is detected as line.[7]

character recognition : It finds the baseline of the text to approximate the height of the character. Then the character width is approximated. If the characters are not having the same width then it is processed in an alternate manner.

Word recognition: After all characters have been extracted it recognizes word line by line and then passes through a contextual and syntactical analyser for proper recognition. [7]



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V. RESULTS

We have successfully extracted the text from an image by cropping the image as shown in figure 5. We have implemented multiple cropping (refer Fig.6) and extracted text from it (refer Fig 7)

VI.CONCLUSION

This paper provides a detailed discussion about offline image to text recognition through an android app. The image is loaded into the Android app and the users are provided the choice to select the part of image to be converted, Then the image is processed by OCR technique to produce the converted text on screen. The concepts involved can further be used to boost the future technology like handwriting recognition or recognition of many more languages and even for translation purpose.

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