Enhancement of Face and Non-Face Recognition in Biometrics Technology

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***Abstract*—Face recognition system is a group of programs for automatically recognize a person from a digital graphics or a video frame. Way to do this is by comparing selected characteristics from graphics and face database. Some facial recognition applications identify facial features by extracting landmarks, or features from graphics of subject's face. In this research we have studied & evaluate different edge detection techniques. We have seen that canny edge detector gives better result as compared to others with some positive points. It is less sensitive to noise, adaptive within nature, resolved problem of streaking, provides good localization & detects sharper edges as compared to others.**

***IndexTerms*— Face Recognition, Biometrics, Canny Edge Detection, Robert, Previtt, Sobel.**

I. INTRODUCTION

A face recognition system is a group of programs for automatically recognize a person from a digital graphics or a video frame. Way to do this is by comparing selected characteristics from graphics and face database. It is generally used within security systems & could be compared to other identifications such as fingerprint or eye iris recognition systems.

Some facial recognition applications identify facial features by extracting landmarks, or features from graphics of subject's face. For example, an algorithm could analyze relative position, size and shape of eyes, nose, cheekbones and jaw. These features are then used to search for other images with matching characteristics. Other applications normalize a group of face images and then compress face properties, only saving data within graphics that is useful for face recognition. A probe graphics is then compared with face data. One of earliest successful systems is based on template matching techniques applied to a set of salient facial characteristics, providing a compressed face representation. Recognition algorithms could be divided into two main approaches like geometric, which overviews at important characteristics or photometric, which is a statistical approach that distills graphics into properties and compares these properties with templates to eliminate variances. Popular recognition algorithms include Principal Component Analysis using Eigen faces, Elastic Bunch Graph Matching using Fisher Face Algorithm (FFA), Linear Discriminate Analysis, The Hidden Markov model, and neuronal motivated dynamic link matching.Now rising development claimed to achieve more correctness is three-dimensional face recognition. This technique use 3D sensors to capture information about shape and size of a face.

This information is then used to identify distinctive characteristics on surface of a face, such as outline of eye, nose, forehead and chin. One advantage of 3D facial recognition is to identify a face from a range of viewing angles, including a profile view that it is not vary by changes within lighting like other methods. 3-D data points from a face highly improve precision of facial recognition. 3D research is improved by development of sophisticated sensors that do a better work of capturing 3D face image. Up to a hundred or more of these graphics sensors could be placed on same IC chip-each sensor observing a different part of spectrum. Sensors work by projecting structured light onto face. Even a perfect 3D matching technique is highly sensitive to expressions. For this work a group at technique applied tools from metric geometry to treat expressions as Isomerizes a company called Vision Access created a firm solution for 3D facial recognition. Company was later acquired by biometric access company Bios crypt Inc. which developed a version known as 3D Fast Pass. The human face plays an important role within our social interaction, conveying people‟s identity. As compared with other biometrics systems using fingerprint and iris, face recognition has distinct advantages because of its non-contact process. Face images could be captured from a distance without touching person being identified and identification does not require interaction with person. Within addition, face recognition serves crime deterrent purpose because face images that have been recorded and archived could later help identify a person. Over past decades, NEC has concentrated on developing face recognition methods within framework of biometric security systems. It is now applying face recognition technology to other markets. NEC's Face Recognition technology achieved highest performance evaluation within Face Recognition Vendor Test (FRVT) 2013 performed by U.S. National Institute of Standards & Technology (NIST). Moreover, NEC's technology took first place for third consecutive time following 2009 Multiple Biometric Grand Challenge (MBGC 2009). NEC‟s face recognition technology could be implemented as a functionally independent application, or seamlessly integrated into new or existing biometric security solutions by system integrators and solution providers.

A. FEATURES

Fast & accurate face recognition

- GLVQ based multiple-matching face detection

- Combination of eye-zone extraction & facial recognition
- Recognition based on neural network technologyEase of Use
- Short processing time, high recognition rate
- Recognition regardless of vantage point & facial changes (glasses, beard, & expression)

B. Reliable matching

- Optimal results through Adaptive Regional Blend Matching (ARBM) technology
- Extraction of similar facial areas
- Identification & authentication based on individual facial features
- Easy adaptation to existing IT systems
- Flexible integration into many types of video monitoring systems
- 1:n matching
- Simple connection to NEC AFIS
- Supporting diverse graphic & video formats as well as live cameras

II. AREA OF APPLICATION

For Security: Protect Sensitive Data, High degree of individuality certainty within transactions and Create databases with singular identities. For Accountability: Improve auditing / reporting / record keeping and Time keeping and For Efficiency. Reduce password-related problems. It is also used within following areas. Enterprise-wide network security infrastructures, Secure electronic banking, investing and other financial transactions, Retail sales, Law enforcement, Health and Social services.

III. WORKING OF CANNY EDGE DETECTION MECHANISM WITH FACE RECOGNITION.

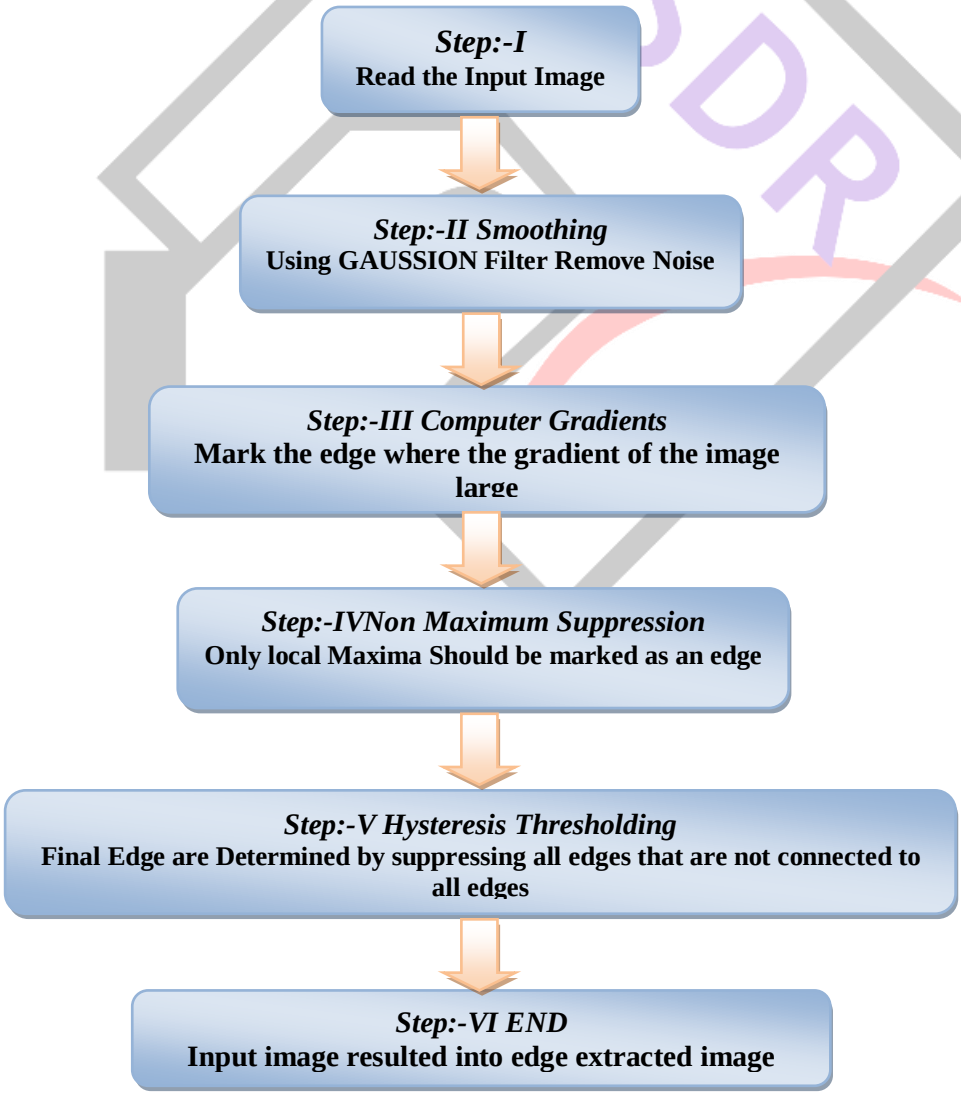

Fig. 1. Working Methodology

IV. RESULT & DISCUSSION

We applied Canny Edge Detection on faces to get edges.

Test 1

Fig. 2 When Values (1.3, 2, 1)

Test 2

Fig. 3 When Values(1, 3, 1)

Face Recognition Implementation

Step 1

Before comparison we crop face

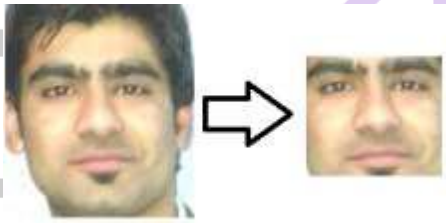

Fig. 4 (Crop face)

Step 2

After cropping face edge are detected

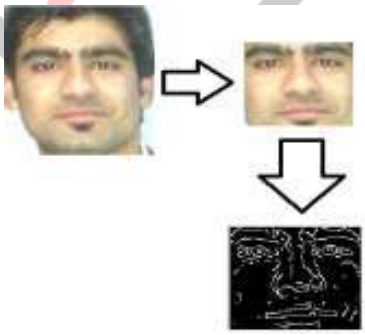

Fig. 5 (Detect Edge)

Step 3

Store graphics as matrix within i

```
i=imread('face1.jpg')
```

Step 4

Apply canny to i matrix & store within ii

```
ii=canny(i,1,1,1)
```

Step 5

Create histogram using surf command

```
surf (ii)
```

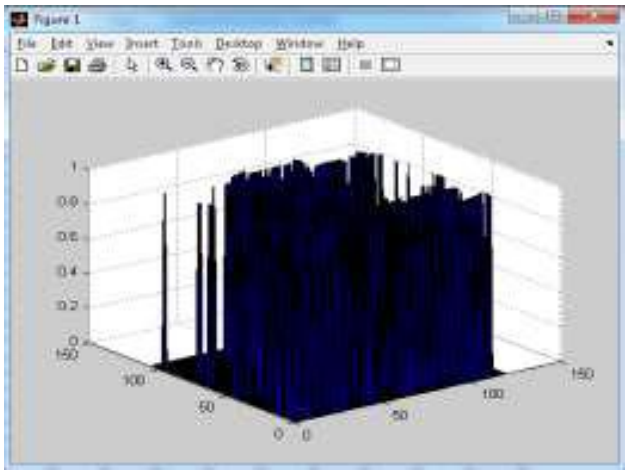

Fig. 6 (Histogram of Image)

V. CONCLUSION

On analyzing all these edge detection techniques, it is found that canny gives optimum edge detection. Following are some points throwing light on advantages of canny edge detector as compared to other detectors discussed within this paper: Less Sensitive to noise: As compared to classical operators like Prewitt, Robert &Sobel. Canny edge detector is less sensitive to noise. Its uses Gaussian filter which removes noise at a great extent as compared to above filters. LOG operator is also highly sensitive to noise as differentiate twice within comparison to canny operator. Remove streaking problem: classical operators‟ like Robert uses single thresholding technique but it results into streaking. Streaking means, if edge gradient just above & just below set threshold limit it removes useful part of connected edge, & leave disconnected final edge. To overcome from this drawback canny detector uses „hysteresis‟ technique which uses two threshold values t low & t high as discussed above within canny algorithm. Adaptive within nature: Classical operator have fixed kernels so cannot be adapted to a given image. While performance of canny algorithm depends on variable or adjustable parameters like which is standard deviation of Gaussian filter & threshold values t low & thigh. Smaller value of E results smaller Gaussian filter within turns results within finer edges. So user could changes these parameters & could improve result of canny algorithm. Good localization: LOG operators cannot find edge orientation while canny operator provides edge gradient orientation which results into good localization.

VI. FUTURE SCOPE

In this research we have studied & evaluate different edge detection techniques. We have seen that canny edge detector gives better result as compared to others with some positive points. It is less sensitive to noise, adaptive within nature, resolved problem of streaking, provides good localization & detects sharper edges as compared to others. It is consider as optimal edge detection technique hence lot of work & improvement on this algorithm has been done & further improvements are possible within future as an improved canny algorithm could detect edges within color graphics without converting within gray image, improved canny algorithm for automatic extraction of moving object within graphics guidance .We have used Canny Algorithm to find edges of pictures of faces & compare them to recognition faces on bases of edges as police recognizes criminal on basis of outlines of face. While within other face recognition techniques some time picture of same person is not recognized due to change within expression, color contrast or brightness of graphics of face. This research is useful to compare faces on basis of edges. It finds practical application within Runway Detection & Tracking for Unmanned Aerial Vehicle, within brain MRI image, cable insulation layer measurement, Real-time facial expression recognition, edge detection of river regime, Automatic Multiple Faces Tracking & Detection. Canny edge detection technique is used within license plate reorganization system which is an important part of intelligent traffic system (ITS), finds practical application within traffic management, public safety & military department. It also finds application within medical field as within ultrasound, x –rays etc.

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