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Literature Survey on Smart Assistance for Visually Impaired People

Saleem S Tevaramani[1], Akash C G[2], Vijaybabu K[3], Vinay S[4], Vivek Gowda J[5]

Assistant Professor, Department of Electronics and Communication, K.S. Institute of Technology, Bengaluru, India[1]

UG Student, Department of Electronics and Communication, K.S. Institute of Technology, Bengaluru, India[2-5]

Abstract: This paper is about the goal of developing a system that can assist people with disabilities in their daily activities. Visually impaired people have faced many challenges. In most cases, they need ongoing support in all situations, especially in their day-to-day activities. Some of the main challenges include difficulty getting from one place to another without the help of others. On top of that, they have difficulty recognizing people, detecting obstacles, etc. To overcome this example, we have proposed "optical character recognition". This system guides the visually impaired. A camera will take a live image. Optical recognition of characters (OCR) is used to extract text from images. The read data was converted to voices using a text-to-speech synthesizer. The system was implemented using various existing technologies to help visually impaired people. The document discusses challenges in system design and device design.

Keywords: Optical Character Recognition (OCR), GTTS, Camera, Visually Impaired, Human Emotion, Pyttsx3.

I. INTRODUCTION

Many people do not lose their sight, and some are blind from an early age. According to a survey by the World Health Organization in 2015, about 246 million people worldwide have an external disability and 39 million are blind. Various types of investigations have been conducted to address of these issues. Previously, Louis Braille was a French teacher and the inventor of Braille. It is a livery script and users must learn it before understanding it. Today, some technologies are developed based on the latest technology for the blind. Moderators will be introduced, based on OCR, blind hindrance and much more. However, these techniques are not enough to fix all the problems of Blind. People with visual impairment cannot survive in their daily life without any assistance. In many previous development and design of I have noticed disadvantages like using apps, blind sticks, handsets etc, they are inefficient. That's why we introduce new technology based on previous technology which is more efficient and is a low-cost project. With this electronic gadget, will also provide excellent assistance to people with disabilities in the outdoor environment.

The main motivation for this article is that I am very interested in solving problems in the different areas that this will open to carry out this project. I read about blind people getting hit by trains and kids saying "they can't read, so let's use new technology to make books speak" in the Deccan Chronicle. This quote will motivate me to find a new technology. I have searched many IEEE documents and websites for current technologies and found that there are some technologies with minimal equipment. Existing projects are with limitations. They can be manipulated by people if they know current technology like smartphones.

The main objective of this document is to plan and implement smart devices for the blind. This project encourages outwardly individuals to feel comfortable in this world. Here I present obstacle

prevention systems and readers of manuals, posters, and other text readers. With the camera, you can take pictures, convert to text and convert to audio using OCR or TTS. Another purpose is to add storage to these converted files, so that you can preview or restore these files in the future.

II. LITERATURE SURVEY

Kiran Rakshana R, Chitra C et.al [1] Aims in providing a system that allows the visually impaired to hear the contents of the text images. This system enables visually impaired people to hear the information which will be in the printed text format efficiently. This system uses a camera, audio microphone, ultrasonic sensor, Raspberry pi, headphones for voice and vibration motor. This system has three modules as the voice searching module, is implemented by using keyword operation search where the input has a voice of user after this

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keyword will be received by the raspberry pi and the next module are image processing and voice processing in this module the camera will capture the image based on the keyword, once the image gets captured the text extraction process starts for that Optical Character Recognition will be used and extracted text will be translated to speech using Text to Speech Synthesiser, in this module Optical Character Recognition(OCR) and Text to Speech Synthesiser is integrated. The image processing module stage includes binarization, de-noising, de-skewing, segmentation, and feature extraction so these stages help in getting an efficient text format. This the system also helps in avoiding obstacles by using ultrasonic sensors which give signals to visually impaired people about that through vibrating sensing technique, so this system helps visually impaired ones to read books and to know texts in the images. This system does not have the emotion recognition feature and it recognizes only the predefined text stored in the database.

Vipul Samalam et.al [2] The system Speech Assistance using OCR for Visually Impaired was proposed by Vivekananda Education Society's Institute of Technology, This system is a camera-based assistive text reading to help the visually impaired in reading the text present on the text labels, printed notes and products, This system uses the camera, audio microphone, Raspberry pi, Text to speech synthesiser, and Optical character recognition (OCR). In this system, the camera captures the image which will be processed by Optical character recognition then the binarization process starts that will convert the grey level image to binary this process helps to identify the extent of objects and also to concentrate on the shape analysis and the extracted text will be further going for segmentation and feature extraction then the identified text will be converted to speech using Text to speech synthesizer. This system cannot detect images and it doesn't detect the numerical.

Christos Liambas et.al [3] this system aims in providing an autonomous mobile system for dictating the text document through an image processing algorithm. This system uses Raspberry pi 2b, glasses with a camera fixed, a Bluetooth headset, Optical character recognition, Text to speech synthesizer, the system is developed by using the algorithm has three main phases calibration, line separation and data preparation for OCR and TTS, initially, the first phase of algorithm calibration takes place with the help of the camera, the video will be captured and analysed to guide the user through voice commands to hold the book in the proper position that is proper position should contain two pages and the next line separation phase helps in locating the text lines for each page, after that binarization and separation of each character will be read using OCR technology and converted into speech using TTS and that can be heard using earphones.

In this system, it can't recognize the mathematical equations and handwriting, it doesn't analyse the text source such as monitor and newspaper.

E.Kodhai, Pooveswari et.al [4] The aim of this project is to focus on the emotion recognition which is a part of computer vision technology. As visually impaired people cannot recognize the facial expressions of the people interacting with them, a new device has been developed to recognize the emotions of the people through a camera and conveys the emotions via headphones. This system is made using Raspberry Pi computer to perform the entire task, which is portable for the users. Emotion recognition model is trained using Convolution Neural Network (CNN) with the fer2013 datasets that contains more than 30000 images. Human face is detected using OpenCV library and some features like Histogram of oriented gradients. The recognized emotion is then converted to a speech using python library Pyttsx3 module, that make use of eSpeak engine control station and is presented in a Graphical User Interface to provide a user interaction with the system. Emotion recognition model is trained using TensorFlow framework. It only recognizes predefined images stored in the database. Obstacles identification and object classification are not implemented in this system.

X. Chen and A. L. Yuille et.al [5] Detecting ad reading text in natural scenes propose an algorithm to detect and read the text in natural images. city scene. This text includes patterned shapes - such as road signs, hospital signs and bus numbers, as well as different shapes such as shop signs, house numbers, and billboards. This article selects this set of features guided by the principle of the information function. Calculating the general probability distributions of the above and beyond this text feature responses, to the classifier weak can be obtained as a proportional test of the log ability.

Xilin Chen et.al [6] Automatic detection and recognition of signs from natural scenes. This paper presents a method to automatic detection and recognition of signs from natural scenes, and its application to a sign translation task The proposed approach embeds multiresolution and multistate edge detection, adaptive searching, colour analysis, and affine rectification in a hierarchical framework for sign detection, with different emphases at each phase to handle the text in different sizes, orientations, colour distributions and backgrounds by Jie Yang, Jing Zhang, Alex Waibel.

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Dimitrios Dakopoulos et.al [7] Fellow affords a comparative survey among portable/wearable obstacle detection/avoidance structures a subcategory of ETAs in an attempt to tell the studies network and customers approximately the abilities of those structures and approximately the development in the assistive era for visually impaired people. The survey is rely upon various functions and overall performance parameters of the structures that classify them in categories, giving quantitative measures. Finally, it gives a ranking, so that it will serve handiest as a reference factor and now no longer as a critique on those structures.

Keechul Jung et.al [8] Texture-primarily based technique for textual content detection in images the usage of aid vector machines and constantly adaptive implies shift algorithms above paper affords via way of means of Kwang in Kim, and JinHyung Kim a unique texture-primarily based approach for detecting texts in images. An aid vector machine (SVM) is used to examine the textural homes of texts. The external texture characteristic extraction module isn't always used, however as a substitute the intensities of the uncooked pixels that make up the textural sample are fed at once to the SVM, which fits nicely even in high-dimensional spaces. Next, textual content areas are recognized via way of means of making use of a constantly adaptive implies a shift algorithm (CAMSHIFT) to the consequences of the feeling analysis.

Chunheng Wang et.al [9] Text Detection in Natural Images Based on Multi-Scale Edge Detection and Classification Long Ma, Baihua Xiao propose a robust approach for text detection in colour scene photos. The set of rules is relied upon aspect detection and connected component. multi-scale aspect detection is carried out via way of means of Canny operator and an adaptive thresholding binary approach. The filtered edges are labelled via way of means of the classifier educated via way of means of SVM combing HOG, LBP and several statistical features, inclusive of mean, well-known deviation, energy, entropy, inertia, nearby homogeneity and correlation. k-way clustering set of rules and the binary gradient photo are used to clear out the candidate textual content candidates. Finally, the texts are relocated as they should be via way of means of projection analysis. Comparison among present system areas and re-detect the areas across the candidate.

G. Asha Hagargund et.al [10] Image to speech conversion for visually impaired people June 2017 presented. This author implemented the system with a software used for the conversion of text to speech. The converted image to text is the input to the device that input will be converted to speech using text to speech synthesizer. All of the above papers are released for conversion techniques only, there should be a new device to avoid obstacle, intimate the distance to the blind as well as reading the text in desired language and storing the converted image to text file for future retrieving

Shalini Sonth et.al [11] OCR Based Facilitator for the Visually Challenged, 2017 presented in [11]. The model comprising of a couple of showcase glasses and a few minimal effort sensors is created, and its effectiveness and exactness were tried by various clients. The exploratory outcomes demonstrate that the brilliant directing glasses can viably improve the client's voyaging knowledge in muddled indoor condition.

Jinqiang Bai Shi Shilian et.al [12] In this paper author introduced a microcontroller based smart assistive device. They used ultrasonic sensors to measure distance of obstacle and a smart phone to give voice commands this will be failed if the blind people haven't any idea about smart phone. Smart Guiding Glasses for Visually Impaired People in Indoor Environment.

OBJECTIVES

The objectives of the proposed work are:

1. To capture the live footage in front of the visually impaired people.
2. To design an image processing module capable of reading the image.
3. To design the object classification module.
4. To design GTTS module, that converts the captured data into speech.

METHODOLOGY

1. Methodology for Objective-1: A Camera is used to capture the live images.
2. Methodology for Objective-2: Optical Character Recognition (OCR) technology is used to recognise text from the captured image.
3. Methodology for Objective-3: TensorFlow tool is used for classifying the object.

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4. Methodology for Objective-4: GTTS is a python library that translates text to speech, which helps in assisting the visually impaired people.

III. PROPOSED WORK

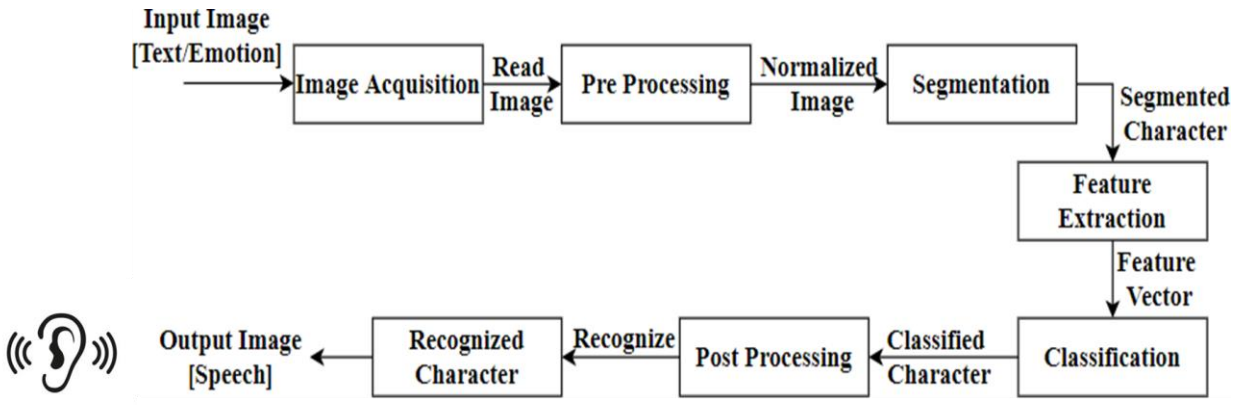

Fig.1 BLOCK DIAGRAM

The system architecture clearly explains the entire system. The architecture consists of the following system.

i. **Image Acquisition:** It is the collection of images for conversion into printed format from other sources. It retrieves the input text or detects the image to start the initial process.

ii. **Pre-Processing:** Preliminary processing of data enhances the quality of an image. Each binary image contains a threshold value and they can be set as a local and global value. The technique of preparing (cleaning and organizing) the raw data to make it suitable for building the training models to a readable format.

iii. **Segmentation:** The read image is converted into normalized image to get accurate data. This process can be processed as explicitly and implicitly both in the classification phase. The characters are segmented on the basis of pre-processing and RGB images.

iv. **Feature Extraction:** After the segmentation the characters are separated based on their features which are extracted from high quality images and are observed with the help of inter-class variations and those characters are selected which are efficiently computable.

v. **Classification:** This step helps the segmented characters to arrange them into different categories and classes. After evaluating their result, they will divide into two categories such as structural pattern classification and statistical pattern classification.

vi. **Post Processing:** The final step is to provide a better-quality image to the system and to provide accurate result. Contextual and lexical processing is done to reduce the chances of errors. Differentiates the training phase and testing phase which are the essential requirements to develop an OCR. At last the characters are recognized and converted into speech.

CONCLUSION

By providing this technology many people in this world who are unable to see will have their daily life in a normal way and they may enjoy same as normal persons. If we give a small training about this system to the disabled people, they can use this system efficiently. This system helps in identifying Human Emotion, Objects and converts text into speech, therefore it makes visually impaired people life easier. This system is user friendly, simple and easy to access.

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