

FACE RECOGNITION BASED ON EDGE DETECTION ALGORITHM USING MATLAB

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ABSTRACT

The automatic recognition of human faces presents a significant challenge to the pattern recognition research community; human faces are very similar in structure with minor differences from person to person. They are actually within one class of "human face". Furthermore, lighting condition changes, facial expressions, and pose variations further complicate the face recognition task as one of the difficult problems in pattern analysis. This paper proposed a novel concept, "faces can be recognized using line edge detection". A face pre filtering technique is proposed to speed up the searching process. It is a very encouraging finding that the proposed face recognition technique has performed superior to the most of the existing comparison experiments.

Keywords: Face Recognition, Edge Detection, Image Processing, MATLAB.

I INTRODUCTION

Computerized human face recognition has been an active research area for the last 20 years. It has many practical applications, such as bankcard identification, access control, mug shots searching, security monitoring, and surveillance systems. Face recognition is used to identify one or more persons from still images or a video image sequence of a scene by comparing input images with faces stored in a database. It is a biometric system that employs automated methods to verify or recognizes the identity of person based on his/her physiological characteristic. In general, a biometric identification system makes use of either physiological characteristics or behavior patterns to identify a person. Because of human inherent protectiveness of his/her eyes, some people are reluctant to use eye identification systems. Face recognition has the benefit of being a passive, nonintrusive system to verify personal identity in a "natural" and friendly way.

The software section is completely based on MATLAB. In our interface we have used MATLAB for face recognition. We have used it in such a way that it matches the face from the predefined database and generates an event. This event is used to control the device by giving the controller input to control the output and thus control controls the door.

II EDGE AND EDGE DETECTION ALGORITHM

An edge in an image is a contour across which the brightness of the image changes abruptly. In image processing, an edge is often interpreted as one class of singularities. In a function, singularities can be characterized easily as discontinuities where the gradient approaches infinity. However, image data is discrete, so edges in an image often are defined as the local maxima of the gradient. Edge detection is an important task in image processing. It is a main tool in pattern recognition, image segmentation, and scene analysis. An edge detector is basically a high pass filter that can be applied to extract the edge points in an image.

2.1 Functional Block Diagram:

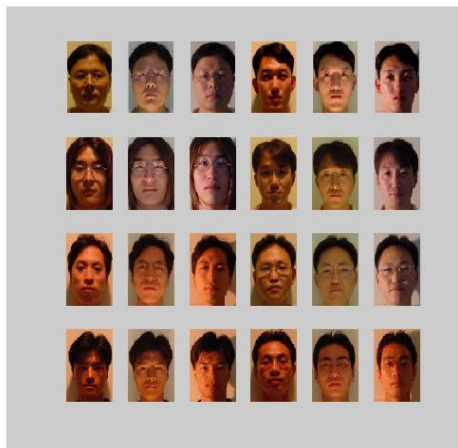
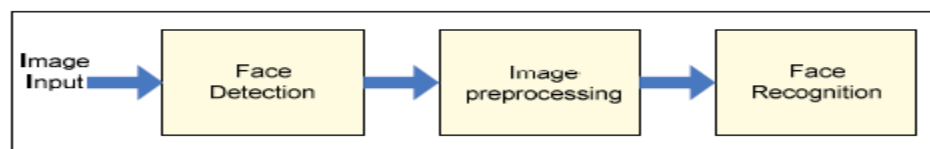


Figure 1: Various view of face images with different illumination conditions in Asian face database

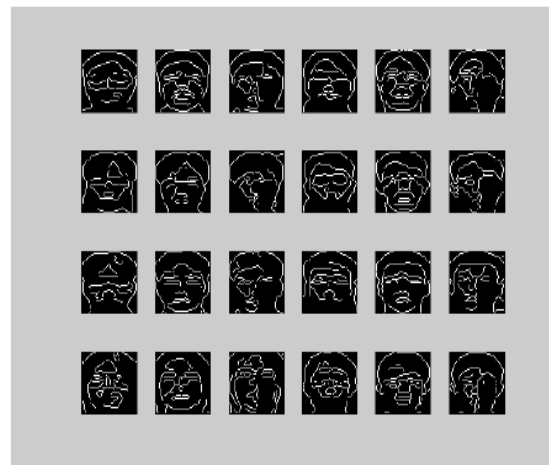


Figure 2: Edge information of few face images

2.2 Algorithm

- STEP 1. Get the edge map image (edge (I,j)) from RGB image using sobel operator.
- STEP 2. For each pixel (I,j), get the corresponding H and S values.
- STEP 3. if (colorhistogram(H,S)>skinthreshold)
and(edge(I,j)<edgethreshold)
then skin(I,j)=1 i.e. (I,j) is a skin pixel ,
else skin(I,j)=0 i.e. (I,j) is a non-skin pixel.

- STEP 4. Find the different regions in the image by implementing connectivity analysis using 8-connected neighborhood.
- STEP 5. Find height ,width and centroid for each region and percentage of skin in each region
- STEP 6. For each region, if (height/width) or (width/height) is within the range (goldenratio \pm tolerance) and (percentage of skin>percentage of threshold) then the region is a face, else it is not face .

III PROBLEMS & CHALLENGES

3.1 Problems Faced

- Determine the identity of a face in an image
- The image can be a frame from a video
- Processing needs to be fast
- Classification problem
- Need faces images for training

3.2 Challenges

- Variations between images of the same person
- face can be greater than those formed in camera
- different faces
 - Illumination
 - Pose (angle)
 - Accessories
 - Expression

IV APPLICATIONS

- Recognize criminals
 - In public spaces (airports, shopping centers)
 - In stores
- Verify identity to grant access in restricted
- Areas: non-invasive Biometrics
 - Airports
 - Office
 - Risk: privacy rights

V CONCLUSION

Although a feature based strategy may offer higher recognition speed and smaller memory requirements, but edge based techniques offer superior recognition accuracy. We have described a system that automatically detects and recognizes a human face in an image captured with a cluttered background under non-uniform illumination. The system has been tested under three different lighting conditions using 45 images from 15 persons. Our face detection scheme has achieved a fairly robust performance under non-uniform lighting conditions, whereas our face recognition method has achieved a significant improvement over the conventional PCA-based approach. Gradient

orientation is one way of representing some of the local variations of the image intensity. Thus, it would be possible to improve many of the existing image processing methods by using gradient orientation based techniques. Finally, in this paper, we have tackled a non-uniform illumination problem in face detection and recognition

REFERENCES

- [1] The MathWorks Inc. MATLAB 7.0 (R14SP2). The MathWorks Inc., 2005.
- [2] S. J. Chapman. MATLAB Programming for Engineers. Thomson, 2004.
- [3] http://en.wikipedia.org/wiki/Facial_recognition_system.
- [4] Architecture and Programing of 8051 Microcontroller by Milan Verle, Microelectronika Publication.
- [5] <http://mhttp://search.edaboard.com/edge-detection-using-matlab.htmlatlabproj.blogspot.in/2012/06/edge-detection-matlab-code.html>.
- [6] <http://engineeringprojects101.blogspot.in/2012/07/face-detection-using-matlab.html>.
- [7] <http://www.mathworks.in/mhttp://www.projects0farm.com/face-recognition-using-matlab/atlabcentral/fileexchange/4408-face-recognition-system>