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Hand-Held Object Recognition for a Blind Person Using Raspberry Pi

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----------**ABSTRACT**----------
In our project, blind person were recognizing the hand-held object by using eSpeak software through the Raspberry Pi. The camera was placed in the spectacle of the blind person. Initially the objects are captured by camera. To match the captured image and the image in the MATLAB database, we have to find the histogram of the captured images and compare with the histogram of image in the MATLAB database. To find the histogram, initially we have to convert the captured image into the gray scale image and followed with LBP algorithm. LBP means Local Binary Pattern algorithm. This algorithm is used to recognize the objects. This algorithm used to convert the gray scale image into the LBP code image. Thenthe output of the MATLAB is given to the Raspberry Pi as an interrupt. By using eSpeak software, LBP code is converted into speech output. The speech output is obtained at the audio jack of the Raspberry Pi. By connecting microphone Bluetooth earpiece at the audio jack, we can hear the speech output.The entire application is based on Raspberry Pi. Using Raspberry pi the overall performance and efficiency get increased. The Raspberry Pi kit is a mini computer in built system and power consumption is very less.

Keywords-*Raspberry Pi, Raspibian, Camera, Spectacle, Python, Bluetooth earpiece, audio jack.*

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I. INTRODUCTION

The Raspberry Pi 2 processing capacity is 6 times of the previous models. This second generation Raspberry Pi provides BCM2836 processor, which is a powerful ARM Cortex-A7 which runs at 900MHz. 1Gbyte memory capacity is present in the board. The local binary pattern operator, which is used to transforms an image into an array of integer labels as describing small-scale appearance of the image and it is an image operator. Thus obtained labels are most commonly the histogram, which are used for image analysis. This project helps the Blind person to live comfortably in this modern world. Ojala et al, Who introduced the basic local binary pattern. This concept was based on the assumption that texture contains two complementary aspects which are pattern and its strength. A 3×3 pixel block of an image is present the local binary pattern.The statistical robustness is the reason for using uniform patterns and where the local primitives that are detected by the LBP containspots, flat areas, edges, edge ends and curves. The eSpeak software is widely used here. This is used to improve the given input speech language and that is based on GUI program that are using a random text.The paper proposes a Raspberry Pi based Hand-held object recognition for a blind person.

II. LITERATURE REVIEW

The blind person uses camera based technique to identify the hand-held objects. From cluster of background an object is identified. For that region of interest (ROI) are used. To find region of interest (ROI), we uses novel text localization algorithm to get the gradient features of edge pixels using Adaboost model. These texts are binarized and threshold value is obtained for that text character. Finally speech output is obtained from the binarized text character. Second paper is proposed to overcome the disadvantages of the previous paper. This project also used for the blind person in their daily lives. In previous paper, we have to shake the object to recognize the text. But, now it will automatically recognize the text character in the hand of blind person. It is also converting the text into binaries but optical character recognition (OCR) softwareis used here. Then finally speech output is obtained.Third paper is proposed to identify the different strings of characters in the natural scene images. We extract the character from the image and enhancement techniques are used here. Finally the text is detected by structure based partition method and then grouping all the text using robust algorithm. The obtained characters are provided with closed contours and these characters are placed in

straight line. Then text and images are separately binarized. The color-based partition gives better performance than gradient-based partition. The text strings are extracted along with arbitrary orientations with the help of text line grouping. The better performance is obtained when adjacent character grouping (CA) is combination with color-based partition. An efficient algorithm is also detected automatically, where it is localize and extract complex backgrounds with horizontal aligned text which is used for in the localization of text.

III. PROPOSED SYSTEM

The Raspberry Pi processing capacity is 6 times of the previous models. This second generation Raspberry Pi provides BCM2836 processor, which is a powerful ARM Cortex-A7 which runs at 900MHz. The board has an increased memory capacity of 1Gbyte.

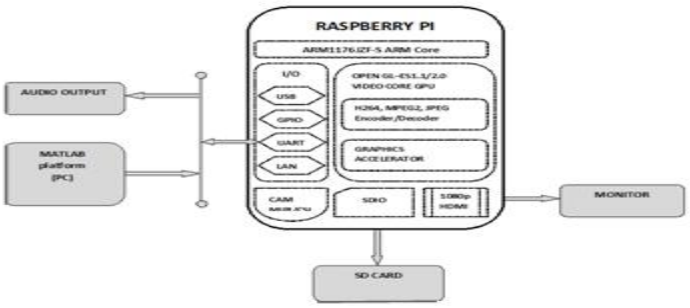


Fig.1.Layout of proposed system configuration

IV. HARDWARE DESCRIPTION

4.1 *Power Supply*

The Micro USB connection is used as a power. The advantage in using Raspberry Pi is to produce at least 700mA at 5 volts and power supply's ratings is maintained carefully. The main adaptor is suitably used in Raspberry Pi. The components that used in power the Raspberry Pi are,

1. Needed USB power supply
2. USB port with wall warts
3. Backup Battery

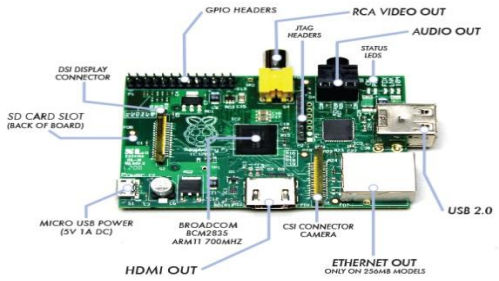


Fig.2.Raspberry Pi kit

4.2 USB Hub

The USB hub is used for additional service connection and it is used for multiple accesses. The power hub is used for additional power supply to the device without effecting Raspberry Pi. USB version 2.0 is used for power availability. USB version 1.1 is used for keyboards and mice, but not for other accessories.

4.3 Display

The display consists of two components, HDMI (high definition) and Composite (low definition). A full-size 'male' HDMI cable is used to connect the HD TVs and LCD Monitors, and inexpensive adaptor is used for DVI. The supported HDMI versions are 1.3 and 1.4, and a version 1.4 based cables are always recommended. HDMI is used to send the output to Raspberry pi as audio and video output. Older TVs can be connected using Composite (a yellow-to-yellow cable) is used for connection in older TVs version. PAL and NTSC TVs are also supported now. The composite video, audio outputs are sent to the headphone or to an amplifier.

V. SOFTWARE DESCRIPTION

5.1 ***Espeak Software***

The eSpeak software is widely used in TTS. This software is an open source and it is under the license agreement, which is used to improve speech language. The eSpeak software is a General User Interface (GUI) program which is used to provide phonetic records in case of random text. Preparation and compilation of phoneme data is done via eSpeak software. The generation speed is high in using this software, but the obtained speech output is not natural when compared to the original human voice. In addition eSpeak software has basic tools that are used for adjusting the input text and supports DDE servers.

5.2 Features of Espeak Software

1. SSML (Speech Synthesis Markup Language) is supported in eSpeak software.
2. It is Compact size of about 1.4 Mbytes.
3. It is used as a front-end to MBROLA diphone voices.

5.3 The MATLAB System

The MATLAB system consists of five main functions:

1. Provided the Development Environment
2. Provided the MATLAB Language
3. To Handle Graphics
4. Used in Application Program Interface Modeling, simulation and prototyping
5. Data analysis, exploration and visualization
6. Scientific and Engineering graphics

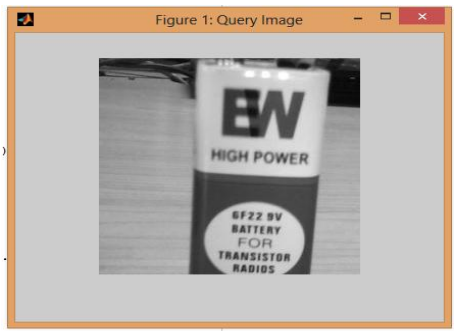


Fig.3.Gray scale output

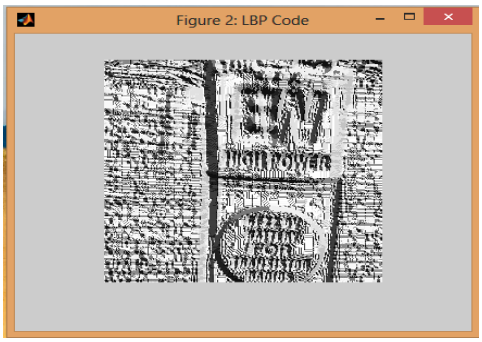


Fig.4.LBP code output

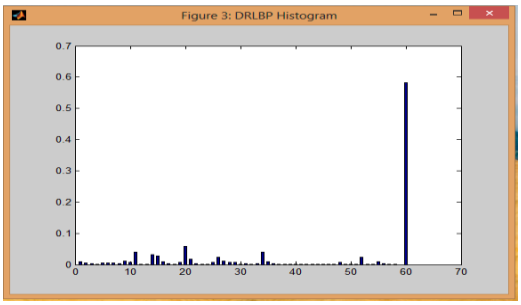


Fig.5.Histogram output

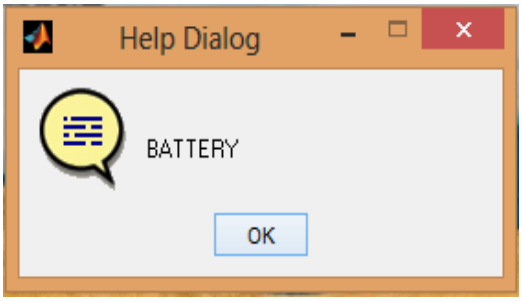
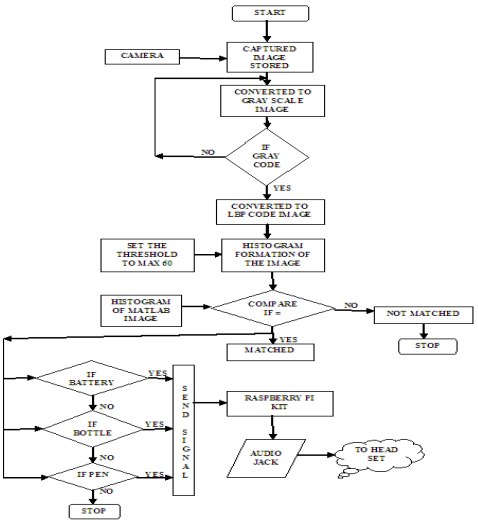


Fig.6.Matched output

5.4 Python Language

1. It is open source- scalable
2. Easy to learn
3. Cross platform compatibility
4. Object oriented
5. High level programming language
6. It is an interpreter
7. Dynamic semantics
8. Maintainability
9. Standard library
10. Interactive mode
11. Database
12. GUI programming

VI. FLOWCHART



VII. RESULT

Thus object was converted into gray scale image followed by LBP code image. Then the LBP code image is compared with the original image, if 16 features are matched, then histogram graph was plotted with threshold value of intensity. Thus we get the matched output.

VIII. CONCLUSION AND FUTUREWORK

In our project, we have recognized the hand-held objects for assisting blind persons. In order to solve the common problem faced by the blind persons. From the graph, we observed that 16 features are matched and object was recognized. Our future work will extend to find the direction and color of traffic signals and to find the routes.

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