

Image to Text format using LabVIEW

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Abstract:

OCR is a technology that recognizes text within a digital image which is commonly used to recognize text in scanned documents, but it serves many other purposes as well. This paper presents a simple, efficient and less costly approach to construct OCR to read a book that has fixed font size and style. OCR software processes a digital image by locating and recognizing characters, such as letters, numbers, and symbols. In OCR processing, the scanned-in image is analyzed for light and dark areas in order to identify each alphabetic letter or numeric digit using ROI. The recognition of text from image is done for better understanding of the reader by using OCR. It makes more quickly a textual version of printed documents. Starting from the capturing of images on web camera, the text is recognized using OCR and is converted into file format where the content acquired from the image can be edited. OCR lies in achieving higher recognition rates with optimal or reduced computational complexities. The performance of algorithm in LabVIEW is found to be satisfactory with an accuracy of 90%.

Keywords — *OCR, LabVIEW, printed character recognition, text format, ROI*

I.INTRODUCTION

There are about 45 million blind people and 135 million visually impaired people worldwide. Disability of visual text reading has a huge impact on the quality of life for visually disabled people. Although there have been several devices designed for helping visually disabled to see objects using an alternating sense such as sound and touch, the development of text reading device is still at an early stage. OCR (Optical Character Recognition) is a software or a system used for recognizing characters by a computer which are either printed or written. OCR, is the mechanical or electronic translation of images and written, type written or printed text. Optical character recognition belongs to the family of techniques performing automatic identification. This system for text recognition is more user friendly. In this paper optical recognition technology (Optical Character Recognition) is used to develop a cost-effective user-friendly image to text conversion. The main idea of this project is to recognize the text character and store it into a text file for future use. The text contained in the page is first pre-processed. The pre-processing module prepares the text for recognition. Then the text is

segmented to separate the character from each other. Segmentation is followed by extraction of letters and resizing them and stores them in the text file. These processes are done with the help of LabVIEW. This text is then stored into text file.

Optical Character Recognition or OCR is a technology that enables you to convert different types of documents, such as scanned paper document PDF files or images captured by a digital camera in to editable and searchable data. OCR is the electronic identification and digital encoding of typed or printed text by means of optical scanner and specialized software. Here is a very basic overview of how an OCR engine processes an image to return text contained in it: (1) An image of the document is acquired by the computer. The image is submitted as input to an OCR engine. (2) After the submission, the size of the image is identified using Get Image Size icon and it is expanded to get better resolution. (3) The expanded image is given as an input to IMAQ Resample which gives all the information of the captured image through IMAQ Histogram. (4) The Histogram report is then manipulated to get the gray scale image. (5) The Character Set file is then read and

by using the OCR property, maximum pixel for space and maximum vertical element spacing is then given in order to read the characters with maximum accuracy. OCR engine matches portions of the image to shapes it is instructed to recognize. (6) Given logic parameter that the OCR engine has been instructed to use, the OCR engine will make its

best guess as to which letter a shape represents. OCR results are returned as text which are then saved into the file format where the content acquired from the image can be edited for future use.

As discussed earlier, text recognition from images is still an active research in the field of pattern recognition. To address the issues related to text recognition many researchers have proposed different technologies, each approach or technology tries to address the issues in different ways. In forthcoming section, we present a detailed survey of approaches proposed to handle the issues related to text recognition process.

Pratik et al. [1] has proposed a method of storing the contents of paper documents scanned by optical scanner in computer storage place and then reading and searching the content. The scanned image is analysed for retrieving the important information and also to improve the quality of the input image further analysis is carried out such as grayscale conversion, binary image conversion and the most important is segmentation. Here the information's related to languages other than English in the world or processed. This process is called Document Image Analysis (DIA).

Anandhi et al. [2] has discussed about Image Segmentation which is an important technique for extracting information from the image which is a primary step for Image Analysis. Segmentation subdivides an image of its constituent parts or objects. The extracted image is processed for converting color image in to grey image which is the measure of pixel intensity. Then the relevant information is extracted from the original data.

Pattern matching is the last step and to compare each database if it equals audio will produce.

Abdul Rahiman et al. [3] has studied and analyzed different OCR systems so far developed in South Indian Languages. The research in this field is still promising and a lot of works are on progress. They felt this as necessary when the research on OCR for South Indian Language was still a challenging task and much more developments are needed.

Teddy Mantoro et al. [4] has proposed a technique to perform multiple pages of text recognition of mobile device and take advantage of the cloud server's ability to process heavy work. The result was compared with OCR results from some OCR applications on market, based on time of process and character detection accuracy. The obtained result showed less time of process with the platform described for multiple pages OCR.

Anupama Ray et al. [5] has made an attempt to develop a single recognition framework for Bilingual documents without the need of script identification modules or script dependent features. The framework can be used for printed as well as handwritten data and is highly suitable for degraded pages as it uses multiple pre-processing hypotheses to overcome such challenges. They came to know that a single segmentation routine is not successful in all cases thus in this paper multiple segmentation routines are considered.

Minesh Mathew et al. [6] has proposed an approach to addresses the need for a multilingual OCR in Indian setting. A single recognition system, but comprising of multiple OCR engines has been used. This enabled each word to be recognized on an OCR, trained exclusively for the script.

Muhammed Tawfiq Chowdhury et al. [7] has implemented on research purpose. They have gone through a lot of trial and error processes to find out which will be the best method to prepare images files from text and we have finally used the dedicated jTessBoxEditor. They have developed it

as a desktop application so that it can be used offline.

Junaid Tariq et al. [8] has used database in OCR instead of Artificial neural network to recognize English language which makes this OCR very simple to manage. They have made a prototype of this system.

Subodh L. Wasankar et al. [9] has discussed about the character with specific protocol in a live streaming video and programs itself according to the text. The protocol used for text consists of a Start word and an end word with embedded instructions between them in special font.

This paper is organized as follows: Section II, we have discussed about the process involved in text recognition system and then converting it into text format. Section III, we discuss about experimental results of this system. Section IV, conclusion is given.

II. PROCESS FLOWCHART

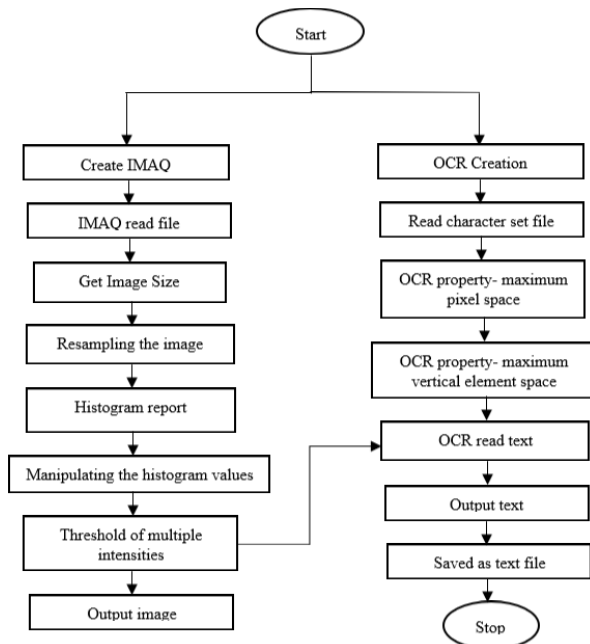


Figure1: IMAGE TO TEXT FILE PROCESS FLOW

A. IMAQ creation and read file

The image is given through a file path to the IMAQ read file which reads the content present in the image and a temporary memory location is created for the image using IMAQ create.

B. Get image size

In order to increase the resolution of the image for better performance, IMAQ Get image size is used to get the information regarding resolution. This value can be manipulated to get better resolution. This is done so as to get better pixel gap values to recognize each content in the image.

C. Resampling the image

IMAQ resample is used to view the image according to user-defined size which gets its input from the output of Get image size icon. This can be used to display a reduced or enlarged image. It is used to increase the pixel gap between each character in the image.

D. Histogram report and manipulation

The histogram report is a cluster that returns the histogram values. This cluster contains the following elements: histogram values in an array which are the number of pixels per class, Minimal Value which returns the smallest pixel value, Maximal Value which returns the largest pixel value, Starting Value which returns the smallest pixel value from the first class calculated in the histogram which can be equal to the Minimum value from the Interval Range or the smallest value found for the image type connected, Interval Width which returns the length of each class, Mean Value which returns the mean value of the pixels and Standard Variation which returns the standard deviation from the histogram. These values are used for calculating the histogram of the image.

E. Threshold

Threshold is the idea of separating the image into particle region and a background region. This process works by setting to white all pixels that belong to a gray-level interval, called threshold interval, and setting all the other pixels in the image to black. The resulting image is referred to as a binary image. Threshold data is an array of clusters specifying the mode and threshold range. This cluster consists of lower pixel value and highest pixel value which are taken into account during a threshold.

F. OCR session creation

An OCR session is created from the OCR pallet using VI Vision Development Module in LabVIEW which returns a refnum associated with the session. This value can be used to refer to this OCR session in subsequent VI calls.

G. Character set file

For Optical Character Recognition (OCR) application, initially a set of sample images and the OCR Training tool available in NI Vision Development Module are used to create a Character Set file that would be later used to read the characters in the images. The training image from file is opened and then performs an initial OCR read (which results in all unknown characters), then asks to identify what character, if any, each detected particle in the image present. After training all detected particles, a second OCR read is performed; this time, OCR read is able to identify each character as the user trained it. Finally, the newly trained character set file is saved to a new character set file.

H. OCR property

In OCR, several properties are available from which two properties are used here as follows:

Maximum pixel space: It is used to provide the maximum pixel gap between each character in a word so that the ROI can be drawn clearly in order to recognize the letters accurately.

Maximum vertical element spacing: It is used to provide the maximum height of the letters so that the letters like 'I','j','l' can be recognised correctly by drawing the ROI perfectly.

I. OCR read

Reads the text in the image. The VI identifies all objects in the image based on the properties that has been set, and then compares each object with every character in the character set file. For each object, the VI selects the character that most closely matched the object. The VI uses the substitution character for any object that did not match any of the trained characters. This OCR Read uses the image from the IMAQ multi threshold where it recognizes the text and gives the text output.

J. Output text and text format

After performing all the image analysis and processing methods, each character in the image are obtained as text and this can be written into a file which can be used for further documentation process.

III. EXPERIMENTAL RESULT

The paper document is generally captured using a camera. The obtained image is a combination of picture elements which are also known as pixels. At this stage we have the data in the form of image and this image can be further analysed so that the important information can be retrieved. So, we apply our method of text recognition which is discussed in this paper and the output results are shown in the form of following images.

Figure 2: The image that has to be converted into text is given as input through web camera. This image is processed using icons IMAQdx palette.

Figure 3: The captured image is recognized using ROI in LabVIEW. Each character in the image will be recognized based on pixel gap and the drawn ROI.

Figure 4: The final output shows the recognized text from the captured image which can be stored into a file.

Figure 5: The output text is stored in file format which can be edited for further use.

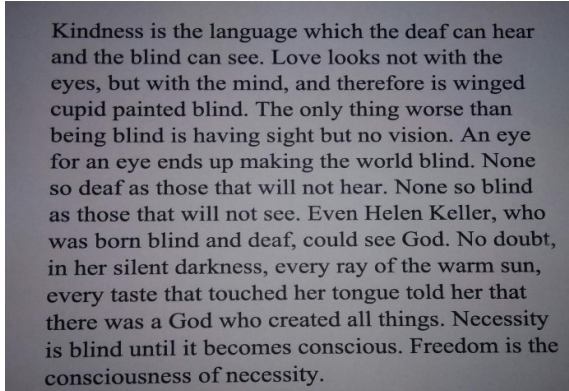


Figure 2: INPUT IMAGE

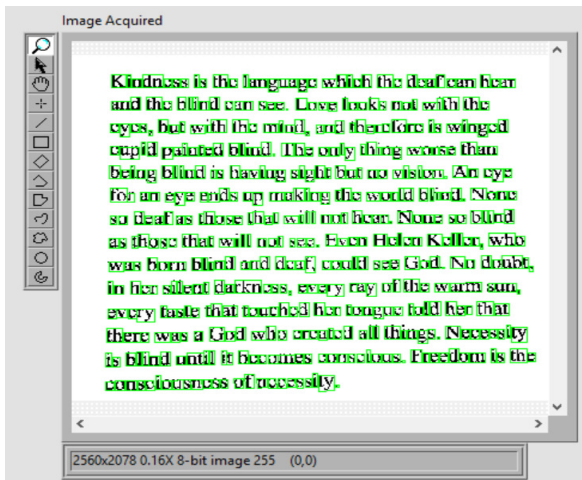


Figure3: CAPTURED IMAGE WITH ROI

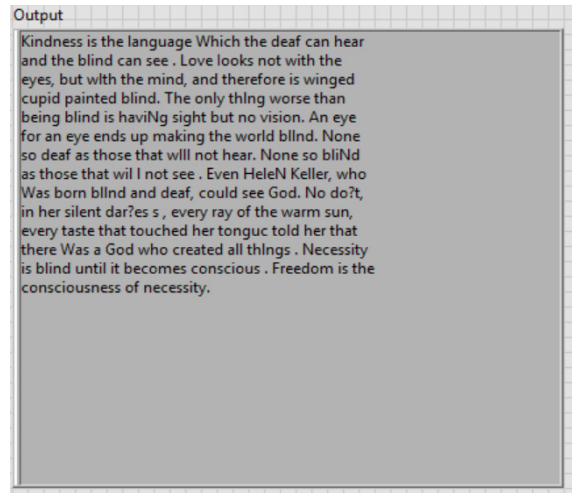


Figure4: CAPTURED IMAGE WITH OUTPUT TEXT

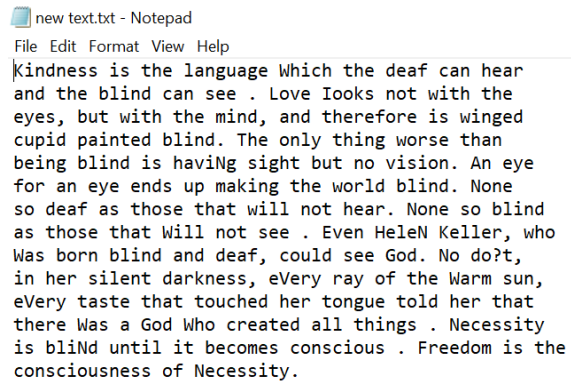


Figure 5: OUTPUT STORED IN TEXT FILE

IV. CONCLUSION

This postulated work portrays Optical Character recognition with Image processing. This is utilized as a decent method of correspondence between individuals. In OCR printed or composed character archives are selected and the picture is obtained utilizing IMAQ Vision for LabVIEW and afterward the characters are processed in various strategies in LabVIEW. By using the OCR property, the pixel gap and vertical element spacing can be manipulated. Similarly, the resolution of the image can be resampled and the histogram values can be used for better clarity of the image. The threshold data is used to produce the binary image which can be used by the OCR Read to get the text from the image and store it in the file for later use.

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