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A Robust Embedded Based String Recognition for Visually Impaired People

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Abstract: This paper presents the development of a camera-based assistive text reading framework to help blind persons read text labels and product packaging from hand-held objects in their daily lives. 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 as optical character recognition (OCR) systems. To automatically extract the text regions from the object, we propose an artificial neural network algorithm by learning gradient features of stroke orientations and distributions of edge pixels in an Adaboost model. Text characters in the localized text regions are binarized for processing the algorithm and the text characters are recognized by off-the-shelf OCR (Optical Character Recognition) and other process involved. Now the binarized signals are converted to audible signal. The working principle is as follows first the respected image will be captured and then it is converted to binary signals. Now the image is diagnosed to find whether the text is present in the image. Secondly, if the text is present, then the object of interest is detected. The respected text of the image is recognized and then converted to audible signals. Thus the recognized text codes are given as speech to the user.

Keywords: Edge pixel, Text region, detection, OCR

1. Existing System

A Camera based Assistive text reading to read text labels to help Blind people in their daily lives. It defines region of interest by asking the user to shake the object by mixture- of- Gaussians- based background subtraction method [2]. The proposed system reads the text encountered in scene images and text boards with the aim to provide assistance to the visually challenged persons. The input image is captured from mobile camera and extracts text information from image. It detects text regions from captured image and recognizes text. [1].

It has completely revolutionaries the way we communicate, especially long distance communication. A design has been made for SMS system for them by interfacing Braille pad with the cell phone so that dual impaired person can have the access to the SMS system and through which they can take important notes[3]. A survey of navigation system of visually impaired people highlighting various technologies with their practical usefulness, design and working challenges and requirements of blind people. The aim of this paper is to provide a better understanding to identify important research directions in this increasingly important social area for future research. Visually challenged persons face constraints independent mobility and navigation. Mobility means the possibility of liberally moving, without support of any supplementary person, at home and unfamiliar scenarios [4].

A novel camera based computer vision technology to automatically recognize currency to assist visually impaired people will be enhanced. To isolate the object from cluttered backgrounds or other surroundings objects in the camera view, an efficient and effective motion based method to define a region of interest in the video by asking the user to shake the object [5]. The approach described in

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the paper is based on color image segmentation and segment shape analysis. Portable text reading devices are useful extensions of navigation systems as they can provide valuable pieces of information, usually not contained in the electronic databases [7]. The proposed framework will capture an image of a public signage and transform it into a text file using Otsu's optical character recognition method. The text file will be read by a speech synthesizer that tells the visually impaired people what the image is [8].

2. Proposed System

In our paper we proposed the algorithm called Artificial Neural Network (ANN) Algorithm which is shown a below. We proposed a new framework to extract text strings with multiple sizes and colors, and arbitrary orientations from scene images with a complex and cluttered background. The figure 1 depicts the flow chart of the framework. The proposed framework is able to effectively detect text strings in arbitrary locations, sizes, orientations, colors and slight variations of illumination or shape of attachment surface. Compared with the existing methods which focus on independent analysis of single character, the text string structure is more robust to distinguish background interferences from text information.

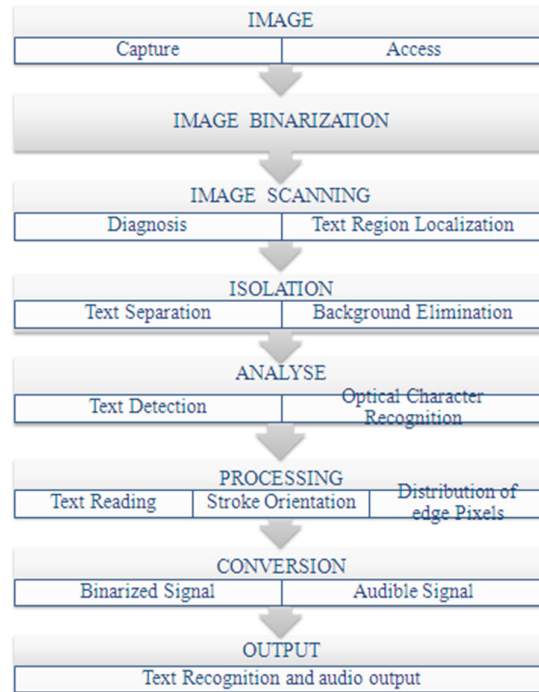


Figure1: ANN Algorithm Flow chart

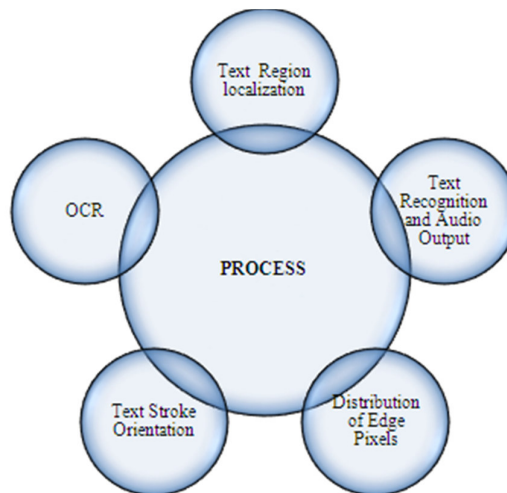


Figure 2: Process involved in Artificial Neural Network Algorithm

As we learned in the flowchart of the artificial neural network algorithm, it involves many process. The various process are shown in the figure 2. Text Region localization is performed to diagnose whether the text is present in the captured image or not. Optical Character Recognition (OCR) plays the role of detecting the text in the image. Text Stroke Orientation and Distribution of Edge pixels are the major process of the artificial neural network algorithm, which determines each letter of the text and reads the text captured in the image. Thus finally the text is recognized and the signals are processed and converted to audible signals and the text codes are given as a speech to the user.

3. Hardware and Software Specification

The Hardware components used are Raspberry Pi microcontroller, 5MP logitech web camera, 16GB SD card, Personal Computer. Raspberry Pi microcontroller is where the program coding is dumped using a SD card. The Logitech camera is used to capture the images, in which the text is to be read. Personal Computer is used to access the kit and process it. The Software platform is Open Source Linux and Operating system in which the program is executed is raspbian OS. The programming language is python.

4. Result

The image in which the text to be studied is captured as shown in figure 3. The program is executed to get the voice output of the text in the figure 4.



Figure 3: Snapshot of the captured image

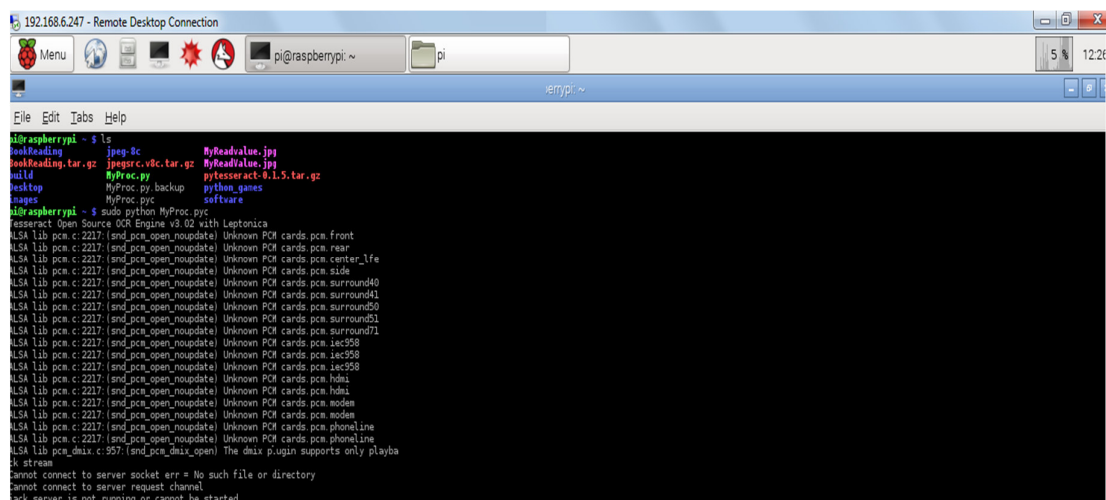


Figure 4: Snapshot of the Execution of the program

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5. Conclusion and Future Work

This system is proposed to assist the blind persons for reading the text without the guidance of other people. We have described a prototype system to read printed text on hand-held objects for assisting blind persons in their day to day life. In order to solve the common aiming problem for blind user, we have proposed a motion based method to detect the object of interest, while the blind user simply focuses the object through a camera provided. In Future, it can be developed as a product, where the camera can be fixed in the sun glass for providing flexibility in focusing the images.

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