Indian Journal of Science and Technology, Vol 8(31), DOI: 10.17485/ijst/2015/v8i31/87275, November 2015
ISSN (Print) : 0974-6846
ISSN (Online) : 0974-5645

Person Identification for Visually Impaired using LabVIEW

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Abstract

Visually impaired find difficult to identify colors and person, the main objective of this project is to make them overcome these. An external camera is fitted with goggles for acquiring images. The acquired image is processed to obtain the required features such as colors in the case of audio colors or facial features in the case of personal identification. The obtained feature is encoded using MATLAB, then fed into LabVIEW through which speakers are connected to get the respective audio signals. The color presented to the camera is converted to corresponding sound. This will also be useful for the visually impaired to identify their friends and foes using face identification software which is implemented in here. This project is meant to describe light, by its frequency and intensity, in terms of an audible signal. However, the domain of the system here is limited only to primary and secondary colors. The complete software solution is implemented using LabVIEW and MATLAB.

Keywords: Audio Colors, LabVIEW, Person Recognition, MATLAB

1. Introduction

The images are acquired from an external camera connected to the computer through a USB port. This is done using image acquisition toolbox in matlab. These acquired images are processed to obtain maximally occurred gray levels in case of audio color and matching extracted features in case of person identification.

1.1 Audio Colors

The audio colors are implemented using LabVIEW and MATLAB. The color to be identified is presented in front of the webcam. The pictured is brought into the matlab script through an image acquisition toolbox. Then the respective color is identified from the maximally occurring gray level derived from the histogram. The flow diagram of the audio colors is given in Figure 1.

1.2 Person Identification

The face to be identified is presented to the web camera[1–2]. The same camera is used to take the face image that are stored, and retrieved for feature matching. The acquired image is equalized first using histogram equalization, and then the edge is detected for the equalized image, with this edge detected image the corner features are extracted and then the extracted features are matched with the extracted features of the stored image[3].

2. Identifiction of Audio Colors

2.1 Image Acquisition Toolbox

The image acquisition toolbox is a compilation of functions that broadens the potential of the MATLAB numeric computing environment[7]. This toolbox supports an extensive range of image acquisition operations, including

- Acquiring images from professional grade frame grabbers to USB-based web cameras.
- Previewing of video feed.
- Triggering the acquisitions.
- Importing the image data into the MATLAB workspace.

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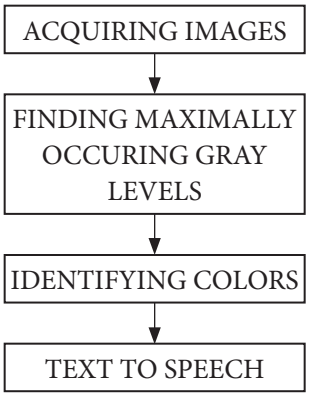

Figure 1. Flow diagram of audio colors.

2.2 RGB Image

The acquired image is an RGB image. It is a format for color images which represents an image with three matrices of equal sizes and image format. 1st matrix corresponds to red, and the 2nd corresponds to green and the 3rd corresponds to blue[4].

2.3 Splitting the Image Matrix

The image matrix contains three sheets of matrices as stated above. Each sheet represents a color red or green or blue. Size of the RGB image contains 3 variables out of which the 3rd variable denotes the sheet of the matrix[5].

2.4 Identification of Maximally Occurring Gray Levels

The histogram is plotted for each of the sheets of the matrices. A sudden rise in the plot signifies that the respective gray levels and thus the maximally occurring gray level is found out[6].

2.5 Identifying Colors

The each of the maximally occurring gray levels signifies the respective colors. The particular set of gray levels denotes a specific color, and thus this is used to identify the color[8]. The output is a text.

2.6 Text to Speech

The text output from the math script is presented to the text to speech converter. The text to speech converter, is an activex element that are to be initiated using an open automation command. Thus the given color is converted to sound.

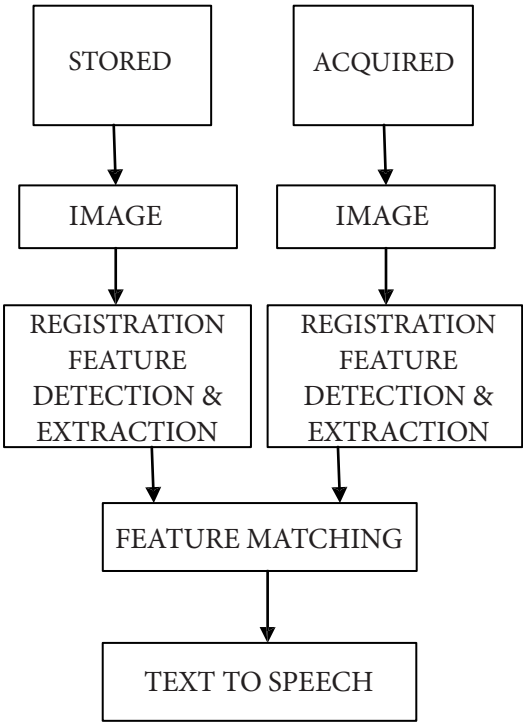

Figure 2. Flow diagram of person identification.

3. Person Identification

The flow diagram of the person identification are shown in Figure 2.

- Acquiring images from professional grade frame grabbers to USB-based web cameras.
- Previewing of video feed.
- Triggering the acquisitions.
- Importing the image data into the MATLAB workspace.

3.1 Conversion to Gray Scale

All image processing operations are carried on the gray scale image. So the RGB image obtained from the webcam is converted into gray scale by using the function rgb2gray (). The matrix can be of class unit8, unit16, int16, single or double[9]. For a matrix of class single or double, using the default gray scale color map, the intensity 0 denotes black and the intensity 1 denotes white.

3.2 Histogram Equalization

This toolbox provides a several ways to improve the contrast in an image.

One way is to call the histeq function to

3.3 Image Acquisition Toolbox

The image acquisition toolbox is a compilation of functions that broadens the potential of the MATLAB numeric computing environment. This toolbox supports an extensive range of image acquisition operations, including spread the intensity values over the full range of the image, a process called histogram equalization[15].

3.4 Intensity Adjustments

The intensity of an image can be adjusted by using imadjust function, where the range of intensity values is specified in the output image[14].

3.5 Image Registration

It helps overcome image rotation, scale, and skew that are common when overlaying images[13]. It involves integrating the images to create a composite view, improving the signal-to-noise ratio, and extracting information that would be impossible to obtain from a single image.

3.6 Feature Detection and Extraction

The registered image is then edge detected using canny operator[12]. Feature is detected from the edge detected image and then it is extracted from both the acquired image and stored image.

3.7 Feature Matching

The extracted features from both the template and the image are compared to detect the matched features, and a variable is assigned to indicate the number of matched features and this variable is used to identify the correct person[10,11].

4. Results and Discussion

Blind person find difficulties in identifying colors and persons. Hence to make it easy, a system is created such that they could hear what they are seeing. Sound is given as an output to them.

The inconveniences of the system designed are,

- There will be a false identification if lighting differs.
- The program will show an error message if the distance does not match with the existing image.
- New faces cannot be stored automatically.

5. Conclusion

Blind person find difficulty in identifying colors or a person close to them.

They have to seek others help for doing so. So an aid that provides help to the visually impaired is developed. In future, the software developed can be implemented in a smart phone and the camera can be fitted to goggles so that it could become handy. If database is explored for facial images, the process of including new images will be easy. We think our paper will fulfill the needy when implemented.

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