A MOTIONLESS HAND GESTICULATION AND FACE RECOGNITION SYSTEM FOR BLIND PEOPLE

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ABSTRACT Recognizing others is a major challenge for people with visual impairments (VIPs) and can hinder their social engagement. We present Accessibility Bot, a research prototype bot on Facebook Messenger, which leverages state-of-the-art computer vision algorithms and the existing set of tagged photos of a user's friends on Facebook to help people with visually impairments recognize their friends. Accessibility Bot provides users information about the identity of friends in camera and their facial expressions and attributes. To guide our design, we interviewed eight VIPs to understand their challenges and needs in social activities. We then conducted a diary study with six VIPs to study the use of Accessibility Bot in everyday life. While most participants found the Bot helpful, their experience was undermined by perceived low recognition accuracy, difficulty aiming a camera, and lack of knowledge about the phone's status. We discuss these real-world challenges, identify suitable use cases for Accessibility Bot, and distill design implications for future face recognition applications.

Author Keywords Visual impairment; face recognition; social activity

ACM Classification Keywords H.5.1. Information interfaces and presentation: Multimedia Information Systems; K.4.2. Computers and Society: Social Issues.

INTRODUCTION

Recognizing people is a major challenge for people with visual impairments (VIPs) [15,42], preventing them from fully engaging in many social activities and undermining their sense of privacy and physical security [4]. For example, when a VIP enters a meeting room, classroom, or cafeteria, it is difficult for her to know who is present. As a result, VIPs can be reluctant to leave their homes, which may cause more anxiety and depression [17,42]. Face recognition technology presents an opportunity for VIPs to overcome this challenge. State-of-the-art computer vision algorithms can detect [31,39,57] and recognize faces This system acts as an Intelligent virtual assistant which helps in bringing the world closer and helps in meeting different ends together. Through this system use of facial recognition and hand

gesture to assist and work with the environment to make it a better place to live for the blind. There are different ways in which it is helping to make this happen and for that hand gesture and facial recognition, system is being used. This system is using computer vision technology this tech has been used for human computer interaction (HCI) using a physical medium where hand gesture and facial recognition plays a major role. Hand gestures have been done since the dawn of civilization and have various meaning depending on the geographical location [1]. Hand gesture have various application in military gaming etc. Methods without using computer vision has also been developed like the wearable gloves but they are too costly as they need sensors and other hardware devices there are numerous algorithm for hand gesture recognition like KNN (K Nearest Neighbor), artificial neural network but most of the algorithm require large amount of samples for training and recognition to overcome this problem convex hull and convexity hull defects are used for gesture recognition. The recognition of hand gestures are of two types, that is, Dynamic gesture and static gesture, so in this research we have covered the section of static gesture recognition. In facial recognition system, two methods are used Haar cascade method and Linear Binary Pattern (LBP) for better prediction we use LBP method. In 2004, a Haar cascade classifier technique was proposed by Voila Jones which has been a motivation to various face recognition systems.[2] LBP is used as a visual description in which classification using computer vision is made using open cv each image is converted into a series of code. a pixel is taken and then the image is given a particular value. This value is predefined based on a series of codes. A LBP histogram mainly works on four parameters: radius, neighbor, Grid X, Grid Y. A radius has an initial value 1, which builds a central pixel, which is used to build circular local binary pattern. Neighbors on the other hand are used to create a sample points to increase the accuracy of facial detection but it comes with drawback of increasing computational cost. Grid x and Grid y are horizontal and vertical features to recognize an image
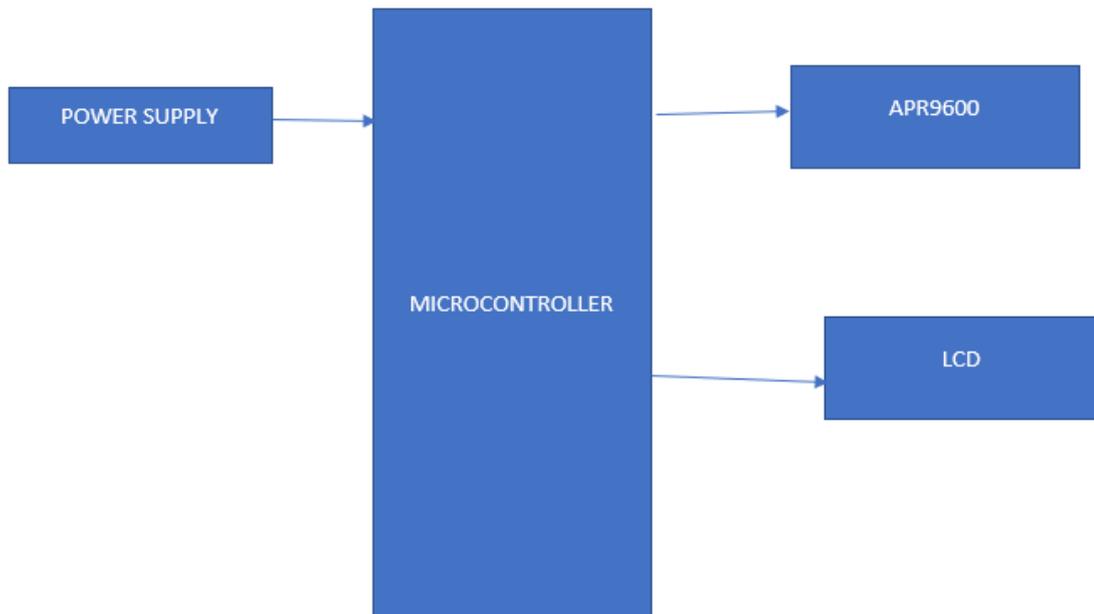
EXISTING SYSTEM

The existing recognition system has only having the hand gesture recognisation. That system doesn't having the image recognisation.

DISADVANTAGES

- Sometimes may get less image quality.

- Storage issue.

BLOCK DIAGRAM

    The input is taken from front facing Camera. The proposed Recognition System is divided into two parts –

• Hand Gesture Recognition

• Facial Recognition

HAND REGION DETECTION

In order to split hand from the real time images RGB colour

$$Y = 0.257R + 0.564G + 0.098B + 16$$
$$Cb = -0.148R - 0.291G + 0.439B + 128$$
$$(1)$$
$$Cr = 0.5R - 0.419G - 0.081B + 128$$

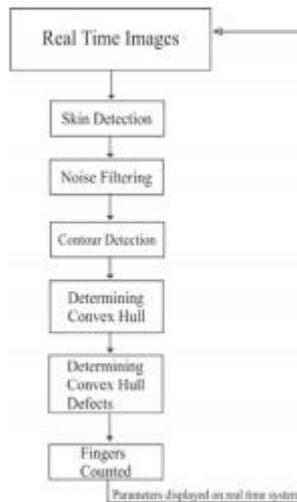space is converted to YCbCr colour space. [4]

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Figure 1: Proposed System Architecture for Hand Gesture Recognition

FACE DETECTION It is an object detection method used to discover faces or cars or any object. This system is provided with positive and negative images and selection of features along with the classifier training and integral images [7]. Each feature is the difference sum of the pixels within two rectangular regions. These rectangular regions are nothing but the darker and the lighter regions. These sectors have same size and shape horizontally or vertically. To find the sum of pixels, under black and white regions, the concept of integral images is introduced. No matter how large may be the number of pixels; it operates over only a AdaBoost does the selection of most appropriate features out of a large set of features. Weak classifiers are combined to form the final classifier. They are weak because alone they cannot identify the object. Each stage of cascade must not have a low false negative rate as when face is classified as non-object then the classification stops. Each stage must have a high false positive rate which means the erroneous detection of an object as face, thus this error can be corrected in (n+1)th stage and succeeding stages in classifier
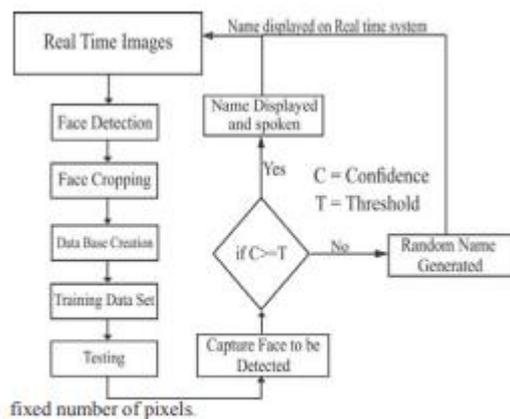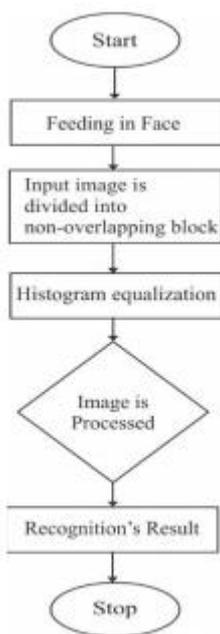
Figure 4: Proposed System Architecture for Face Recognition

FLOW CHART:

The system introduced in this paper can be helpful for a blind person and can act as a virtual assistant for it. Haar cascade Classifiers and LBPH recognizers has been used for face detection and identification in the real time whereas Convex hull and Convex defects algorithm has been used to detect the Hand gestures in real time. Skin color recognition has been in YCbCr color space and different threshold ranges have been used to detect skin color in different lighting conditions and skin color. Hand gestures are recognized with an accuracy of 95.2% and face recognition and identification has been done with an accuracy of 92%. There are some limitations, which are needed to be addressed. Recognizing more amount of

gestures would be helpful for performing more tasks. Alternate methods like MLBPH [12] or LBPH + CNN [13] can be used to improve the gesture recognition and face recognition must be considered.

ADVANTAGES

- No need of man power

- No man errors.

- Save time

APPLICATIONS Application is limited only by our imagination. Not only blind people can use it but also a number of industries can use this technology. Hand gestures can be applied in the field of telemedicine or surgery and even in locking systems. Industrial robots can also take an advantage of hand gestures. While Facial recognition have its own applications like it is used in security, criminal identification, Advertising and Healthcare. Due to use of LBPH Recognizers, facial recognition can also be done in low light.

CONCLUSION AND FUTURESCOPE The system introduced in this paper can be helpful for a blind person and can act as a virtual assistant for it. Haar cascade Classifiers and LBPH recognizers has been used for face detection and identification in the real time whereas Convex hull and Convex defects algorithm has been used to detect the Hand gestures in real time. Skin color recognition has been in YCbCr color space and different threshold ranges have been used to detect skin color in different lighting conditions and skin color. Hand gestures are recognized with an accuracy of 95.2% and face recognition and identification has been done with an accuracy of 92%. There are some limitations, which are needed to be addressed. Recognizing more amount of gestures would be helpful for performing more tasks. Alternate methods like MLBPH [12] or LBPH + CNN [13] can be used to improve the gesture recognition and face recognition must be considered.

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