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Currency Note Recognizer for Visually Impaired People

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Abstract - Identification of colorful appellations of currency isn't an easy task for visually disabled people. In India though there are special symbols embossed on different appellations, still the task is tedious for blind people. The lack of identification bias motivated the need of a handheld device for isolation of different appellations. In this design, through the camera capture the real time video for image and save it and after it will crop and using image processing the image of that particular currency number will display.

Key Words: Raspberry Pi, Pi Camera, Python

1. INTRODUCTION

People have to detect and recognize different types of currency denomination and that isn't an easy job. They have to flash back the symbol and other security features for each currency note. This may create some problems(e.g. wrong recognition), so they need an effective and exact system to help them in this task.

In banks, there are Currency Sorting Machine which helps honor different currency notes. fashion used in similar machine are visual, mechanical and electronic integration, integrated with computation, pattern recognition, currency anti-fake technology, and lots of multidisciplinary ways It's accurate and largely effective.

But problem with this machines are that they are not mobile and it's delicate for people to use it in diurnal routine. Indeed for that, no one can ever be 100 per cent confident about the homemade recognition. Our system is based on image processing, ways which include filtering, transforms, segmentation, etc.

As per the WHO, An expected 253 million individualities live with vision debilitation 36 million are visually impaired and 217 million have direct to extreme vision weakness and 81 of individualities who are visually impaired or have direct or serious vision interference are progressed 50 times or further. Among this number, highest chance of 15 million people from India.

It's veritably delicate to do daily routines singly for visually bloodied and To identify Indian bills, particularly while accepting their plutocrat back when shopping for their day-to-day requirements is a exacting task. On 8th November 2016, the Government of India reported the demonetization of all ₹ 500 and ₹ 1,000 and announced that application of all ₹ 500 and ₹ 1000 bills of the Mahatma Gandhi Series would be invalid once night, and declared the allocation of new ₹ 500 and ₹ 2000 bills of the Mahatma Gandhi New Series in return for the old bills. It's exacting task for a eyeless person to identify the new bills, modify the old bank notes with new Indian currency and to do other money deals singly.

To address these type problems so numerous exploration papers are published from a decade of times for feting different countries' currencies. As of now there is no optimized system for new Indian bank note recognition in India. To identify or fete a bank note, it should be reprocessed through a machine which can determine the bank notes. similar systems use different image processing ways to complete this process. All in all there are two patterns in Money acknowledgment interrogate about field, Scanner- grounded and Camera-based frames. Scanner- grounded systems These frames accept catching the entire paper(like scanner).

2. LITERATURE SURVEY

Saumya Gupta et al. [1] developed "Currency Recognition System Using Image Processing". In this paper, they propose a system for automated currency recognition using image processing techniques. The proposed method can be used for recognizing both the country or origin as well as the denomination or value of a given banknote. Only paper currencies have been considered. This method works by first identifying the country of origin using certain predefined areas of interest, and then extracting the denomination value using characteristics such as size, color, or text on the note, depending on how much the notes within the same country differ. They have considered 20 of the most traded currencies, as well as their denominations. Our system is able to accurately and quickly identify test notes.

Sandeep S et al. [2] developed "Currency detection for the Blind". The objective behind this application is that it can help visually impaired to recognize money, the application is designed such that people can speak and give command to open camera and camera will click the a picture of the note and a voice message through a speech medium on the amount of that

particular note is sent to the user. We are representing an app in which any form of currency is recognized by the app and the result is sent through certain audio devices.

Muhammad Sarfraz et al. [3] developed "An intelligent paper currency recognition system". This paper proposes an automatic paper currency recognition system for paper currency. A method of recognizing paper currencies has been introduced. This is based on interesting features and correlation between images. It uses Radial Basis Function Network for classification. The method uses the case of Saudi Arabian paper currency as a model. The method is quite reasonable in terms of accuracy. The system deals with 110 images, 10 of which are tilted with an angle less than 15o. The rest of the currency images consist of mixed including noisy and normal images 50 each. It uses fourth series (1984–2007) of currency issued by Saudi Arabian Monetary Agency (SAMA) as a model currency under consideration.

Shweta Yadav et al. [4] suggested "CURRENCY DETECTION FOR VISUALLY IMPAIRED". Despite the quick expanding utilization of Master cards and other electronic types of payment, money is still broadly utilized for ordinary exchanges because of its convenience. However, visually impaired people may suffer from knowing each currency paper apart. Currency Recognition Systems (CRS) can be used to help blind and visually impaired people who suffer from monetary transactions. In this paper, a Currency Recognition System based on Oriented FAST and rotatedYoloV3 algorithm is proposed.

Aiswarya V al. [5] suggested "FAKE CURRENCY DETECTION SYSTEM FOR VISUALLY IMPAIRED". Technology has been evolving exponentially with time but along comes its adverse effect. One of them being the currency notes. There are lot of counterfeit or fake currencies doing rounds in the society. The major who fall prey to this are the visually impaired. In the proposed system we aim to provide a helping hand to the visually impaired to detect the fake Indian currency and prevent them from being deceived. This paper proposes a system that uses image processing techniques and KNN algorithm. The output is provided in the form of audio which specifies the amount if its a real currency .

3. THEORETICAL BACKGROUND

1. Raspberry Pi 4 model b

Raspberry Pi 4 Model B is the latest product in the popular Raspberry Pi range of computers. It offers ground-breaking increases in processor speed, multimedia performance, memory, and connectivity compared to the prior-generation Raspberry Pi 3 Model B+, while retaining backwards compatibility and similar power consumption. For the end user, Raspberry Pi 4 Model B provides desktop performance comparable to entry-level x86 PC systems. This product's key features include a high-performance 64-bit quad-core processor, dual-display support at resolutions up to 4K via a pair of micro-HDMI ports, hardware video decode at up to 4Kp60, up to 4GB of RAM, dual-band 2.4/5.0 GHz wireless LAN, Bluetooth 5.0, Gigabit Ethernet, USB 3.0, and PoE capability (via a separate PoE HAT add-on). The dual-band wireless LAN and Bluetooth have modular compliance certification, allowing the board to be designed into end products with significantly reduced compliance testing, improving both cost and time to market.

Fig -1: Raspberry pi 4 Model B Board

2. Pi camera

The pi Camera module is a camera that can be used to take pictures and high definition video. Raspberry Pi Board has CSI (Camera Serial Interface) interface to which we can attach the PiCamera module directly. This Pi Camera module can attach to the Raspberry Pi's CSI port using a 15-pin ribbon cable.

Features of Pi Camera

Here, we have used Pi camera v1.3. Its features are listed below,

- Resolution – 5 MP
- HD Video recording – 1080p @30fps, 720p @60fps, 960p @45fps and so on.
- It Can capture wide, still (motionless) images of a resolution 2592x1944 pixels
- CSI Interface enabled.

Fig -2: Pi Camera

4. PROPOSED SYSTEM

The main aim of this paper is currency recognize for blind people using raspberry pi 4B. For this purpose, python language is used. The raspberry pi is integrated with pi camera module. When the image of currency will capture it will processing the task and display the currency number and save that detected currency image.

1.System Architecture

The system architecture comprises of Raspberry Pi 4 B Board, power supply cable ,SD card, Pi camera acts as an input. The figure 3 describe the architecture diagram of currency recognize system which contains the raspberry pi a low-cost single Board computer used for connecting the raspberry pi camera. For capturing image , we connected a Pi camera .with the help of Opencv2 we can capture the video of an currency after the capturing video it will crop the mentioned image part. Converting the BGR to HSV image and after apply bitwise mask and then edge will detected and output will display on screen.

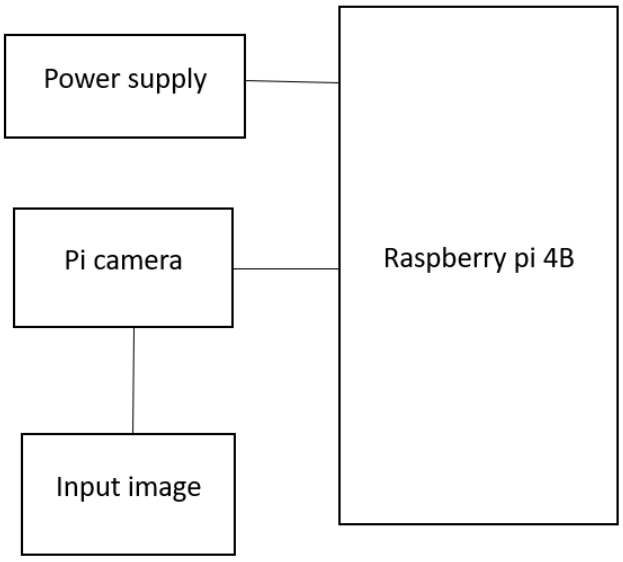

Fig -3: Block Diagram

5. IMPLEMENTATION

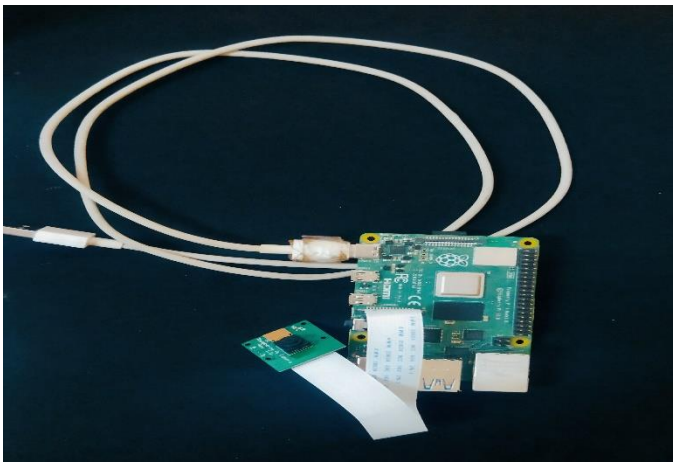

Fig -4: Prototype model

The prototype model of currency recognize system consists of a Raspberry pi board, pi camera and USB cable. A raspberry pi is charged by using a micro USB charger.

Following flowchart explain the working of an currency recognition system. First of all we capture video through pi camera and for this we required Opencv2 library. Then this input image was saved. The original image will sort and we need the particular part from the input image so we cropped that part.

Then convert that image from BGR to HSV image and then apply the mask for that HSV image and then detect the image of image and then display the output.

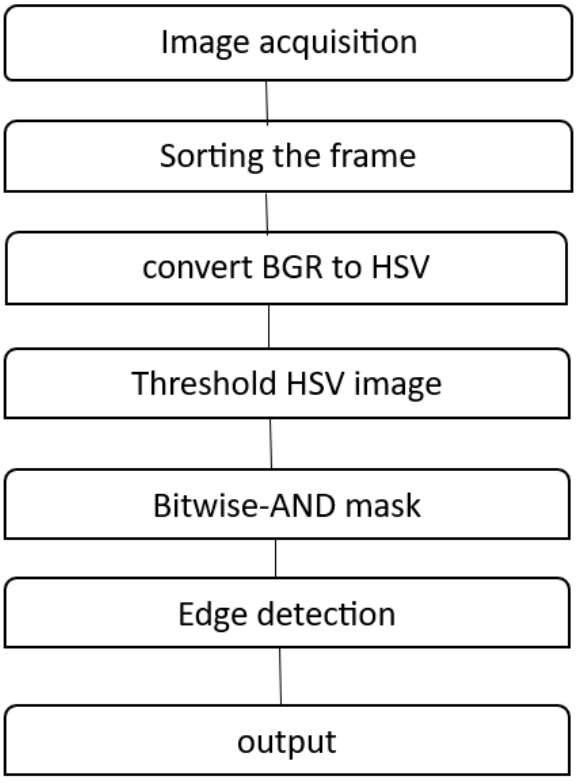

Fig -5: Algorithm

6. RESULT AND DISCUSSION

This section represents the performance of the project model with the use of hardware raspberry pi to obtain results we are using python as the programming language with the use of this software we get the result of our project.

Fig -6: Original image

Fig -7: crop image

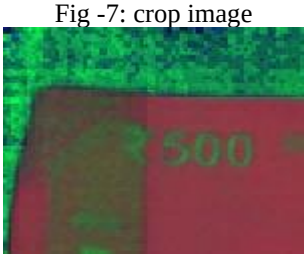

Fig -8: HSV image

Fig -9: Output image

7. CONCLUSION

The motivating insight on this research is that recognizing the notes manually becomes time-consuming and untidy process hence there is need of automation techniques with which currency recognition process can be efficiently done. Using image processing techniques this process becomes more software oriented rather than depending on machines thus aiding a person to recognize and detect fake (counterfeit) notes at some extent. However, blind
people particularly suffer in monetary transactions. Such a system will help visually impaired people finding it difficult to distinguish different currency denominations and also unable to recognize counterfeit currency. Current Systems implemented using Image processing techniques focuses more on extracting denomination value only.

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