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Assistive clothing Pattern Recognition for Impaired people

Thogaricheti Ashwini[1], Mrs. Anuradha.S.G[2]

Student of 2nd year, M.Tech in SCS, Dept. of CSE, RYMEC, Bellary, Affiliated to VTU University, Belgaum[1]

Assistant Professor for M.Tech, Dept. Of CSE, RYMEC, Bellary, Affiliated to VTU University, Belgaum[2]

Abstract: Human–computer interaction (HCI) researches the design and use of computer technology, focusing particularly on the interfaces between people (users) and computers. HCI is one of the ongoing researches especially for visually impaired people. They introduce the special thematic session "blind and visually impaired people Human computer interaction and access to graphics" represents current research towards solutions for visually impaired and brings together researchers and practitioners. Choosing clothes with complex patterns and colors is a challenging task for visually impaired people. We have matured a camera-based model system that notice clothing patterns in four categories (plaid, striped, pattern less, vertical and irregular etc) and identifies 11 clothing colors. To recognize clothing patterns, we propose a Hough line Transformation for the detection of pattern and canny detection for detection of edges in the clothing pattern. we proposed the CCNY Clothing Pattern dataset and other different pattern datasets to our method. Using various other performances our method is under the study.

Keywords: Human computer interaction, cloth patterns, visually impaired people.

1. INTRODUCTION

Human computer interaction they observe the ways in which humans interact with computers and design technologies that let humans with computers in novel ways. As a field of research, Human Computer Interaction is situated at the intersection of computer science, behavioural sciences, design, media studies, and several other fields of study[1]. Humans interact with computers in many ways; and the interface between humans and the computers they use is crucial to facilitating this interaction. Desktop applications, internet browsers, handheld computers, and computer kiosks make use of the prevalent graphical user interfaces (GUI) of today. Most impaired people don't have access to extra special teaching aids they need to learn. Based on data from the World Health Organization (WHO)[1][2][4], there are more than 37 million people across the globe who are blind, over 15 million are in India .

Our system mainly says about how the human computer interaction can be done with the help of sensor and like other devices helps the visually impaired people. Our system focus on these kind of fields where such as pattern recognition in the form of clothes how a impaired person can come to know about the pattern and color of that clothes. Our system can handle clothes with complex designs and notice clothing patterns into four categories (plaid, striped, pattern less, horizontal, vertical and irregular etc.). Our system is able to identify 11 colors[5][1][6][4]: red, orange, yellow, green, cyan, blue, purple, pink, black, grey, and white. For the large intra class variations. etc.

Although many methods have been developed for texture matching and colour detection in the computer vision and image processing research, currently there is no device that can effectively supply matching choices for blind people. In this paper, we develop a computer vision-based prototype to match a pair of images of clothes for both pattern and colour. The image pair is captured by a camera which is connected to a computer. To configure and control the system, users can simply speak out the commands to switch on/off the system, execute corresponding functions, and adjust the volume of audio outputs. Our algorithm can detect: 1) Colours of the clothes; 2) whether the clothes have pattern or have homogeneous colour3) whether the colours match for a pair of images.

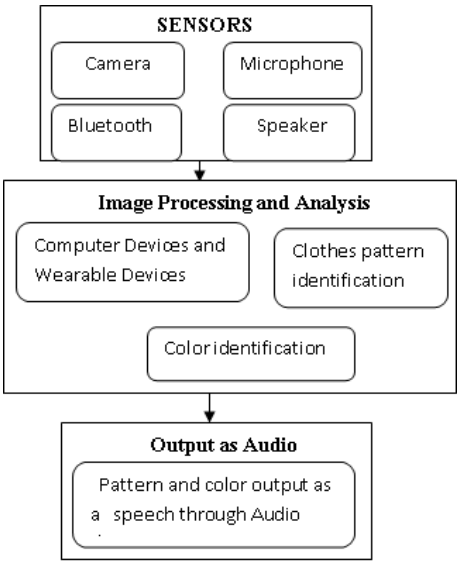

Figure 1 :- overview of major components for our system

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We introduce a camera-based system to help visually impaired people to recognize clothing patterns and colors. The system contains three major components : 1) sensors including a camera for capturing clothing images, a microphone for speech command input and speakers (or Bluetooth, earphone) for audio output; 2) data capture and analysis to perform command control, clothing pattern recognition, and color identification by using a computer which can be a desktop in a user's bedroom or a wearable computer (e.g., a mini-computer or a smartphone); and 3) audio outputs to provide recognition results of clothing patterns and colors.

2. METHODLOGY OF THE SYSTEM

In this document, "clothing design and color recognize" implies that the automatic system is capable of noticingthe clothing patterns and colors. The camera captures the image of clothes which as different patterns and colors. The color of 255x255x255 like red, blue, green ect all the 11 colors are stored in friendly ARM board.

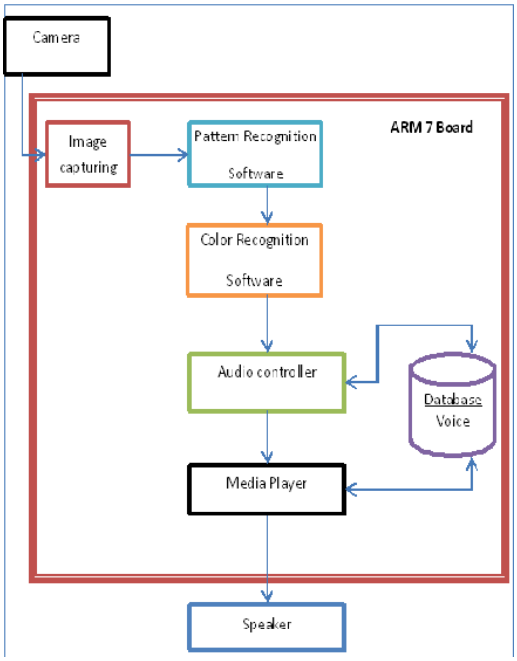

Figure 2 :- System Block Diagram

The Raspberry Pi board or a ARM board will be loaded with voice recognition library, Hence when user says a word the library is programmed to recognize the a word from user's voice. Based on the pronounced word appropriate action is taken. For example when user says "capture", the word will be recognized and software will activate the camera and it will capture the picture. Or when user says word "reboot", the word will be recognized and system will reboot.

The captured image will be processed with image processing technique. The image will be analyzed for various patterns like lines and shapes. The shapes include circle, square, triangle and few other shapes. The software will be programmed to recognize these shapes. Also the various colors will be identified for example the captured picture has red color then red color will be detected and voice will tell that captured image has red color. Same way if captured image has many colors like blue, green and yellow then all three colors will be announced through voice. Some 10 to 12 colors can be detected approximately. Since the color and pattern detection depends on camera resolution and lighting conditions.

3. UNDERSTANDING LEVELS OF VISUALLY IMPARIED PEOPLE

Globally, an estimated 40 to 45 million people are totally blind, 135 million have low vision and 314 million have some kind of visual impairment . The incidence and demographics of blindness vary greatly in different parts of the world. In most industrialized countries, approximately 0.4% of the population is blind while in developing countries it rises to 1%. It is estimated by the World Health Organization (WHO) that 87% of the world's blind live in developing countries.

Of all sensations perceived through our senses, those received through sight have by far the greatest influence on perception. Sight combined with the other senses, mainly hearing, allow us to have a world global perception and to perform actions upon it. For the blind, the lack of sight is a major barrier in daily living: information access, mobility, way finding, interaction with the environment and with other people, among others, are challenging issues.

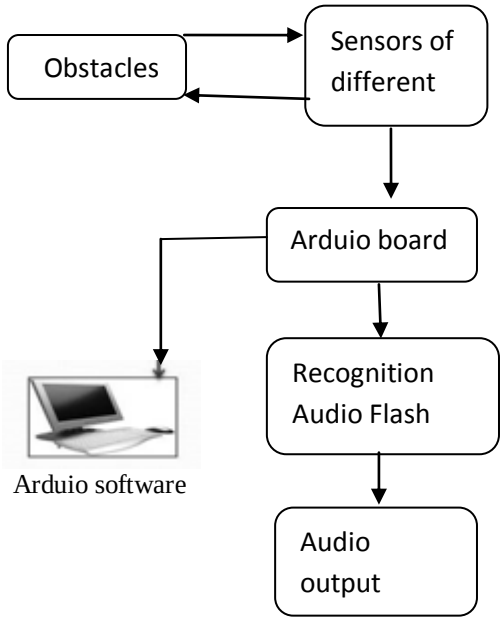

Figure 3: Block diagram for viusally imparied people using obstacles and sensors.

Assistive devices designed to aid visually impaired people need to deal with two different issues: at first they need to capture contextual information (distance of an obstacle, position of the sensors, environment around the user), second they need to communicate to the user with those observed information . A basic building block of

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assistance system to measure the distance of the obstacle from the user is shown in the Fig. 4 . The elements involved are Sensors, Arduino Board, Arduino Software, Flash Memory and Audio output .

For the visually imparied people how the human computer interaction can be identified using some wearable sensors and wearable devices considered like hearing and touching, assistive devices worn on fingers and hands, Assistive devices worn on the wrist and forearm, Assistive devices worn on the tongue, imagination, etc.

4. CLOTHES PATTERN

There are many kinds of clothing patterns. In our project we mainly used clothing patterns like palid, striped, irregular,patternless,vertical etc. Most of the clothing pattern will have there own structure, identification etc.

The below figures indicates different patterns are listed.

Plaid cloth pattern

Striped cloth pattern

Irregular cloth patterns

Pattern less cloth pattern

5. RECOGNITION OF PATTERN AND COLORS

5.1 PATTERN IDENTIFICATION

Cloth Pattern Identification (CPI) is used to retrieve the image based on their features such as color, texture and shape. The primary use of the cloth pattern identification is to retrieve the data from the database by using color and shape features. The main aim of the CPI is to increase the efficiency during image retrieval and image indexing. Therefore, human intervention in the indexing process is reduced. Here, we develop a camera-based system specifically for visually impaired people and also common people to help them recognize clothing patterns and colors. The extracted global and local features are combined to recognize clothing patterns by using a support vector machines (SVMs) classifier. The recognition of clothing color is implemented by quantizing clothing color in the HIS (hue, saturation, and intensity) space. In the end, the recognition results of both clothing patterns and colors mutually provide a more precise and meaningful description of clothes to users.

5.2 CLOTHING COLOR IDENTIFICATION

Clothing color identification is based on the normalized color **histogram** of each clothing image in the HSI color space. The key idea is to quantize color space based on the relationships between hue, saturation, and intensity. In particular, for each clothing image, our color identification method quantizes the pixels in the image to the following 11 colors: red, orange, yellow, green, cyan, blue, purple, pink, black, grey, and white.If a clothing image contains multiple colors, the dominant colors (i.e., pixels larger than5%of the whole image) will be output. The clothing patterns and colors mutually provide complementary information, the recognized patterns provide additional information about how different colors are arranged, e.g., striped clothes with blue and white color.

The recognition of clothing color is implemented by quantizing clothing color in the HIS (hue, saturation, and intensity) space. In the end, the recognition results of both clothing patterns and colors mutually provide a more precise and meaningful description of clothes to users. This research enriches the study of texture analysis, and leads to improvements over existing methods in handling complex clothing patterns with large intra-class variations. The method also provides new functions to improve the life quality for blind and visually impaired people. The algorithm here we are considered is “Hough Line Transformation”.

The Hough Line Transform is a transform used to detect straight lines. To apply the Transform, first an edge detection pre-processing is desirable. The Canny Edge detector was developed by John F. Canny in 1986. Also known to many as the optimal hl detector. Canny algorithm aims to satisfy three main criteria: Low error rate: Meaning a good detection of only existent edges. Good localization: The distance between edge pixels detected and real edge pixels have to be minimized.

6. SYSTEM DESGIN

6.1 Raspberry Pi

In the above block diagram for model *A, B, A+, B+*; model *A* and *A+* have the lowest two blocks and the rightmost block missing (note that these three blocks are in a chip that actually contains a three-port USB hub, with a USB Ethernet adapter connected to one of its ports).

In model *A* and *A+* the USB port is connected directly to the SoC. On model *B+* the chip contains a five-point hub, with four USB ports fed out, instead of the two on model *B*.

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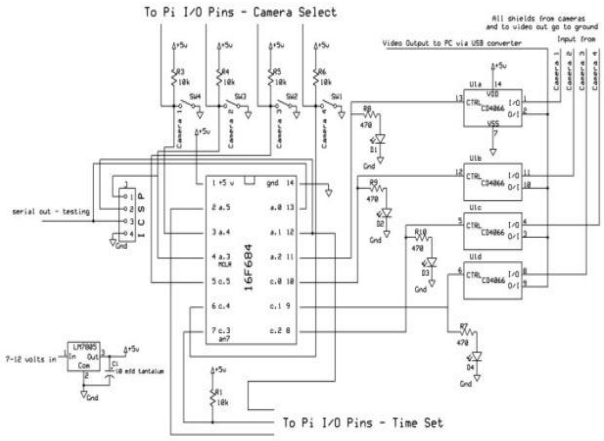

Figure 6.1:- Raspberry pi circuit diagram

The Raspberry Pi is a series of credit card-sized single-board computers developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools. The original Raspberry Pi and Raspberry Pi 2 are manufactured in several board configurations through licensed manufacturing agreements with Newark element14 (Premier Farnell), RS Components and Egoman. These companies sell the Raspberry Pi online. Egoman produces a version for distribution solely in China and Taiwan, which can be distinguished from other Pis by their red coloring and lack of FCC/CE marks. The hardware is the same across all manufacturers.

Figure 6.2:- Raspberry pi or ARM board

The original Raspberry Pi is based on the Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF S700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded (models B and B+) to 512 MB. The system has Secure Digital (SD) (models A and B) or MicroSD (models A+ and B+) sockets for boot media and persistent storage In 2014, the Raspberry Pi Foundation launched the Compute Module, which packages a BCM2835 with 512 MB RAM and aneMMC flash chip into a module for use as a part of embedded systems.

The Foundation provides Debian and Arch Linux ARM distributions for download. Tools are available for Python as the main programming language, with support for BBC BASIC (via the RISC OS image or the Brandy Basic clone for Linux), C, C++, Java, Perl and Ruby. As of 18 February 2015, over five million Raspberry Pis have been sold. While already the fastest selling British personal computer, it has also shipped the second largest number of units behind the Amstrad PCW, the "Personal Computer Word-processor", which sold eight million.

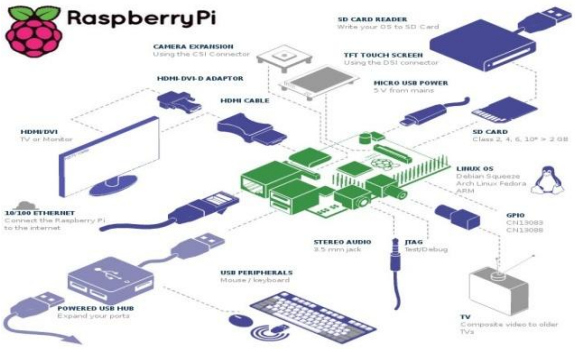

Figure 6.3:- Raspberry pi Architecture

7. CONCLUSION

There exist numerous patterned clothes nowadays. Choosing clothes with different patterns are challenging issues for visually impaired people. In our paper we propose a system that helps impaired people choose clothes easily. The system can identify successfully 11ccolors and 5patterns using canny edge detection and Hough transformation. In the future work our results and evolution of performance can be made by different methods. we can apply morphological operations also extend system to identify patterns and colors of different types for blind people.

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