



An Efficient Approach to Face Recognition of Surgically Altered Images

Er. Supriya, Er. Sukhpreet Kaur

Department of computer science and engineering
SUS college of Engineering and Technology,
Tangori, District, Mohali, Punjab, India

Abstract: Boundless worthiness and utilization of biometrics for individual verification has incited a few systems for dodging ID. One such procedure is adjusting facial appearance utilizing surgical strategies that has raised a test for face recognition algorithms. At the point when an individual experiences plastic surgery, the facial elements are remade either globally or locally. On the other hand, the varieties presented by plastic surgery stay hard to be displayed by existing face recognition algorithms and debase the exhibitions of face recognition algorithms. Thus, Facial plastic surgery changes facial components to huge amplify what's more, in this manner making a noteworthy issue to face recognition system. In this research, an efficient approach to face recognition of surgically altered images is presented. For this, picture is partitioned into diverse granules and elements are separated utilizing center-symmetric local binary pattern (CSLBP). Finally, decision is made by using chi square.

Keywords: -Face recognition, Plastic surgery, Face granulation, Feature Extraction and Matching.

I. INTRODUCTION

Plastic surgery methodology give a capable and en-amid approach to upgrade the facial appearance by revising element peculiarities and treating facial skin to get a more youthful look. Aside from corrective reasons, plastic surgery methods are useful for patients experiencing a few sorts of clutters brought about because of exorbitant basic development of facial elements or skin tissues. These techniques alter the facial components and skin surface in this way giving a makeover in the presence of face. Figure 1, demonstrates a case of the impact of plastic surgery on facial appearances.



Figure1: Illustrating the variations in facial appearance, texture and structural geometry brought on because of plastic surgery (pictures from web)

The primary point of plastic surgery is to re-build up the working of skin and tissue to a level that is as near to typical as could reasonably be expected. Enhancing the appearance of the skin is a critical auxiliary goal of plastic surgery. Plastic surgery is used to:

1. Conform imperfections that are available from conception.
2. Restore skin and tissue harm coming about from illness or sickness.
3. Restore skin and tissue harm coming about because of damage.

Inside of these three general gatherings, there are various circumstances where plastic surgery may be required, and a mixture of distinctive surgical systems that can be utilized. Plastic surgery methodology can be arranged into globally and locally plastic surgery.

Global plastic surgery: totally changes the face and is prescribed in situations where practical harm is to be cured, for example, patients with deadly blazes or injury. In these sorts of surgeries, facial appearance, skin composition, and highlight shapes fluctuate definitely subsequently making it burdensome for any face recognition system to perceive pre and post-surgery faces.

Local plastic surgery: is implied for reshaping and rebuilding facial elements to enhance the style. These surgical systems bring about changing sums of progress in the geometric separation between facial components in any case, the general composition and appearance of the face remains like the first face.

A. Facial Recognition System

Facial Recognition System is a PC application for consequently distinguishing or confirming a man from an advanced picture or a feature outline from a feature source. One of the approaches to do this is by looking at those facial components from the picture and a facial database. It is ordinarily utilized as a part of security frameworks. Face recognition is utilized for two essential errands:

1. *Verification (one-to-one matching)*: At the point when given a face picture of an obscure individual alongside a case of personality, discovering whether the individual is who he/she claims to be.

2. *Identification (one-to-numerous matching)*: Given a picture of an obscure individual, verifying that individual's character by contrasting (conceivably in the wake of encoding) that picture with a database of (perhaps encoded) pictures of known people.

B. Face Granulation

The first module of the proposed system is the face granulation; in this module distinctive components are produced by three levels of granularity. Let F be the detected frontal face image of size $n \times m$. Face granules are generated pertaining to three levels of granularity. The first level provides global information at multiple resolutions. This is analogous to a human mind processing holistic information for face recognition at varying resolutions. The granules contain data, for example, nose, ears, temple, cheeks and the blend of two or more components. The three levels of granularity are as follows:

First Level of Granularity: In the first level, face granules are created by applying the Gaussian and Laplacian operators.

Second Level of Granularity: horizontal and vertical granules are created by separating the face picture into diverse locales.

Third Level of Granularity: To consolidate this property, neighborhood facial sections are removed and used as granules in the third level of granularity.

C. Feature extraction using Center symmetric local binary pattern (CSLBP)

The center-symmetric local binary pattern (CS-LBP) descriptor is another descriptor and has a few focal points, for example, resilience to enlightenment changes, vigor on _at picture regions, and computational proficiency. A decent district descriptor can endure light changes, picture commotion, picture obscure, picture pressure, and little viewpoint bends, while saving uniqueness. CS-LBP which consolidates the qualities of the no doubt understood SIFT descriptor and the LBP texture operator.

II. BLOCK DIAGRAM OF FACE RECOGNITION OF SURGICALLY ALTERED FACE IMAGES

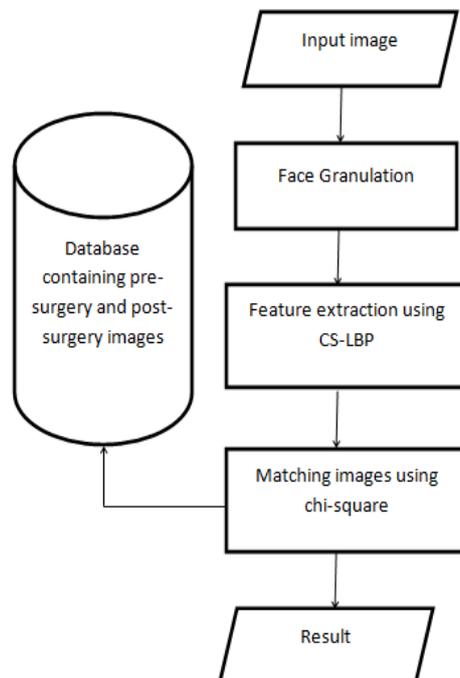


Fig 2: block diagram of the implement method

- i. Face granulation: In this methodology non-disjoint elements are removed at distinctive granular levels. Level 2 granularity is used in this methodology. In level 2 granularity, the image is divided into horizontal and vertical parts or granules.
- ii. Feature extraction using CS-LBP: This processes the Histogram of CSLBP operator, which is an augmentation of LBP. Utilizing CSLBP is truly effective for light and obscure sort of picture change.
- iii. Matching using chi-square: Matching procedure is done by using chi-square test, also referred as χ^2 . Method used for chi-square test is:

$$X^2(X,Y)=\frac{1}{2}\sum_i\frac{(x_i-y_i)^2}{(x_i+y_i)},$$

Where, $X = \{x_i | i = 1, 2, \dots, N\}$ and $Y = \{y_i | i = 1, 2, \dots, N\}$

III. RESULTS AND DISCUSSION

This method is evaluated by considering two datasets. One dataset consists of images that are taken before plastic surgery and the second one contains images after plastic surgery. Images vary by scale and small expression, small pose, and majorly by plastic surgery procedures. The identification accuracy of the proposed method is 90%. Figure 3 shows the result of implemented method.

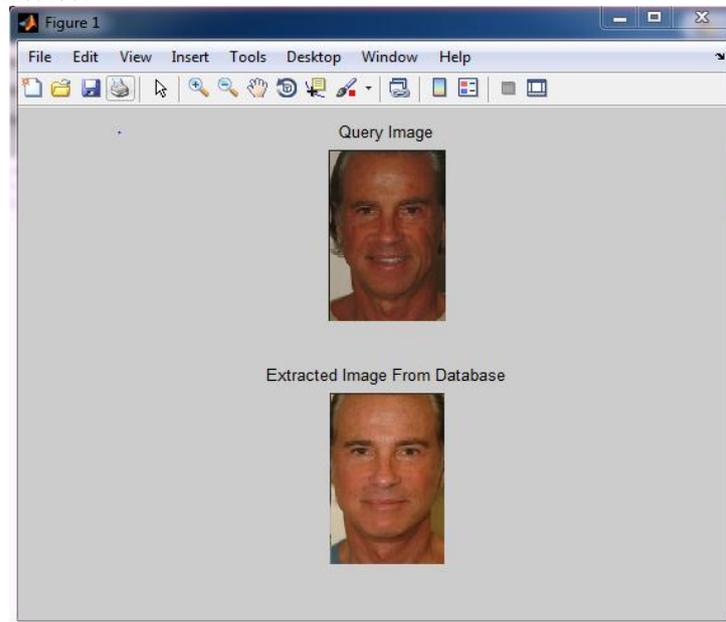


Fig 3: shows output of the method.

IV. CONCLUSION AND FUTURE SCOPE

Plastic surgery has developed as another covariate of face recognition what's more; its charm has made it essential for face recognition systems to be strong in coordinating surgically changed face pictures. This paper presents an efficient approach for face recognition of surgically altered face images. The face granulation method divides the image into horizontal and vertical granules. The feature extraction method, Center-symmetric local binary pattern (CS-LBP) is very effective and can tolerate illumination changes, noise, image blur and small perspective distortions. To ensure high accuracy chi square test method is used for matching. Taking into account the outcomes, we accept that more research is needed to planan ideal face recognition of surgically altered face images.

REFERENCES

- [1] AntitzaDantcheva, Cunjian Chen, Arun Ross, "Can facial cosmetics affect the matching accuracy of face recognition system," in *proceedings of 5th IEEE International Conference on Biometrics: theory, applications and systems*, 2012.
- [2] Bema K K, S. shobhna, "A new dimensional approach towards fraps face recognition after plastic surgery," in *proceedings of International Conference on global innovations in computing technology*, 2014.
- [3] Bincy Baby, Nurjahan V C, "Identify the surgically altered face images using granular PCA approach," *IOSR journal of computer engineering, volume 16, PP08-14*, 2014.
- [4] Chollette C ChudeOlisah, GhazaliSulong, Uche A K ChudeOkonkwo and Siti Z M Hashim, "Face recognition via edge based gabor feature representation for plastic surgery altered images," *EURASIP Journal on advances in signal processing*, 2014.
- [5] Cunjian Chen, AntitzaDantcheva, and Arun ross, "Automatic facial makeup detection with application in face recognition," in *proceedings of 6th IAPR International Conference on biometrics* , 2013.
- [6] E. Sumanthi, Mrs. P. Raja Rajeshwari, "Genetic algorithm based recognizing surgically altered face images for real time security Application," *International Journal of scientific and research publications volume 3*, 2013.
- [7] Himanshu S. Bhatt, Samarth Bhardawaj, Richa Singh and MayankVatsa, "recognizing surgically altered face images using multi-objective evolutionary algorithm," *IEEE Transactions on information forensics and security*, 2013.
- [8] Lizy A, Gayathri S, "Feature extraction based on recognition of surgically altered face images," *International Journal of Engineering Research and Applications, International Conference on Humming bird*, 2014.
- [9] Lin Xu, Yangzhou Du, Yimin Zhang, "An automatic framework for example based virtual makeup," *IEEE, ICIP*, 2013.

- [10] Miphy Tom, Jubilant J Kizhakkethottam, "Face granulation scheme for identity proving after plastic surgery," *International Journal of engineering trends and technology- volume 13*, 2014.
- [11] NurbekSaparkhojayev and YerlanAkhmetov, "Human identification in video streaming based on some facial parameters," *Middle East Journal of Scientific Research 21(7)*, 2014.
- [12] PrachiAggarwal, Naveen Prakash, "Modular approach for face recognition system using multi-level haar wavelet transform, improved PCA and enhanced back propagation neural network," *International Journal of Computer Applications(0975-8887)*, 2013.
- [13] P. Karuppusamy, Dr. P. Ponmutturamalingam, "Recognizing pre and post-surgery faces using multi-objective particle swam optimization," *International Journal of advanced Research in Computer science and Software engineering*, 2013.
- [14] Tudor Barbu, "Novel approach for moving human detection and tracking in static camera video sequences," in *proceedings of the Romaninan Academy, series-A*, 2012.
- [15] Yun Fu, Thomas S. Huang, "Age synthesis and estimation via faces," *IEEE transactions on pattern analysis and machine intelligence*, 2013.