

Voice based both Tamil and English Reading System for Visually Impaired Person

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ABSTRACT

To support the blind people, a smart specs camera is introduced, it can perform a text detection and produces a voice output. It will help the visually impaired persons to read any handwritten text both (Tamil and English) in speech form. It capture the information in the handwritten text form and produce corresponding voice output using OCR (Optical Character Recognition) tool and TTS (Text-to-speech). The importance of OCR tool is used to convert the handwritten character to text form. OpenCV is used to match the words or characters based on the predefined templates. The outcome is based on text-to-speech, it will converts the text into speech. Then e-speak tool is used to produce the audio signal further it is transmitted as voice through headphone or speaker.

Keywords: OCR, Text to speech module, Tamil Text, Raspberry pi interface, e-speak tool.

1. INTRODUCTION

The New technology that allows for storing information in a Digital form, but the information presented on papers is still the easiest way to exchange the information (ex. Newspapers). So, such details are not easily accessible by the visually impaired peoples. To improve their ability to access those data in a detailed manner a smart specs is introduced that reads texts from images and represent it as text form later it will convert to speech. It requires the use of two advent technologies that plays the vital role, namely OCR for Text Extraction and TTS is used to convert the text to voice. It was mainly developed by the Raspberry Pi module and Python-Open CV. Initially the image is captured then the captured image is found in Open Cv. In this software the matching of text with the image takes place by using the predefined templates. And The OCR is used for the conversion of image which might be in a handwritten form or printed text form to a editable form. The image should be easily read by the ordinary peoples. But to the Computer it will it will understand the text present in the image as a combination of black and white dots. Speech synthesis is a easiest method to produce the artificial speech in a voice form. A TTS plays a vital role to convert any form of text to a voice .By using the e-speak tool the text can be read aloud. The main advantage of using e-speak tool is the speech that is produced is clear and also it can be used at high speed.

2. RELATED WORKS

This is implemented by using Opencv, the image processing tool which is mainly used to analyse the captured image and then match it with the predefined templates. Character recognition is done by using the optical character recognition tool here the noise removal is takes place by using the image processing tool. Then Raspberry pi act as the interface between the camera module and the speaker port. The English and Tamil handwritten text is converted into text file then the text is converted to speech by using the e-speak tools. In this tool the pause break is introduced.

This image to speech conversion has four modules:

1. Capturing Handwritten text
2. Image Processing OpenCV Software
3. OCR (text detection)
4. Raspberry pi (interface)
5. TTS(e-speak)

2.1. Capturing handwritten text

The image is captured using the camera and the image should contain the handwritten text or printed text. Initially the captured image is processed using OCR tool. In Optical Character Recognition the processing of text extraction takes place. Then the obtained text is converted into editable form further the text is converted to audio form.

2.2. Image Processing using opencv

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually Image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them. It is among rapidly growing technologies today, with its applications in various aspects of a business. Image Processing forms core research area within engineering and computer science disciplines too. OpenCV (Open Source Computer Vision) is a library of programming functions mainly aimed at real-time computer vision. In simple language it is library used for Image Processing. It is mainly used to do all the operation related to Images.

2.3. Optical Character Recognition

The extraction of the text in the image is done using optical character recognition (OCR). OCR is a field of research in pattern recognition, artificial intelligence and computer vision. It is the conversion of the images of typed, handwritten or printed text into a digital text or computer format text. Earlier OCR versions had to be trained in each character of a text with its specific font. Today, advanced OCRs are available that have a high degree of accuracy, support a wide variety of image formats, languages and fonts. For our project, we have used Tesseract OCR. It is the most accurate open source OCR engine and is powered by google. It can be used on the Linux, mac and windows platform. The newest Tesseract version, 3.4 supports a hundred languages. However, images must undergo a number of pre-processing stages like noise removal, scaling etc. otherwise the output will be of low quality.

2.4. Raspberry pi

The raspberry Pi is a small, low cost CPU which can be used with a monitor, keyboard and mouse to become an efficient, full-fledged computer. The reason we chose Raspberry Pi micro-computer for our project is that, firstly, it is an easily available, low-cost device. RPi uses software which are either free or open source, which also makes

it cost-effective. The Raspberry Pi uses an SD card for storage and its small size also gives us the advantages of portability.

2.5. Text-To-Speech

Text to speech, abbreviated as TTS, is a form of speech synthesis that converts text into spoken voice output. Text to speech systems were first developed to aid the visually impaired by offering a computer-generated spoken voice that would "read" text to the user. TTS should not be confused with voice response systems. Voice response systems synthesize speech by concatenating sentences from a database of prerecorded words and are used for different purposes than TTS systems, which form sentences and/or phrases based on a language's graphemes and phonemes. Voice response systems are limited to synthesizing sentences that contain only words that have been predetermined by the system. TTS systems, in contrast, are theoretically capable of "reading" any string of text characters to form original sentences.

3. EXISTING SYSTEM

In past various image to speech recognition systems are available but there is no compatibility is achieved for virtually impaired peoples. The raspberry pi is used as a interface between the camera module and the speaker. Then the text extraction and detection is done by using the OCR tool where in the previous works matlab, the image processing tool is used to match the handwritten text present in the image with the predefined templates. Then the important limitation is when reading the text in the speaker there is no pause break is introduces so it reads the text continuously without any pause and resume feature, it leads to misunderstanding of the texts by the visually impaired persons.

4. PROPOSED SYSTEM

Text reading system based on voice for blind people is mainly developed to read the text which could be both in tamil and English language without the help of another persons. Initial process is capturing the image by the smart specs with the camera which is inserted and then the captured image is send to the OCR tool to extract the text present in the image. The Optical character recognition the text extraction tool plays a role to extract the text present in the image. The peoples feels easier to understand the data present in the paper. The information is conveyed to them by using Text To Speech process .The produced text is matched with the templates in the opencv image processing tool. The extracted text is converted to speech by using the text to speech methodology. Then finally the output is produced in the head phone or speaker by using the e-speak tool. Pause Break is introduced in the e-speak tool while reading the text continuously.

4.1 Advantages

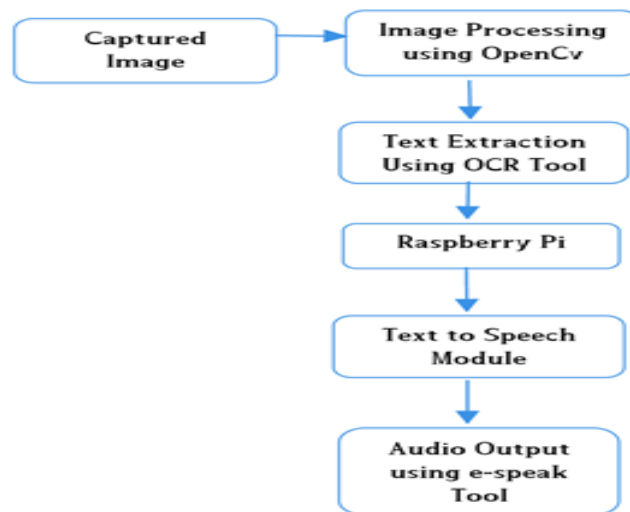
1. It increases the performance of text reading system
2. Used to convert both tamil and english text to speech
3. It has the facility to pause and resume while reading the text

4. Understandable artificial human speech output is produced

4.2 Disadvantages of Existing System

1. Only It converts the English text to speech
2. Pause break feature is not available
3. Processing speed is low

5. DESIGN AND IMPLEMENTATION



The image of Raspian Desktop with the Opencv installed using the terminal



Represents the text reading System for Blind Peoples using the Raspberry Pi interface. Initially Image is captured in the smart specs and this image is processed in the Opencv here the extracted text should matched with the predefined templates, the text extraction is done by the OCR (Optical Character Recognition) then the raspberry pi act as the interface then the extracted text is converted to speech by using the text to speech module and by using the e-speak tool the pause break is introduced. The audio Output is obtained in the speaker or Headphone. Initial process is to set up the raspberrypi, this includes the step by step process.

1. Mount the Raspian OS to the SD Card
2. Then Image to Text conversion is done by using OCR Tool
3. Text is Extracted by using OpenCV Software
4. Raspberrypi is converted as chip and later it should be inserted into specs

The Hardware setup of Raspberry pi is



6. CONCLUSION

This Project demonstrates the image to speech recognition is done for both the english and tamil language. And the pause break is introduced while reading the text by using the e-speak synthesizer. This is the very efficient way to help visually impaired peoples to read the text present in the paper without the help of humans. And importantly the hand written character recognition is done easily by using the Optical character recognition tool. It is More useful to peoples to get clear and spontaneous speech output using the e-speak tool.

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