Product Label Reading System for visually challenged people

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Abstract - With this project, we propose a camera-based assistive text reading framework for helping blind persons in reading text labels from hand-held objects in their daily lives. To Isolate the object from backgrounds or other surrounding objects in the camera view ,we use Stroke Width Transform (SWT) technique. We first propose an efficient and effective method to define a region of interest (ROI) in an image of an object captured by using Camera. In the extracted ROI, text localization and recognition are performed for acquiring text information. For automatic localization of text regions from the extracted object's Region Of Interest, we propose a text localization algorithm by learning gradient features of stroke orientations and distributions of edge pixels. Text characters are then converted into binary and recognized by off-the-shelf optical character recognition OCR software. We focus on user interface issues and try to achieve robustness of an algorithm while extracting and reading text from objects having complex backgrounds.

Key Words: Assistive Devices, Blindness, Edge pixels, Handheld objects, Optical Character recognition(OCR), Stroke Orientation, Region of interest(ROI) detection, Text localization, extraction and recognition, Stroke width Transform(SWT).

1. INTRODUCTION

Reading is essential in today's life. We see Printed text everywhere. It can be in reports, newspaper, receipts, bank slips, restaurant menu cards, product packages, medicine wrappers , etc. And while optical aids, video magnifiers, and screen readers can help blind users and those with low vision to access documents, there are few devices that can provide good access to common hand-held objects such as product packages, and objects printed with text such as prescription medication bottles. So people who are blind or have significant visual impairments to read printed labels will enhance independent living and foster economic and social self-sufficiency. Recent developments in computer vision ,digital cameras, and portable computers make it feasible to assist these individuals by developing camera-based products that combine computer vision technology with other existing commercial products such optical character recognition (OCR) systems.

So, Product Label reading system is a system which helps blind persons to read text labels from hand-held objects in their daily lives.

To isolate the objects in the camera view, an efficient and effective method has been proposed to define a region of interest(ROI).

In the extracted ROI, text localization and recognition are conducted to acquire text information.

The recognized text codes are output to blind users in speech.

2. LITERATURE SURVEY

Chucai Yi, Yingli Tian and Aries Arditi [1] proposed Portable Camera-Based Assistive Text and Product Label Reading From Hand-Held Objects for Blind Persons that totally focus recent developments in computer vision, digital cameras,and portable computers make it feasible to assist these individuals by developing camera-based products that combine computer vision technology with other existing commercial products such optical character recognition (OCR) systems.

Karen Duarte, Jos´e Cec´ılio, Jorge S´a Silva, Pedro Furtado [2] proposed Information and Assisted Navigation System that aims to highlight the user's device integrating it with devices and technologies already used by users, as their own smartphone.

Ender Tekin and James M. Coughlan [3] proposed an algorithm enabling blind users to find and read barcodes. In this paper, 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.

Sunil Kumar, Rajat Gupta, Nitin Khanna, Santanu Chaudhury and Shiv Dutt Joshi [4] proposed Text Extraction and Document Image Segmentation Using Matched Wavelets and MRF Model. This paper proposes scheme for the extraction of textual areas of an image using globally matched wavelet filters. A clustering-based technique has been devised for estimating globally matched wavelet filters using a collection of ground truth images and text extraction scheme.

Kwang In Kim, Keechul Jung, and Jin Hyung Kim[5] proposed Texture-Based Approach for Text Detection in Images Using SVM and Continuously Adaptive Mean Shift Algorithm. This paper show texture-based method for detecting texts in images. A support vector machine (SVM)

is used to analyze the textural properties of texts.No external texture feature extraction module is used.

3. EXISTING SYSTEM

Fig2.1- Pen Scanner

Fig2.2-Barcode Reader

Fig2.3- K Reader

Portable bar code readers designed to help blind people identify different products in an extensive product database can enable users who are blind to access information about these product through speech and braille. But a big limitation is that it is very hard for blind users to find the position of the bar code and to correctly point the bar code reader at the bar code. Some reading-assistive systems such as pen scanners might be employed in these and similar situations. It cannot handle screen image with complex background. Objects must be placed on a clear dark surface and must contain text

4. PROPOSED SYSTEM

Product Label Reading System reading system helps blind persons read text labels and product packaging from hand-held objects in their daily lives by recognizing word on localized text regions and transforming them into audio output.

Functional Components

1) Screen Capture
2) Data Processing
3) Audio Output

Fig1- Proposed System

4.1 System Architecture

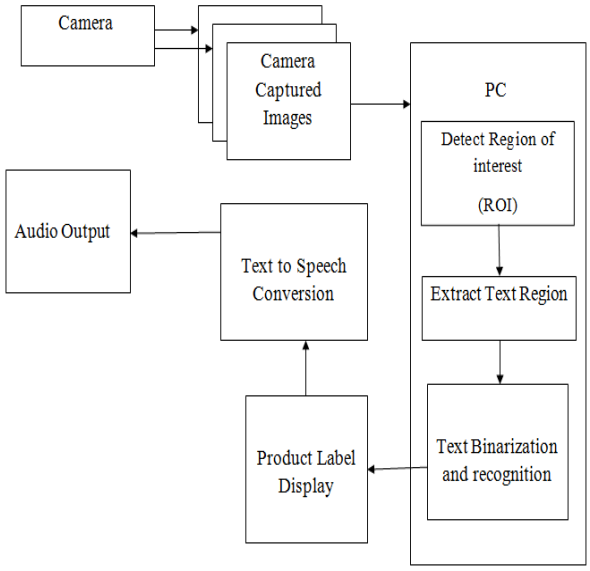

Fig3- System architecture

1)Capture an image by using camera.
2)In captured image, System detects Region of interest(ROI).
3)Extracts Text Region. Text extraction can be done by two features,
a)Stroke orientation.
b)Edge distribution.
4)Extracted text region undergoes text binarization and recognition. Text recognition is performed by off-the-shelf OCR.
5)Displaying label in the form of text.
6)Text is converted to speech which is heard by using headphone.

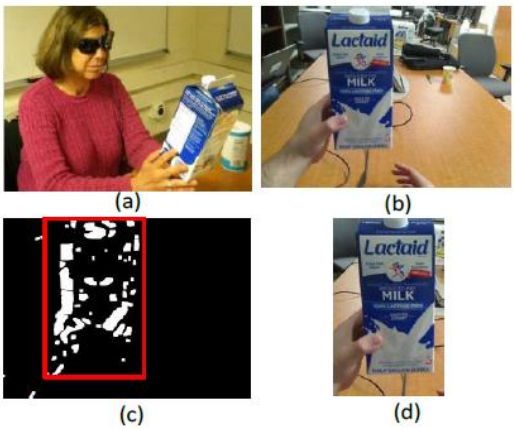

Fig4- Working Scenario

Localizing the image region of the hand-held object of interest.
(a)Capturing images by a camera
(b)an example of a captured image;
(c)detected areas
(d)detected region of the hand-held object for further processing of text recognition.

4.2 Procedure

Step 1: Detect Candidate Text Regions

The MSER feature detector works well for finding text regions . It works well for text because the consistent color and high contrast of text leads to stable intensity profiles.

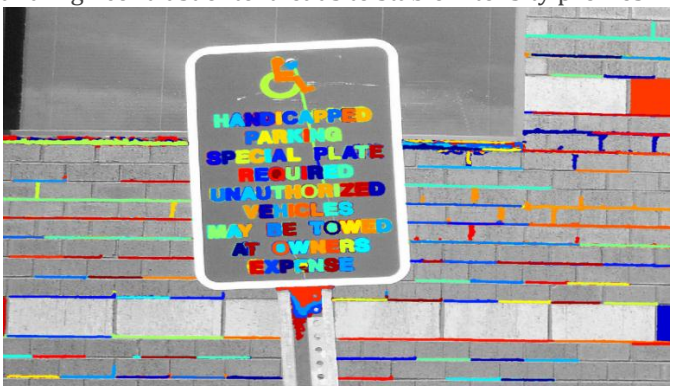

Fig 5.1-Original Image

Step 2: Remove Non-Text Regions Based On Stroke Width Variation

Metric used to discriminate between text and non-text is stroke width. *Stroke width* is a measure of the width of the curves and lines that make up a character. Text regions tend to have little stroke width variation, whereas non-text regions tend to have larger variations.

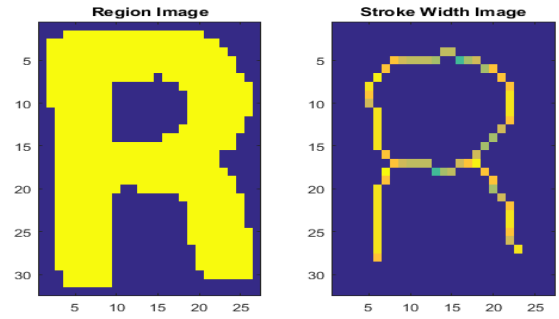

Fig 5.2- Stroke Width Image

In the images shown above, notice how the stroke width image has very little variation over most of the region. This indicates that the region is more likely to be a text region because the lines and curves that make up the region all have similar widths, which is a common characteristic of human readable text.

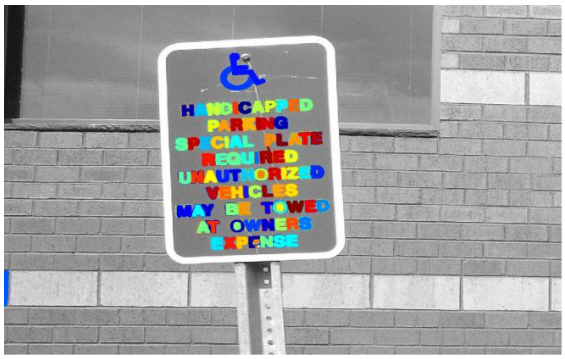

Fig 5.3- Removal of non-text region

Step 3: Merge Text Regions For Final Detection Result

At this point, all the detection results are composed of individual text characters. To use these results for recognition tasks, such as OCR, the individual text characters must be merged into words or text lines. This enables recognition of the actual words in an image, which carry more meaningful information than just the individual characters. For example, recognizing the string 'EXIT' vs. the set of individual characters {'X','E','T','I'}, where the meaning of the word is lost without the correct ordering.

One approach for merging individual text regions into words or text lines is to first find neighbouring text regions and then form a bounding box around these regions. To find neighbouring regions, expand the bounding boxes computed earlier with region props. This makes the bounding boxes of neighbouring text regions overlap such that text regions that are part of the same word or text line form a chain of overlapping bounding boxes.

Fig 5.4-Expanded Bounding Boxes Text

Now, the overlapping bounding boxes can be merged together to form a single bounding box around individual words or text lines. To do this, compute the overlap ratio between all bounding box pairs. This quantifies the distance between all pairs of text regions so that it is possible to find groups of neighbouring text regions by looking for non-zero overlap ratios. Once the pair-wise overlap ratios are computed, use a graph to find all the text regions "connected" by a non-zero overlap ratio.

Fig 5.4- Detected Text

Step 4: Recognize Detected Text Using OCR

After detecting the text regions, use the ocr function to recognize the text within each bounding box.

5. ADVANTAGES

- Visually Challenged people become independent.
- Makes Product Label Reading easy.
- Automatic Text Recognition.
- Accuracy and Flexibility.
- Easy to use.

6. CONCLUSION

In this paper, we implemented a Product Label Reading System that reads printed text on hand-held objects for assisting blind person. In order to solve the common aiming problem for blind users. This method can effectively distinguish the object of interest from background or other objects in the camera view. Unlike Barcode reader and pen scanner , Our system uses camera which does not require to detect the exact position of barcode or label in an image and using an effective algorithm, it detects Region of interest as well which is then converted to text and further to audio using optical character recognition(OCR).

ACKNOWLEDGEMENT

This work was supported by STES's SKNCOE by providing all necessary facilities with their constant encouragement and support. We are ending this acknowledgement and are thankful to our colleagues who have helped us.

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