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A Review Paper on Smart Text and Book Reader for Blind People

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Abstract: In this era, there are many types of physically challenged people one of these types is Blind people. To help such types of people we developed an automatic text reading system based on Raspberry Pi. The main objective of this paper is to provide review information about this system. This is a magnificent technique to convert text to audio using Optical Character Recognition (OCR) and Text to Speech Synthesizer (TTS) in Raspberry Pi. With the help of a camera, the text is captured and then converted into the voice message output which is heard through headphones or a speaker by the blind person. This device is introducing the integration of a complete Text Read- out system. This device is divided into two parts of modules one is an image processing module and the other is a voice processing module. The efficiency of this device is very good which can be detected from an experimental model.

Keyword: OCR, TTS, Raspberry pi, Webcam, Python

I. INTRODUCTION

Physically challenged people are an indivisible part of our human society, one of these is blind people. In the entire world, many people are blind. Some have blindness disorders, night blindness, etc. That's the reason they have to face many challenges like reading, study problems, writing, etc. Although there is a technique to overcome all such problems commonly known as the Braille technique, it is not an easy technique. They find this technique somewhat difficult to learn and understand. Therefore, we are focusing on and trying to resolve related problems and hence we have developed a device that detects the text and then converts it into a voice message which easily helps blind people to understand, learn and read. This work is done in three steps. This device works on the methodology of OCR and TTS technology. There are two sections that are OCR module section and the other is TTS module Section. Firstly, the typed or written text on anything is captured using the camera and with the help of the OCR (optical character recognition) technique, the text is recognized and is processed using TTS (Text to Sound) technique to get the sound output. All this is done on the framework of an embedded system based on the Raspberry Pi Board. Then the output sound message is heard by using the speaker or headphone.

II. LITRETURE SURVEY

- A. This paper explains in detail about the OCR (Optical Character Recognition). The objective is to develop user friendly application which performs image to speech conversion system using android phones. The OCR takes image as the input, gets text from that image and then converts it into speech. This system can be useful in various applications like banking, legal industry, other industries, and home and office automation. It mainly designed for people who are unable to read any Type of text documents.
- B. This paper gives the information about the Text to speech (TTS) synthesis. It is the automatic conversion of text into speech. Generally, TTS system consists of two phases. The first is text analysis, where the input text is transcribed into a phonetic or some other linguistic representation. The second one is the generation of speech waveforms. In this TTS system, text to phoneme conversion depends on dictionary based approach to get the exact phonetic transcription. Speech synthesis such as domain specific, phoneme based synthesis and unit selection synthesis are used for concatenating speech. For numerical text to speech system, domain specific synthesis is applied. In phoneme based synthesis, the input text is considered as word to produce sound. For input sentence, unit selection speech synthesis is applied. This TTS system is mainly used for visual impairments and handicapped people.
- C. This paper deals with research in which images are converted into audio output. OCR is used in machine process such as cognitive computing, machine translation, text to speech, key data and text mining. It is mainly used in the field of research in Character recognition, Artificial intelligence and computer vision. In this research, as the recognition process is done using OCR the character code in text files are processed using Raspberry Pi device on which it recognizes character using tesseract algorithm and python programming and audio output is listened.

- D. This paper proposes a portable camera-based assistive text reading framework to help blind persons to read text labels and product packaging from hand-held objects in their daily lives. The system framework consists of three functional components: First, scene capture-using a mini camera, the text which the user needs to read gets captured as an image and has to be sent to the image or data processing platform., second, data processing -where text will be filtered from the surrounding and will be recognized by optical character recognition (OCR) software, and finally, Speech output.
- E. This paper explains that for using OCR for pattern recognition to perform Document image analysis (DIA) they use information in grid format in virtual digital library’s design and construction. Raspberry PI features a Broadcom system on a chip (SOC) which includes ARM compatible CPU and an on-chip graphics processing unit GPU. It promotes Python programming as main programming language

III. METHODOLOGY

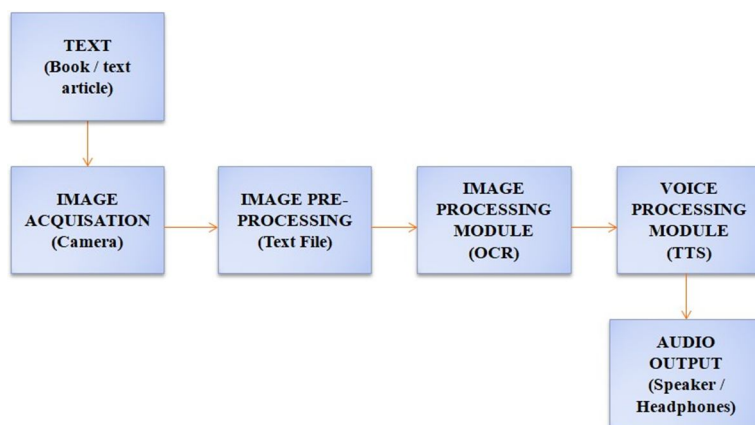


Fig.1 OCR Method

The initial step is image acquisition in which the image of the text is captured by the camera. After the acquisition of the image, various operations are needed to be performed to extract text from the image. Then pre-processing steps such as filtering of the image, noise removal are done. Books and papers have letters. Our main target is to extract letters words and switch them into digital form and arrange them accordingly. Hence Image processing is used to obtain the letters. Once words are obtained then they are segmented into alphabets. By using OCR (object character recognition) lettering is analyzed and is compared with the created database. Now when these letterings are acknowledged they are finally converted into the audio output. The audio output is obtained using a text to speech (TTS) synthesizer. It is a computer- based system that reads text aloud automatically. Hence the audio is heard using a speaker or headphones.

IV. BLOCK DIAGRAM

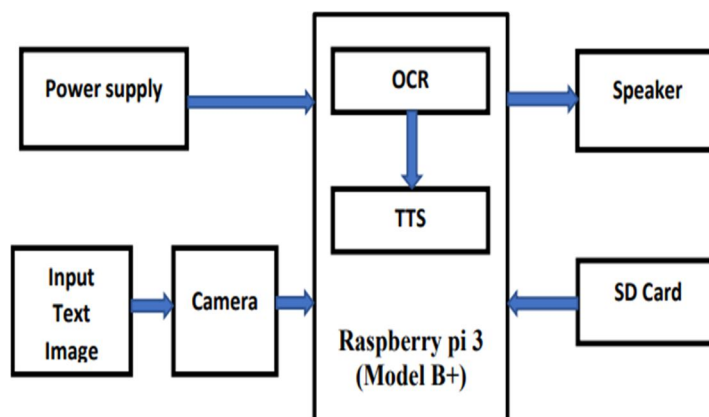


Fig 2: Block Diagram of Smart Text and Book Reader for Blind People

V. OPERATION

A smart text and book reader for blind people basically works on the Raspberry Pi. The input to this device is type or written data that is captured by the camera mounted on the device. The captured data is then pre-processed when the image is filtered and the image is converted into text data with the help of OCR. All the text data is characterized and compared with the saved libraries in the processor and arrange these words in series. This data is sent to the TTS module where it is converted into audio. The audio is amplified and then sent to the speaker or headphone through which the output audible words are heard by the blind person. The system works on the battery or power supply through the adapter.

VI. CONCLUSION

In this paper, our main aim was to provide blind and visually challenged people with a device that will help them to read books, text, articles, etc. hence we developed a device named smart text and book reader for a blind person. This device has good efficiency and is helpful for these people at blind schools for study purposes or at the shop while doing any cash payments, etc. this device overcome all the problems faced by blind and visually challenged people during reading any kind of text.

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