

Raspberry Pi Based Reader for Blind People

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ABSTRACT- This paper shows the programmed report peruser for outwardly hindered individuals, created on Raspberry Pi. It utilizes the Optical character acknowledgment innovation for the distinguishing proof of the printed characters utilizing picture detecting gadgets and PC programming. It changes over pictures of composed, transcribed, or printed content into machine encoded content. In this exploration these pictures are changed over into the sound yield (Speech) using OCR and Text-to-discourse union. The transformation of printed record into content documents is finished utilizing Raspberry Pi which again utilizes Tesseract library and Python programming. The content records are handled by OpenCV library and python programming language and sound yield is accomplished.

Keywords — Character recognition, Low power, Document Image Analysis (DIA), Raspberry Pi 3B, Speech Output, OCR based book reader, OpenCV, Python Programming

I. INTRODUCTION

Utilized for the discovery and perusing of reported content in pictures to support the visually impaired and outwardly hindered individuals. The general calculation has a triumph rate of 90% on the test set as the new content is essentially little and inaccessible from the camera. We have proposed a system to remove content from composed reports, convert them into machine encoded content, make the content records and afterward process them utilizing Digital Image Analysis (DIA) to change over the content into sound yield. Our emphasis is on improving the abilities of visually impaired individuals by giving them an answer with the goal that the data can be sustained to them as a discourse flag. This task can likewise be executed for the programmed location of street signs, cautioning signs, in different terms to improve the visually impaired route on bigger scale.

II. BLOCK DIAGRAM

Figure 1 shows the block diagram of the proposed book peruser. In this framework, the printed content is to be set under the camera see by the visually impaired individual to guarantee the picture of good quality and less twists. At that point an appropriate visually impaired assistive framework, a content limitation calculation may incline toward higher review by yielding some exactness. At the point when the application begins at first, it checks the accessibility of the considerable number of gadgets and furthermore for the association. The GUI shows the status of the picture clicked from the camera and a status box for speaking to the picture. The Raspberry Pi has coordinated fringe gadgets like USB, ADC, Bluetooth and Serial.

Raspberry Pi 3B utilizes Linux based working framework named Raspbian.

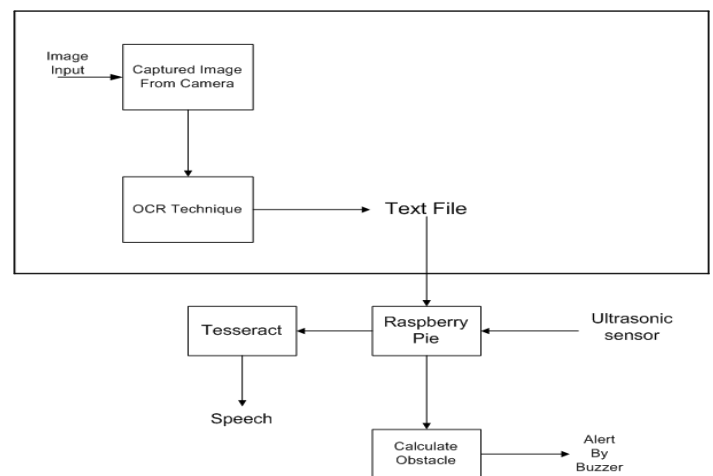


FIGURE 1: BLOCK DIAGRAM OF BLIND READER

III. WORKING PRINCIPLE

At the point when catch is clicked, this framework catches the archive picture put before the camera which is associated with ARM microcontroller through USB. After choosing the procedure catch the caught record picture experiences Optical Character Recognition(OCR) Technology. OCR innovation permits the change of examined pictures of printed content or images into content or data that can be comprehended or altered utilizing a PC program. In our framework for OCR innovation we are utilizing TESSERACT library. Utilizing Text-to-discourse library the information will be changed over to sound. Camera goes about as primary vision in recognizing the picture of the set record, at that point picture is prepared inside and isolates mark from picture

by utilizing open CV library lastly distinguishes the content which is articulated through voice. Presently the changed over content into sound yield is listened either by associating headsets by means of 3.5mm sound jack or by interfacing speakers by means of Bluetooth.

IV. EQUIPMENT IMPLEMENTATION

Raspberry Pi is an ease, Mastercard measured PC that connects to PC screen or TV and utilizations standard console and mouse. There are two models of it, Raspberry Pi 2 and Raspberry Pi 3. These two are bit comparative with few development includes on Pi 3. Contrasted with the Raspberry Pi 2 it has:

- A 1.2GHz 64-bit quad-center ARMv8 CPU
- 802.11n Wireless LAN
- Bluetooth 4.1
- Bluetooth Low Energy (BLE)
- 4 USB ports
- 40 GPIO pins
- Full HDMI port
- Ethernet port
- Consolidated 3.5mm sound jack and composite video
- Camera interface (CSI)
- Display Interface (DSI)
- micro SD card space
- VideoCore IV 3D illustrations center

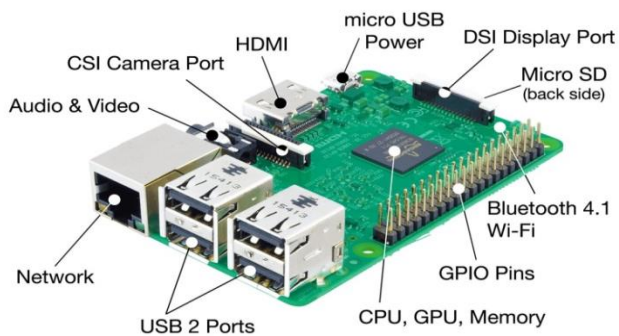


FIGURE 2: COMPONENTS OF RASPBERRY-PI

The equipment segments of the Raspberry Pi incorporate power supply, stockpiling, information, screen and network. Power Supply Unit is the gadget that provisions electrical vitality to the yield loads.



It gives an all around controlled power supply of +5v with a yield current similarity of 100 mA. Camera sustains its pictures continuously to a PC or PC organize, regularly by means of USB, Ethernet or Wi-Fi. HDMI to VGA Converter is utilized to associate the Raspberry Pi board to the Projectors, Monitors and TV.

V. PROGRAMMING IMPLEMENTATION

A. WORKING FRAMEWORK:

- Operating System: Raspbian (Debian)
- Language: Python 2.7
- Platform: Tesseract, OpenCV (Linux-library)
- Library: OCR engine, TTS engine

The working framework under which the proposed undertaking is executed is Raspbian which is gotten from the Debian working framework. The calculations are composed utilizing the python language which is a content language. The capacities in calculation are called from the OpenCV Library. OpenCV is an open source PC vision library, which is composed under C and C++ and keeps running under Linux, Windows and Mac OS X. OpenCV was intended for computational proficiency and with a solid spotlight on continuous applications. OpenCV is written in improved C and can exploit multi-center processors.

VI. OPTICAL CHARACTER RECOGNITION

Optical Character Recognition is a content acknowledgment strategy that permits the composed content or printed duplicates of the content to be rendered into editable delicate duplicates or content records. OCR is utilized for the checking of content from the pictures and changing over that picture into the editable content document. It is a typical technique for digitizing printed message with the goal that they can be electronically altered, sought, put away more minimally, showed on the web and utilized in machine procedures, for example, psychological processing, AI and interpretation, Text-to-discourse and so forth. OCRs are of two sorts for perceiving printed characters and for perceiving manually written content.

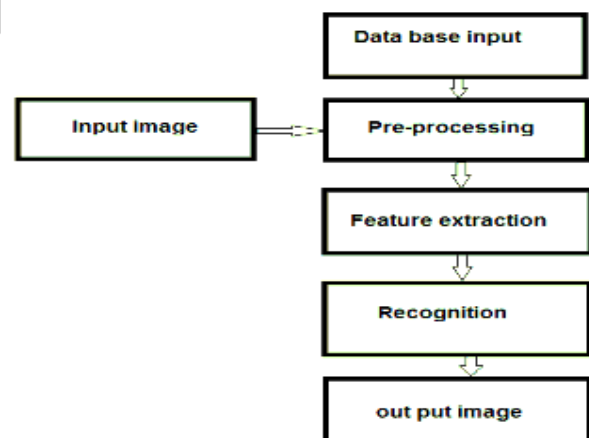


FIGURE 3: OCR PROCESS TECHNIQUE

The procedure incorporates scanning, document image analysis (DIA), pre-processing, segmentation and recognition.

VI. FLOW OF PROCESS

A. IMAGE CAPTURING

The initial step is the one in which the archive is put under the camera and the camera catches a picture of the set report. The nature of the picture caught will be high in order to have quick and clear acknowledgment because of the high-goals camera.

B. PRE-PROCESSING

The pre-preparing stage comprises of three stages: Skew Correction, Linearization, and Noise Removal. The caught picture is checked for skewing. There are conceivable outcomes of the picture getting skewed with either left or right introduction. Here the picture is first lit up and binarized.

The capacity for skew recognition checks for an edge of introduction between ± 15 degrees and whenever distinguished then a straightforward picture pivot is completed till the lines coordinate with the genuine flat pivot, which creates a skew rectified picture. The commotion acquainted amid catching or due with the low quality of the page must be cleared before further handling.

C. IMAGE TO TEXT CONVERTER

The ASCII estimations of the perceived characters are handled by Raspberry Pi board. Here every one of the characters is coordinated with its comparing format and spared as standardized content interpretation. This interpretation is further conveyed to the sound yield.

D. TEXT TO SPEECH

The extent of this module is started with the finish of the retreating module of Character Recognition. The module plays out the undertaking of transformation of the changed content to capable of being heard structure. The Raspberry Pi has an on-board sound jack, the on-board sound is created by a PWM yield and is negligibly separated. A USB sound card can incredibly improve the sound quality and volume. As the acknowledgment procedure is finished, the character codes in the content record are handled utilizing Raspberry Pi gadget on which perceive a character utilizing Tesseract calculation and python programming, the sound yield tunes in.

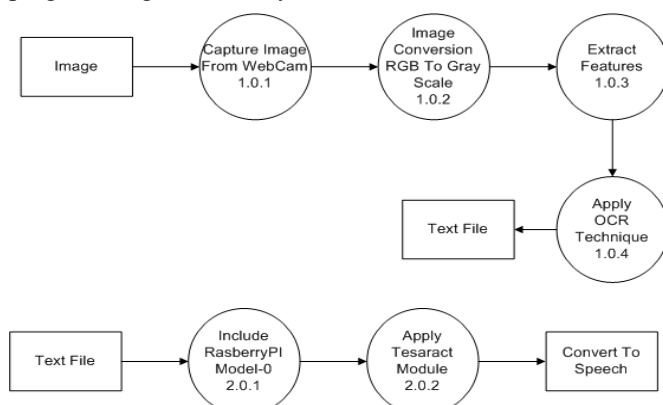


FIGURE 4: DATAFLOW DIAGRAM OF OCR PROCESS

VII. APPLICATIONS

Blind Reader is a compact, ease, perusing gadget made for the visually impaired individuals. The Braille machines are costly and accordingly are not available to many. Blind Reader beats the confinement of ordinary Braille machine by making it moderate for the regular masses. The framework utilizes OCR innovation to change over pictures into content and peruses out the content by utilizing Text-to-Speech conversion. The framework bolsters sound yield through Speakers just as earphone. The client additionally can stop the sound yield at whatever point he wants. It likewise has the office to store the pictures in their particular book envelope, in this manner making advanced reinforcement at the same time. With this framework, the visually impaired client does not require the intricacy of Braille machine to peruse a book. Everything necessary is a catch to control the whole framework

VIII. CONCLUSION

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 Adaboost learning model is utilized to localize text in camerabased 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. Because the Raspberry Pi board is high-powered the camera starts streaming. The streaming knowledge are going to be displayed on the screen victimization GUI application. Once the item for text reading is placed ahead of the camera then the capture button is clicked to produce image to the board. Using Tesseract library the image are going to be born-again into knowledge and also the knowledge detected from the image are going to be shown on the standing bar.

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