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Text Recognization of Product for Blind Person using MATLAB

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Abstract – *There is printed text everywhere around us and we see it in our day to day life. Like product names, restaurant menus, instructions on medicines etc. But the question arises how Visually Impaired or blind people can recognize this text. Thus surely they need some assistance to read the text. In this project I tried to propose a camera-based assistive text reading framework to help low visual power or blind person to read text and product label or document from hand-held objects. By using MATLAB coding and camera it is tried to help blind persons to read information of the products. In this project camera acts as main vision in detecting the label image of the product then image is processed internally and separates label from image by using MATLAB program and finally identifies the product name and information the optical character recognition.*

***Key Words*: Text reorganisation, camera-based text assistance, MATLAB algorithm for RGB**

1. INTRODUCTION

Recent developments in computer systems, digital cameras, and different software like MATLAB make it feasible to assist low visibility individuals by developing camera-based products that combine computer vision technology with other existing commercial products such optical character recognition (OCR) systems. Million people are visually impaired worldwide, near about 39 millions are blind. Even in developing country like India, in 2015 Blind people Association survey reported that a 12 million people are blind. Using system like video magnifiers, screen readers help blind person and those with low vision to access the documents and text. The ability of people who are blind or have low visual impairments to read printed labels and documents will enhance independent living and social self-sufficiency. Today, there are many systems that have promise to portable use, but they cannot provide the product labeling. Such systems are bar code reader which helps to blind person to identify the different product. Database can gives the permission to access the information for blind persons about the product through speech .But there is big limitation for blind person to find the position of bar code on the product. Some assistive systems like pane scanner which is used in some situations. Such systems integrated with OCR software having functions to scanning and recognition of the text and have integrated voice output. These systems generally design to read the text from simple backgrounds, standard fonts and also small range of fonts. Some systems need only white background for scanning the text. This system cannot read the text from the complex background. Reading is essential for every human being. Printed text is everywhere in the form of reports, receipts, bank statements, restaurant menus, product packages, medicine bottles etc. can help blind users and those with low vision to read text, there are few devices that can provide good access to common hand-held objects such as product packages, and object sprinted with text such as prescription medication bottles. The ability of people who are blind or have significant visual impairments to read printed labels and product packages will enhance independent living and foster economic and social self-sufficiency. Image processing is processing of images using mathematical operations in any form of signal processing for which the input is an image. The output of image processing may be either an image or a set of characteristics or the parameters which is related to the image. Most image-processing techniques which involve treating the image as a two-dimensional signal and applying the standard signal-processing techniques to the input. Image processing is usually refers to digital image processing, optical and analog image processing also are possible. The acquisition of images is referred to as imaging. The close related to image processing is computer graphics and computer vision. In computer graphics, images are manually made from physical models of objects, surrounding and lighting, instead of being acquired from natural scenes, and also in most animated movies. Computer vision, on the other hand is often considered a high-level image processing. In modern sciences and technologies, images also get much broader scopes due to the ever growing importance of scientific visualization .The millions of visually impaired people in worldwide are still blind.

1.1 Problem Review

For visually Impaired or blind people it is very important to be an independent. For that it is important to provide some assistance them in reading. So, I tried to propose a camera-based assistive text reading framework to help low visual power or blind person to read text and product label or document from hand-held objects.

1.2 Objective

Our Objective is to develop a system for visually challenged person who can help them to identify the various products and give some more information about the product. To fulfill this objective some sub objectives were formed which are as following.

i) Identify the common deficiency in most of the character recognition software/tools by calculating the recognition rate of each character and digit and find out the characters and digits whose recognition rate is very less.

ii) Designing and development of the model to eliminate the common deficiency identified.

iii) Develop the algorithm to implement the above model.

iv) Testing and Performance evaluation by analyzing results of model

1.3 CONTRIBUTION

The algorithm used previously cannot handle complex background and multiple patterns, and extract text information from hand-held objects. In assistive reading systems for blind persons, it is very challenging for users to position the region of interest within the center of the camera's view. As of now, there are still no acceptable solutions.

In this project the previous drawback of algorithm can be minimized and divided the problem in stages. To make sure the hand-held object appears in the camera view, a camera with sufficiently wide angle to accommodate users with only approximate aim. This may often result in other text objects appearing in the camera's view. To extract the hand-held object from the camera image, a motion-based method to obtain a region of interest of the object is used.

It is a challenging problem to automatically localize objects and text ROIs from captured images with complex backgrounds, because text in captured images is most likely surrounded by various background outlier "noise," and text characters usually appear in multiple scales, fonts, and colors. For the text orientations, algorithm used in the previous paper assumes that text strings in scene images keep approximately horizontal alignment but that drawback of algorithm will overcome by algorithm which is best suitable. Many algorithms have been developed for localization of text regions in scene images. So we will be working on vertical character recognition problem and try to solve the problem by using Image Processing.

2. THEORETICAL BACKGROUND

2.1 Image Input

The Image or we can say printed text/label is captured by camera which is used in project. Initially this image containing noise in background. This complicated background can be removed by stroke width transform algorithm that helps to recognize the character by their shape and width by calculating each pixel by their start to end point.

2.2 Conversion of RGB to Gray Scale

To make the system more simple i.e. work for noisy conditions or complicated background, image pre-processing methods like noise filtering are applied. The processing time of the overall process is long, so to reduce this process timing the input image is converted from RGB to gray scale. This preprocessing of images in this paper is a technique to improve the quality of images. The main purpose of this conversion is to enhance and extracts useful information from the image. Two preprocessing tasks, thresholding and noise removal, are performed here.

2.3 Text Binarization

There are numbers of methods for binarization in document analysis but few in text analysis. In this paper, we reviewed text analysis binarization methods related. Thresholding techniques are quite popular in document analysis. Several improvements over thresholding techniques are also proposed recently in document analysis and people try the same methods to extend for scene text binarization also.

2.4 Filter image

It is nothing but the image processing, since the methods take an input image and create another image as output. Other appropriate terms often used are ltering, enhancement, or conditioning. The major notion is that the image contains some signal or structure, which we want to extract, along with uninteresting or unwanted variation, which we want to suppress. If decisions are made about the image, they are made at the level of a single pixel or its local neighborhood.

2.5 Automatic Text Extraction

There are two popular methods for extracting a text region in images are, merge and split method and comparison of two frames. Thus, they take long computing time due to the use of a whole image. So automatic text extraction algorithm is implemented to detect the region containing the label text. In order to handle complex backgrounds, two novel feature maps to extracts text features based on stroke orientations and edge distributions, respectively are used. Maximally stable external region is used in automatic text extraction.

2.6 Optical Character Recognition

Text recognition is performed by off-the-shelf OCR prior to output of informative words from the localized text regions. A text region labels the minimum rectangular area for the accommodation of characters inside it, so the border of the text region contacts the edge boundary of the text character. However, OCR generates better performance if text regions are first assigned proper margin areas and binarized to segment text characters from background. We propose to use

Template matching algorithm for OCR. The output of the OCR is nothing but a text file containing the product label (its name) in textual form. Audio output component is to inform the blind user of recognize text code in the form of speech or Audio.

3. Algorithm used for Image to Audio Conversion

3.1 Text Detection Algorithm

We describe the text detection algorithm that is MSER (Maximally Stable Extremal Region) algorithm. MSER is a method for text detection, blob detection in images. The MSER algorithm extracts number of co-variant regions from image. We rst de ne the concept of stroke and then explain the stroke width transformation. MSER is based on the idea of taking regions which stay nearly the same through a wide range of thresholds. All the pixels above or equal to a given threshold are black and all the pixels below a given threshold are white. MSER uses two important properties to remove non text regions from image rst is Geometric Properties and another is Stroke Width Variation Properties.

3.2 Geometric properties

MSER detects almost all text regions from image but alongside it also detect some non-text regions. To remove those non text regions rst we apply Geometric Properties on image. Geometric Properties detects the non-text regions from image and remove those regions.

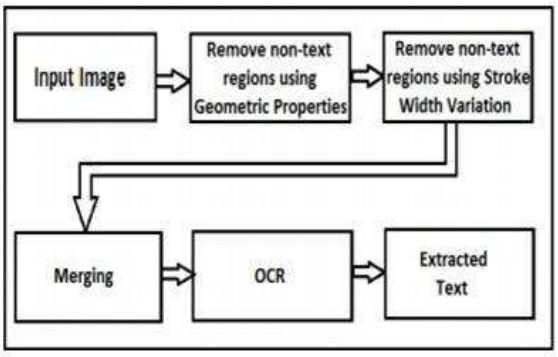

***Fig**. Flow chart of the Proposed Method*

3.3 Stroke Width Transform

It receives the RGB image with the help of algorithm the image is converted into grey but of the same size after that text can be marked from the region of interest. It has three important stages: first the most important stage is stroke width transform, then collection of pixel of images on their stroke width, then pigeonholing letter candidates into regions of text. In Stroke Width Transform, the stroke in image is converted into constant width with the help of continuous band. Figure shows example of stroke in image. The Stroke Width Transform is operation for calculating width of pixel stroke from image.

4. Result and Discussion

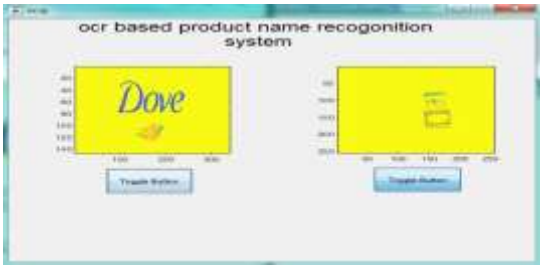

Fig. OCR based product name Recognition System

Here, two images have been taken one is of Dove and one of Battery. Toggle button 1 this button is used for Character recognition and Character Identification.

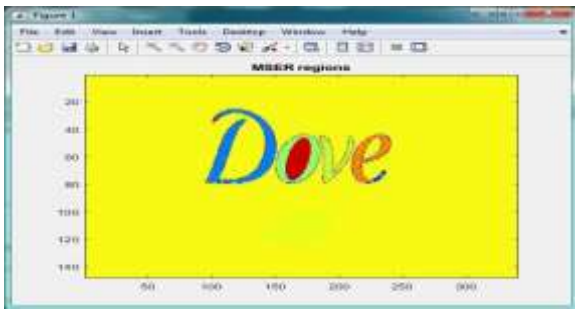

Fig. MSER Region

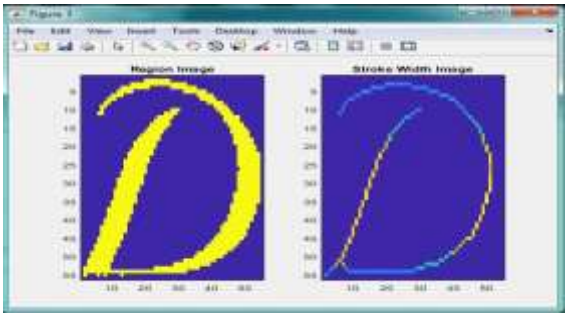

Fig. Region and stroke width image

As shown in the Result figure the toggle button 1 Proceed Character Recognition by using OCR. This image of result shows the region After Removing Non-Text Regions Based on Geometric Properties OCR is the stand of optical character recognition which is field of computer science that recognizing image-based text from photos and transforms it to real digital character. OCR works like human ability in the brain to recognize the letters, numbers and symbols. OCR can read both handwritten and printed text. The performance of OCR is directly related to quality of input documents and pictures.

Fig. Expanded Bounding Boxes Text

In this it will find out all the Region of Interest. And it will identify and find out its Stroke Width of Image. Stroke Width is a measure of the curves and lines that make up character. Text regions have little stroke width variation, whereas non text regions have larger variations. To remove the non-text regions using stroke width we require thresholds. All the pixels above or equal to a given threshold are black and all the pixels below a given threshold are white.

5. Summary and Conclusion

In this project, we proposed algorithm for solving the problem of character recognition for blind persons. We had given the input in the form of images of a product. The algorithm was trained on the training data that was initially present in the database. We have done pre-processing and OCR classification and detect the text. The project presents a brief survey of the applications in various fields along with experimentation into few selected fields. The proposed method is extremely efficient to extract all kinds of products which have text including blur and illumination. The project includes two different methods of product identification which are successfully implemented.

The text-image recognition initiatives discussed in the preceding sections illustrate research themes at OCR which expand and redefine the role of recognition technology in document-oriented applications. These include the development of editors which operate directly on scanned image data, and the use of text-image recognition to retrieve text information from documents with content. Key concepts embodied in these research efforts include partial document models, task-oriented document recognition, user specification and interpretation of recognition models, and automatic generation of recognizers from declarative models. These concepts enable the realization of a broad range of signal-based document processing operations, including font, vocabulary and language-independent classification and text detection.

6. Future scope

- future work of this project is to recognize the text from the more complex background and different type of challenging background surfaces
- Such system can be implement to read the text from the object and translate output in different languages.
- Future work can also extend for localization algorithm to process text strings with characters fewer than three and to design more robust block patterns for text feature extraction.
- We will also extend our algorithm to handle incline text strings. Furthermore, we will address the significant human interface issues associated with reading text by blind users.

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