

# A Review on Surgical Face Recognition

Rahul Sharma, Prof. Vinit Baghel

**Abstract**— Human face provides important information for identification (such as age, gender, etc) through face recognition technique. Alternate, several technologies are available to identify the identity like iris recognition, finger print etc. in which face recognition one the most popular even face recognition after plastic surgery technique that provide challenging process for face recognition due to variation in the illumination, pose, expression, age factor and texture changes after surgery. A large number of face recognition algorithms has been developed in the last decades. In this paper we will investigate all these approaches with parameter and conclude the extract of the approaches.

**Index Terms**— Matlab, Face Recognition, Feature Extraction, Feature Selection, Database of Plastic Surgery Face Images.

## I. INTRODUCTION

Every human has his/her unique face due to this uniqueness it differentiate one person to other that's why, we can use face recognition as a strong identification but problem comes when people has surgical face after plastic surgery. Due to this reason, plastic surgery has become most popular research area worldwide since few years. Plastic surgery is basically related to the medical process with biometric techniques. Plastic surgery comes under the cosmetic surgery in which modification the appearance of external anatomic features perform on the face such as face reconstruction[1], removing birth marks, moles, scars, disease correction, shape changes and as so on[10].

There are two types of plastic surgery:

*A. Local Surgery:* This is kind of surgery in which an individual undergoes local plastic surgery for correcting feature, anomalies and improving skin texture[2] such as forehead, lips, jaw lift, nose structure, chin and cheek lift as so on.

*B. Global Surgery:* A completely change in the facial structure known as full face lift[10] such as fatal burn or trauma, disease on whole face, accidental case as so on.

According to the report Feb 2015 of American Society of Plastic Surgery (ASPS) 15.6 million people went for cosmetic surgery and march 2015 report 12 billion people performed cosmetic surgery for man up 43% over 5 year period.

So many people are taking interest in plastic surgery even popular actors also, as shown in figure 1

**Manuscript received.**

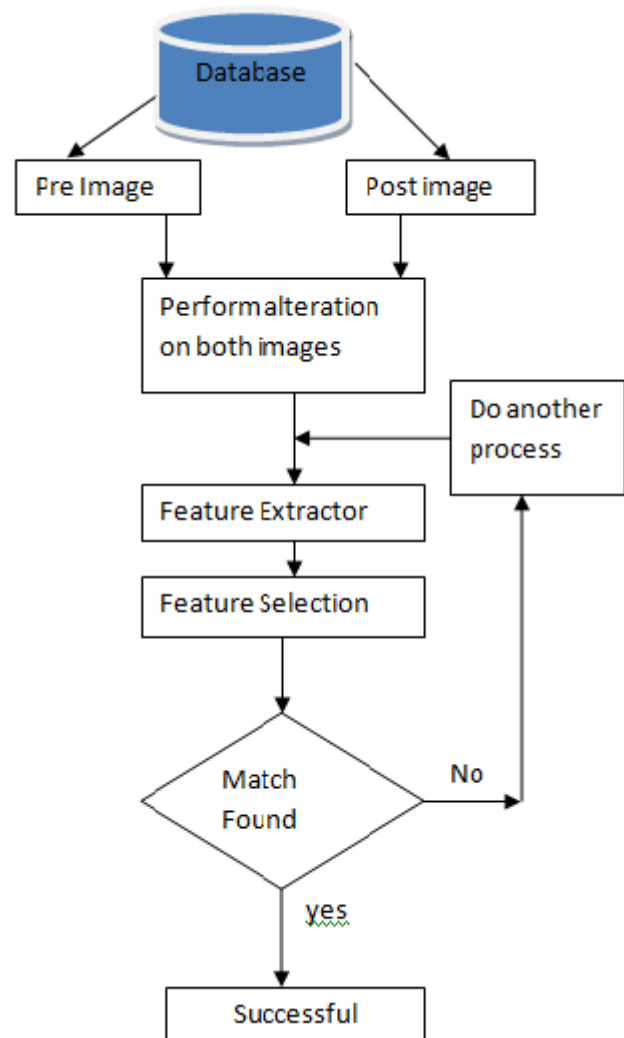
**Rahul Sharma**, Student, Computer Department, K.E.C. Engineering College, Ghaziabad, India.

**Prof. Vinit Kumar**, Computer Department, K.E.C. Engineering College, Ghaziabad, India.



Fig. 1 Befor and After Plastic Surgery Images ( Taken from the Internet)

## II. GENERAL RECOGNITION METHOD



### III. LITERATURE REVIEW

Surgical face recognition can be lead to expose of imposters while surgical face recognition so many approaches available in which tried to eliminate the challenging problems like illumination, pose, aging factors etc. In this literature we will analyze these approaches and techniques.

According to R.Singh et al.[2] experimented with already existing algorithms like PCA, LDA, GF, LFA, GNN as so on. In this experiment investigated that during surgical face recognition procedure significantly change the facial region as both locally and globally altering the appearance, facial features and texture. In which PCA and FDA are appearance based algorithm, GF and LFA are feature based algorithm, LBP and GNN are the texture based algorithm and after the applied above algorithm on the surgical face calculated recognition accuracy of each algorithms and found that these algorithms are unable to produce satisfiable result effectively due to variations in texture appearance even these algorithm are meeting good result in general face recognition approach. Thus there are further more research require to mitigate recognition rate.

Raghvendra et al.[1] produced approach of face and ocular regions at score level fusion to improve recognition rate. Feature extraction from the ocular region used SIFT and LBP algorithms and reported that global surgery may impact more than local surgery face recognition and analyzed also it produce better accuracy rate from the R.Singh et al.[2]. According to this analyzed that plastic surgery database could be further improved if the non-ideal factors are accounted (ex. Duplicate entries, low resolution image etc) and need further analysis on fusion technique for improve identification.

Gaurav Aggraval et al.[4] proposed sparse representation on local facial fragmentation to match surgical face and part wise sparse representation approach. Both approaches significantly out performs and reported good performance with PCA based representation where calculated minimum error if min error is calculated then process is success otherwise not.

H.S.Bhatt et al. [14] evaluated multi-objective approach with granular level technique to match pre and post surgical face. First of all generate granules levels of the face images ten optimizes the selection of feature extractor for each face granules along with weight and retrieved feature with SIFT method. Investigated that propose approach produced better result form the other existing method.

De marsico et al.[8] developed an method to integrate information derived from the local region to match pre and post images. The face utilizes correlation index obtained from defined sub-region between two images. Illumination problem and improve performance was obtained using face recognition methods.

Kshitij et al[3] proposed a method to match pre and post both images using segmentation into different granules levels and feature are extracted using SIFT and LBP method to get different – different information from the face granules. This approach similar to the H.S.Bhatt[14]. But feature selection is performing with SWARN optimization algorithm. After this experiment reported that given approach has high degree of identification accuracy.

P.karuppusamy [6] given an approach with PSO Algorithm in which image is also segmented at multi-level granules[3,11,14] and then PSO used for feature selection from the images with weight addition to select each and every image granules. Feature extractor is also using similar as [14] SIFT and LBP algorithm that help encoding information for each granules. Experiment evaluated that proposed method is out performs from the existing method. Finally, analyzed that more research is required in order to optimal face recognition after measuring the performance with PSO algorithm.

### IV. PROBLEM FINDING

According to the, Literature Reviewed measure most of the problems occurred while surgical face recognition such as illumination factor, Aging Factors, Pose factors, variability in scale, lighting position as so on, but generally problem generate while surgical face recognition that may create big problem creation and make more challenging task for example facial texture changed, facial appearance change aging factors, etc. as shown in figure 2.

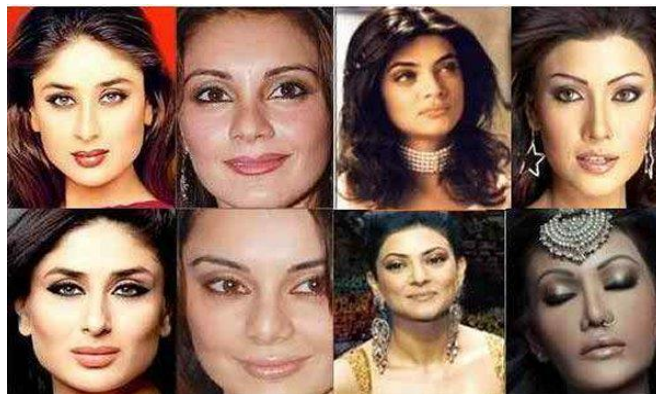


Fig. 2 variations in both images (Image is taken from Internet)

### V. CONCLUSION

In this literature survey, we have come to conclusion that none of the approaches and methodologies are available with biometric technology which is produce better accuracy rate of surgical face recognition with existing and recent developed technologies due to lack of variation in between pre and post face images like illumination factor, aging factor, re-construction texture factor and re- correct the anomalies. After go through with all literature we came on conclusion that these type of problem will always be raise while surgical face recognition on pre and post images. Therefore, we have apply human mind with the existing approaches for recognizing surgical face because no one technologies has been developed that produce better recognition result and human mind can recognize better with many variations in the face. Another thing is that, it is necessary to modify centralized database (pre and post images) of each and every person who went for cosmetic surgery. At last, there is further more research required with unique approach for optimization recognition of surgical images.

### ACKNOWLEDGMENT

I would like to express my sincere gratitude to Prof. Vinit Kumar for the necessary support and guidance. I would also

like to thank my friends for the necessary support during various stage because of which we are able to complete our survey paper.

#### REFERENCES

- [1] RAGHVENDRA JILLELA, ARUN ROSS, MITIGATING EFFECT OF PLASTIC SURGERY: FUSING FACE AND OCULAR BIOMETRIC. IEEE INTERNATIONAL CONFERENCE ON BIOMETRIC (WASHINGTON DC, USA) SEPTEMBER 2012.
- [2] R.SINGH, MAYANK VASTA, AFZEL NOORI. EFFECT OF PLASTIC SURGERY ON FACE RECOGNITION: A PRELIMINARY STUDY. WEST VIRGINIA UNIVERSITY, MORGANTOWN, USA.
- [3] KSHITIJ UMREDKAR, PRASHIK WAGH, AKHIL BHOIR. FACE RECOGNITION SYSTEM INVARIANT TO PLASTIC SURGERY. IJARC AND COMMUNICATION ENGINEERING. VOL. 4 ISSUE APRIL 2015.
- [4] G.AGGRAWAL, S.BISWAS, P.J.FLYNN AND K.W. BOWYER. A SPARSE REPRESENTATION APPROACH TO FACE MATCHING ACROSS PLASTIC SURGRY. IEEE WORKSHOP ON APPLICATIONS OF COMPUTER VISION, JANUARY 2012.
- [5] RENU BHATIA. BIOETRIC AND FACE RECOGNITION TECHNIQUES. IJAR IN COMPUTER SCIENCE AND SOFTWARE ENGINEERING, VOL 3, MAY 2013
- [6] P.KARUPPUSAMY,P.PONMUTHURAMALINGAM. RECOGNIZING PRE AND POST SURGERY FACES USING MUTLI OBJECTIVE PSO. IJAR IN COMPUTER SCIENCE AND SOFTWARE ENGINEERING. VOL 3 OCT 2013.
- [7] ASMAHAN M ALTAHER. FACE RECOGNITION TECHNIQUES – AN EVALUATION STUDY. IJANETWORKING AND APPLICATION. VOL 6, 2014.
- [8] VAIBHAV R. WAGARE, HARISH K.BHANGALE. A SURVEY OF PLASTIC SURGICAL FACE RECOGNITION. IJARCE, VOL. 2, APRIL 2015.
- [9] KETKI KALAMKAR, PRAKASH MOHOD. A REVIEW ON FACE RECOGNITION USING DIFFERENT TECHNIQUES, IJARCSAND SOFTWARE ENGINEERING. VOL.5, JAN 2015.
- [10] R.SINGH, MAYANK VASTA, H.S.BHATT, S.BHARADWAJ, A. NOORI, A NEW DIMENSION TO FACE RECOGNITION. IEEE STANDARD, 2010.
- [11] MAHENDRA P. RANDIVE, UMESH W. HORE, AN INNOVATIVE APPROACH FOR PLASTIC SURGERY FACE RECOGNITION REVIEW. IJESRT. JAN 2015.
- [12] SNEHA R. MADANE, S.T. KHANDARE. A SURVEY ON FACE RECOGNITION IN PRESENT SCENARIO, IJMCTR, VOL. 3, 2015.
- [13] ASHISH PROSOD GOPE, RABI NARAYAN BAHERA. A NOVEL PATTERN MATCHING ALGORITHM IN GENOME SEQUENCE ANALYSIS, IJCSIT, VOL.5, 2014.
- [14] H. S. BHATT, S. BHARADWAJ, R.SINGH, M.VASTA, RECOGNIZING SURGICALLY ALTERED FACE IMAGES USING MUTLI-OBJECTIVE EVOLUTIONARY ALGORITHM IEEE TRANSACTION ON INFORMATION FORENSICS AND SECURITY, 2012.

**Rahul Sharma** is master of Technology Student of Computer Science Department, studying from the K.E.C. Ghaziabad, India. He has first paper in National conference. His areas of interest include Image Processing, Pattern recognition.

**Prof. Vinit Kumar** is Professor of computer science department in K.E.C. Ghaziabad India. His area of interest Image Processing, Mobile Computing.