

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 12, December 2018

A Survey on Providing Reading Assistance for Visually Challenged Individuals

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ABSTRACT: The difficulties faced by Visually Challenged individual lies in different areas of day-to-day activities. One such difficulty is gaining information from the text in front of them. This is a vital issue for which Braille dialect is present, but all the resources of information such as information on goods and all books aren't available in braille. Hence a system is proposed to help the user understand the text in front of them with audio as an output. This method is using Optical Character Recognition(OCR) for Image to Text conversion where method of Binarization is used for pre-processing. The output of this stage is then fed to Text to Speech conversion stage to get the final output as speech.

KEYWORDS: Optical Character Recognition(OCR), Image to Text Conversion, Binarization,Text to Speech Conversion.

I. INTRODUCTION

Reading is an activity that we need to perform in our everyday lives. Visually Challenged individuals face this as an issue among many that they face every waking minute of their life. [7] It is estimated that approximately 1.3billion people live with some form of vision impairment. Emerging technologies and research in taking place around the globe in this domain. [9] There are systems like Eye-Scan Reader that scans a document and user can hear the content on the document, but this can only be used for documents that can be handy and scanned. For reading the text on signboards or computer this system is not feasible.Hence a viable, robust, efficient and cost effective solution is needed. The main goal is to assist these individual in reading which can recognize the text in front of them and give the output in the form of speech.

Project Scope

1. This project is focused on visually challenged students who wish to pursue higher education.
2. The project has exponential possibilities from reading of normal day to day articles in the form of printed information to reading of large hoardings and public transport route information.

Assumptions

1. The users of the system are assumed to have no other disabilities apart from being visually impaired.
2. The user should have the physical ability to wear it and move around in the external environment without any constraints.
3. The user should have complete knowledge about the language (i.e. English) in which the documents are represented in.
4. The end-user is patient with technology and is willing to learn and update them as technological advances are made.

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II. RELATED WORK

[1] Technology is key for helping visually challenged students studying at university. This reference proposes a method to develop software which performs text-to-speech and speech-to-text conversion which can be used for examination of Visually Challenged individual. The desired result is fully operational web based software for challenged student and teachers. But this is only specific to the computer which has this software installed in it.

[2] Along with this they also face difficulty in understanding text in front of them to obtain information from goods, computer, books, etc. Limited resources are available in Braille. So to provide a viable solution this reference proposes a method in which the image of the text is clicked which is then separated using Optical Character Recognition (OCR) Technique. The text extracted is then processed to get the output as sound.

[3] Although mobile application has also been developed but it is difficult for these people to exactly find the location of text in the environment. To improve these factors, this reference paper proposes a real-time tracking method by helping them locate text by sound signals.

[4] Along with this ignoring the non-text region is also important while retrieving text from image. This research paper elaborates methods of ignoring the non-text area from the image. This reference identifies the problem faced by the Visually Challenged people and also the difficulty they face while handling the devices made for them. [5] This method proposes a system which implements scene-text detector and tracking it by capturing in video-frames hence providing a robust solution for individuals. The output is provided using speech synthesizer. Along with this avoiding duplicate images and obtaining single result is vital for optimistic result proposed.

III. PROPOSED ALGORITHM

This algorithm consists of two stages, that is Image to Text and Text to Speech this is shown in Fig. 1

A. Image to Text

This is carried out in four stages mentioned below

Stage 1: Perform Pre-Processing using steps such as de-skew, de-speckle, binarization, line removal, layout analysis /zoning, line and word detection, script recognition, character isolation/segmentation.

Stage 2: Character Recognition using Matrix Matching also known as pattern matching or recognition and Feature extraction

Stage 3: Post-processing stage checks if the words are in Lexicon format.

Stage 4: Application Specific Optimization

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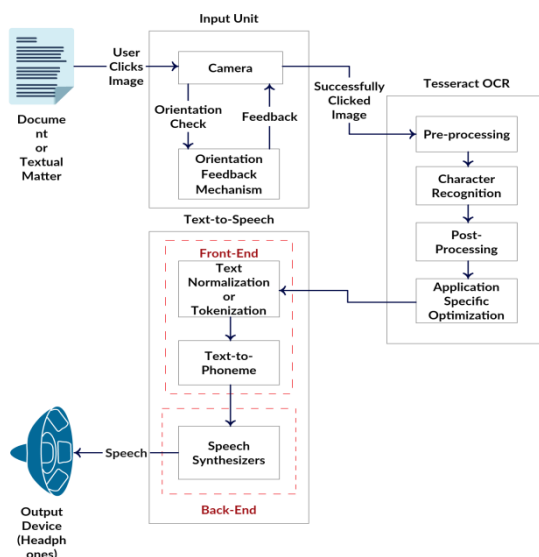


Fig 1. System Architecture

B. Text to Speech

[8] This algorithm (or engine) consists of two components

(a) Front-End:

i. [6] Text Normalization (Pre-processing or Tokenization): It performs conversion of raw textual data containing characters like symbols, numbers and other textual representations into equivalent written-out words.

ii. Text-to-phoneme (Grapheme-to-phoneme): It performs phonetic transcriptions to each word, and divides the textual content into other units such as phrases, clauses and sentences.

(b) Back-End:

The back-end is also called as a synthesizer. The back-end then converts these representations output by the front-end into sound.

IV. CONCLUSION AND FUTURE WORK

We propose an assistive system to read printed text on objects for assisting blind people. To solve the common problems of blind people we have proposed a method in which the blind people will click the image. This method can effectively separate the objects of interest from complex background and other objects in the camera view. OCR is used to perform word recognition of the localized text regions and transform into audio output for blind people. The RPi-based system can be equipped with a high-resolution webcam compared with the one used in this project, and we expect this will improve its accuracy. We predict more work will be produced in this critical area of assistive technology, and project that future portable gadgets will have easy to use and built-in mechanism as reading and navigation system for the blind.

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