International Journal of Research in Engineering, Science and Management
Volume-2, Issue-11, November-2019
www.ijresm.com | ISSN (Online): 2581-5792

Image to Text Processing Using Raspberry Pi

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***Abstract*: Text recognition in images is a research area which attempts to develop a computer system with the ability to automatically read the text from images. These days there is a huge demand in storing the information available in paper documents format in to a computer storage disk and then later reusing this information by searching process. One simple way to store information from these paper documents in to computer system is to first scan the documents and then store them as images. But to reuse this information it is very difficult to read the individual contents and searching the contents form these documents line-by-line and word-by-word.**

***Keywords*: Image to Text Processing, Raspberry Pi**

1. Introduction

Now-a-days, there is growing demand for the software systems to recognize characters in computer system when information is scanned through paper documents as we know that we have number of newspapers and books which are in printed format related to different subjects. These days there is a huge demand in "storing the information available in these paper documents in to a computer storage disk and then later reusing this information by searching process". One simple way to store information in these paper documents in to computer system is to first scan the documents. Whenever we scan the documents through the scanner, the documents are stored as images format in the computer system. These images containing text cannot be edited by the user. But to reuse this information it is very difficult for computer system to read the individual contents and searching the contents form these documents line-by-line and word-by-word. The reason for this difficulty is the font characteristics of the characters in paper documents are different to font of the characters in computer system. As a result, computer is unable to recognize the characters while reading them. This concept of storing the contents of paper documents in computer storage place and then reading and searching the content is called document processing. Sometimes in this document processing we need to process the information that is related to languages other than the English in the world. This process is also called Document Image Analysis (DIA). Thus our need is to develop some text recognition algorithm to perform Document Image Analysis which transforms documents in paper format to electronic format.

2. Dataset

This opens door for many applications like to automatically read the information from a business card, recognize a shop from its name board or recognize sign boards on road and much more. Some of us might have already experienced these features through Google Lens, so today we will build something similar using an Optical Character Recognition (OCR) Tool from Google Tesseract-OCR Engine along with python and OpenCV to identity characters from pictures with a Raspberry Pi. The mechanical or electronic conversion of images of typed, handwritten or printed text into machine-encoded text, whether from a scanned document, a photo of a document, a scene-photo (for example the text on signs) or from subtitle text superimposed on an image (receipts, business cards, mail, printouts of static-data, or any suitable documentation. on only one font at a time. the image to text processing uses the rasp bean stretch operating system which is used in Linux.

3. Related work

The Paper document is generally scanned by the optical scanner and is converted into the form of a picture. A picture is a combination of picture elements which are also known as pixels. The pixels contain basically two values ON and OFF. The ON value points that the pixel is visible and the OFF value points that's the pixel is not visible. At this stage we have the data in the form of image and this image can be further analyzed so that's the important information can be retrieved. So to improve quality of the input image and make it suitable for further analysis, we perform some operation on it such as Grayscale conversion, binary image conversion and the most important is segmentation.

This step consists of color to gray scale conversion, edge detection, noise removal, bending and cutting and thresholding. The image is converted to gray scale as many Open CV functions require the input parameter as a gray scale image. Bilateral filter is used for noise removal. For better detection of the contours, canny edge detection is performed on the gray scale image. The warping and cropping of the image are performed according to the contours. This enables us to detect and extract only that region which contains text and removes the unwanted background. In the end, Thresholding is done so that the image looks like a scanned document. This is done to

allow the OCR to efficiently convert the image to text.

The OCR architecture is broken down in following stages:

A. *Image Capturing*

The initial phase in which a device is moved over the printed page were an inbuilt camera captures the pictures of the content. The nature of the picture captured will be high in order to have quick and clear recognition because of the high definition camera

B. *Pre-processing*

This performs certain activities such as scanning document, storing them as images. The module supports the following services:

a) Scanning printed documents and storing the documents as snapshots or images.
b) Processing those image-based documents, converting these image-based documents into proper format (also called structured documents) such as Grayscale and Binary format.

C. *Segmentation*

The segmentation is the most important process in text recognition. Segmentation is done to make the separation between the individual characters of an image. Segmentation is one of the most important phases in this project. The performance of this project is depending on segmentation. Segmentation subdivides an image into its constituent regions or objects. Basically in segmentation, we try to extract basic constituent of the script, which are certainly characters. This is needed because our classifier recognizes these characters only. In this project, we perform the segmentation of character from image by applying Line detection and Character detection algorithm.

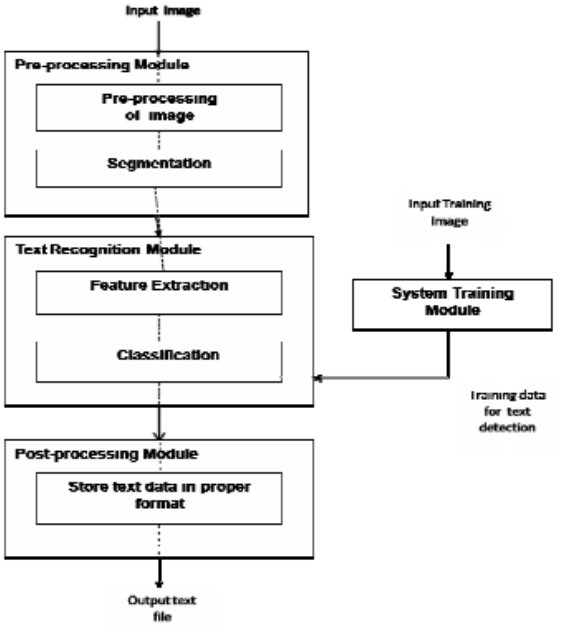

Fig. 1. Flowchart

4. Methodology

The process of detecting and recognizing text is divided into text detection stage and recognition stage [1]. Text detection deals with finding text area from input image, whereas recognition deals with converting obtained text into characters and words. Methods used for this purpose are categorized as stepwise methods and integrated methods. Stepwise methods have separate stages of detection and recognition and they proceed through detection, classification, segmentation and recognition. Integrated methods have information sharing amongst detection and recognition stages and these methods aim at recognizing words from text available.

In this section we describe the overall architecture of text recognition system. A Text recognition system receives an input in the form of image which contains some text information. The output of this system is in electronic format i.e. text information in image are stored in computer readable Our text recognition system is divided into following module:

A. Pre-processing Module
B. System Training Module
C. Text Recognition Module
D. Post-processing Module

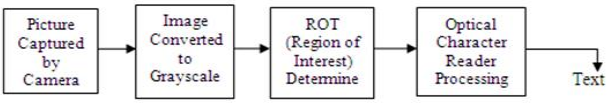

Fig. 2. Methodology

5. Result

We have implemented the new technique to recognize the different types of handwritten texts. This work of paper will base on optical character recognition. Long short term memory (LSTM) to calculate parameter values. This results will prove that the training dataset text, we can recognize from input image it's to a certain limit. Recognized text using raspberry pi camera is saved in editable format.

6. Conclusion

In this analysis, one's we got represent to scan image and detecting text for reducing work. OCR is employed to perform word recognition on the localized text regions and rework into text output. During this analysis, the camera acts as input for the paper. Because the Raspberry Pi board is high-powered the camera starts streaming. The streaming knowledge are going to be displayed on the screen. We develop one system that can detect text from scanned image and give output in the form of editable text.

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