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Design of automated reader for blind person

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Abstract

This work introduces smart reader by using Raspberry Pi. The system consists of a camera interfaced with computer which receives the printed or hand written text. This work proposes the novel implementation of smart book reader with raspberry pi controller. The system consists of a webcam interfaced with raspberry pi which accepts a page of printed text. The experimental results are done with the help of raspberry pi controller. Controller coding for the Raspberry pi is done through PYTHON language. The audio output is obtained after the captured image is converted to text. The image captured by the camera is converted to text and displayed in the form window and then the text is obtained as audio output. Raspberry pi has the audio port where the output can be heard through the headphone or the speaker. Once the image is converted to text raspberry pi takes few milliseconds to convert it as a voice output. This system is validated with both simulation and experimental verification it achieves the text document is converted with speech for the use of visually impaired people.

Keywords: Raspberry Pi; Tesseract OCR engine; Python based TTS Synthesizer; Speaker; Image Processing; Semantic Check; Raspberry pi Operating System

1. Introduction

The International Classification of Diseases 11 (2018) classifies vision impairment into two groups, distance and near presenting vision impairment.

Distance vision impairment:

- Mild – visual acuity worse than 6/12 to 6/18
- Moderate – visual acuity worse than 6/18 to 6/60
- Severe – visual acuity worse than 6/60 to 3/60
- Blindness – visual acuity worse than 3/60
- Near vision impairment:
- Near visual acuity worse than N6 or M.08 at 40cm.

A person's experience of vision impairment varies depending upon many different factors. This includes for example, the availability of prevention and treatment interventions, access to vision rehabilitation (including assistive products such as spectacles or white canes), and whether the person experiences problems with inaccessible buildings, transport and information. Globally, at least 2.2 billion people have a near or distance vision impairment. In at least 1 billion – or almost half – of these cases, vision impairment could have been prevented or has yet to be addressed. This 1 billion people includes those with moderate or severe distance vision impairment or blindness due to unaddressed refractive error (88.4 million), cataract (94 million), age-related macular degeneration (8 million), glaucoma (7.7 million), diabetic retinopathy (3.9 million), as well as near vision impairment caused by unaddressed presbyopia (826 million).

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In terms of regional differences, the prevalence of distance vision impairment in low- and middle-income regions is estimated to be four times higher than in high-income regions. With regards to near vision, rates of unaddressed near vision impairment are estimated to be greater than 80% in western, eastern and central sub-Saharan Africa, while comparative rates in high-income regions of North America, Australasia, Western Europe, and of Asia-Pacific are reported to be lower than 10%.

Population growth and ageing are expected to increase the risk that more people acquire vision impairment.

2. Methodology and Implementation

Figure 1 shows the block diagram of the proposed book reader. In this system, the printed text is to be placed under the camera view by the blind person to ensure the image of good quality and fewer distortions. Then an applicable blind assistive system, a text localization algorithm might prefer higher recall by sacrificing some precision. When the application starts at first, it checks the availability of all the devices and also for the connection. The GUI displays the status of the image clicked from the camera and a status box for representing the image. The Raspberry Pi has integrated peripheral devices like USB, ADC, Bluetooth and Serial. Raspberry Pi 3B uses Linux based operating system named Raspbian.

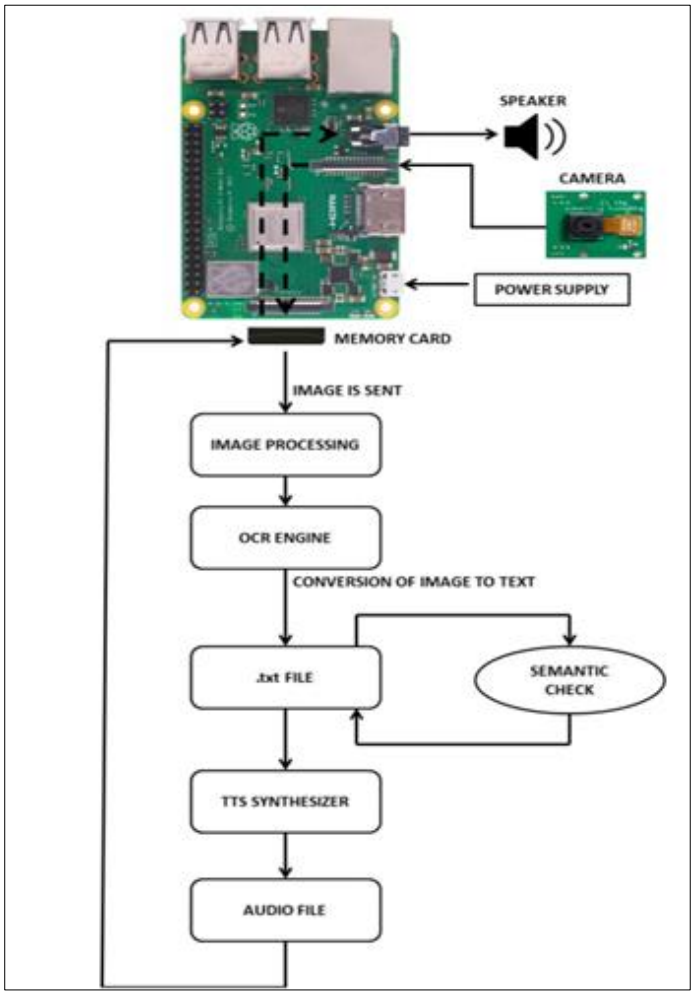

Figure 1 Implementation of Diagram

2.1 Working

The power supply provides 5VDC stable power to the LCD screen, camera, audio speaker, and Raspberry Pi board.

The digital camera/USB camera takes snapshots of the paper placed within its field of view and continuously communicates the images to the Raspberry Pi board.

The LCD screen displays the progress of the project operation.

The audio speaker announces the digital speech produced by the Raspberry Pi board after the extraction of text from the image.

The Raspberry Pi board communicates with all the peripheral devices and applies the image processing algorithms to the images.

It then converts the extracted text to speech and sends it to the output to be announced via the speaker.

2.2 Design of Model

Figure 2 Design of Model

2.3 Hardware

- Raspberry pi 3
- Speaker
- Camera Interface (CSI)
- LCD Display
- Resistors and Capacitors
- Voltage Regulator
- Cables and Connectors
- Diodes
- Zero PCB
- LED
- Transformer/Adapter
- Push Buttons and Switch

2.4 Future Scope

- For educational purpose
- For government offices
- Can be installed in library
- Knowledge at your fingertips
- Used to read official documents

3. Conclusion

In this analysis, we've got represented a epitome system to scan written text and handheld objects for helping the blind individuals. To extract text regions from advanced backgrounds, we've got projected a completely unique text localization formula supported models of stroke orientation and edge distributions. The corresponding feature maps estimate the worldwide structural feature of text at each component. Block patterns project the projected feature maps of a picture patch into a feature vector. Adjacent character grouping is performed to calculate candidates of text patches ready for text classification. Associate degree Ad boost learning model is utilized to localize text in camera-based pictures. OCR is employed to perform word recognition on the localized text regions and rework into audio output for blind users. During this analysis, the camera acts as input for the paper. The proposed system helps blind persons to read printed texton products which appears in front of the camera through the speaker. In addition, it also helps them to detect the obstacleto prevent them from falling. It can build self-confidence and can give a better life to the blind users as they become self-dependent for day to day requirement.

Compliance with ethical standards

Acknowledgments

Raspberry pi which acknowledges a page of printed text. In the Raspberry Pi module we have introduced the OCR (Optical Character Recognition) checks it into an advanced record which is then exposed to slant revision, division, before highlight extraction to perform classification. After classifying, the text is readout a text to speech conversion unit (TTS engine) installed in raspberry pi. The output will be of preferred language. The simulation is only an inception of picture handling for example the picture is converted into text and text is converted into speech by the OCR software installed in raspberry pi.

Disclosure of conflict of interest

Conflict of interest occurs when an individual's personal interests – family**,** friendships**,** financial**,** or social factors – could compromise his or her judgment, decisions, or actions in the workplace. Government agencies take conflicts of interest so seriously that they are regulated.

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