LOW RANK REPRESENTATION OF FACIAL IDENTIFICATION WITH OCCLUSION

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***Abstract*:** In this paper to proposed a continual (iterative) method to label the face identification dispute with occlusions. This approach handles the robust representation problems based on two characteristics to mock-up flanking errors successfully. First characteristic controls the error distribution characterizes by a tailored loss function and second characteristic label by a specific structure (low-rank image comparison with image size). F-LR-IRNNLS (Fast low rank iteratively reweighted non negative least square) algorithm to model the strong (robust) representation for face identification. The robust representation scheme performs efficiently on face identification during occlusions of 70%. In this paper to proposed a SVD (Singular Value Decomposition) method for face identification, at SVD method determines the low-rank (structural) representation of a image, and also eliminates the small singular values in a face. To introduce SVD method in face identification by compressed the image to improve the performance than compare to F-LR-IRNNLS method.SVD method to improve the performance of face identification and speed up the face identification, the experiment of face identification conduct on GUI (Graphical User Interface) technique.

Keywords: Singular Value Decomposition (SVD), face identification, Robust, low rank representation, contiguous errors, GUI technique.

1. INTRODUCTION

Several works on face identification (FI) target only on reduced the image identify is one of the main problem in computer vision . At FI database contained by non occluded faces with some intra-class illumination, and test sample contains a 70% random part (block) of occlusion of the illuminating features in a face are covered.

Several researches on face identification try to handle with some intra-class illumination variations. SRC (sparse representation method) is one of the algorithm to identify a face image , SRC method handle the face identification effectively it consist the L_1 norm minimization, L_1 norm minimization mainly useful to identify the sparse in a image. SRC method are complex for identification because of vary sensitive to noise and utilizes more complex illumination, face disguise. One recent extension of SRC algorithm is CRC (collaborative representation classification) this method consist L2 norm minimization for face identification CRC algorithm minimizes the number of training class to allay the representation difficulty on query sample with different samples .Another extension of SRC method is patch based come near this approach handles the sparse-based representation . In patch based approach is critical propose for face identification because of occlusion in a images.

Robust representation method exhibited high computational cost and also identification results reduced the block occlusion up to 50%. To solve the robust representation problem to propose a iterative method, iterative method reduces the robust representation problem when block occlusion are 70% and reduces the computational cost this method effectively work on robust representation problems with occlusions of 70%, and also eliminated the contiguous errors. Robust representation method perform the FI based on two characteristics. The first characteristic is tailored loss function and second characteristic is reduced the rank structure of a image (low-rank representation) , this two characteristics reducing the spatial continuity errors effectively.

II. ROBUST WITH LOW RANK ILLUSTRATION FACIAL REPRESENTATION WITH OCCLUSIONS

F-LR-IRNNLS(Fast low rank iterative reweighted non negative least square) proposed a fast iterative reweighted non-negative least square method handles the face identification problem mainly at block occlusions this approach handle the robust representation depend on two characteristics. The first characteristics fit to describe the tailored loss function. The tailored loss function method utilizes contiguous errors and second characteristic is low-rank representation of a facial image structure, this method is contrast the image size which is more efficiently on computational cost .

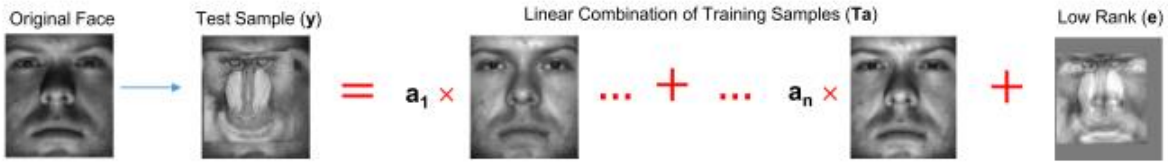


Fig.1: mortification model of occlusion image with linear combination of training samples with some intra class variations plus the error.

The mortification model is of the form **Y=Ta+e** Eq(1)

Where **Y** represents the test sample and **Ta** is nuclear combination of training samples and **e** is error (low-rank). The mortification model of test sample of occlusion represented by linear combination of training samples **(Ta)** with same- intra class variations plus the error **e**. The **e** (error) contains the two characteristic first one is low-rank contrast size of a image and also

specified by tailored loss function.

III.GRAPHICAL USER INTERFACE (GUI)

MATLAB's Graphical User Interface Development Environment (GUIDE) supports a affluent set of tools associate for Graphical User Interfaces in M-functions. Using GUIDE (i.e., its buttons, pop-up menus, etc.) programming the process of the GUI. GUI is divided into two sorts of tasks.

1.A file with expansion .fig, call a FIG-file that have a complete graphical narrative of every one of the functions of GUI.

2.A file with expansion .m, called a GUI M-file, which including the code that controls the GUI operation. This file of GUI is floated and exited, and callback functions that are carried out when a user interacts with GUI objects.

The Implementation of a GUI

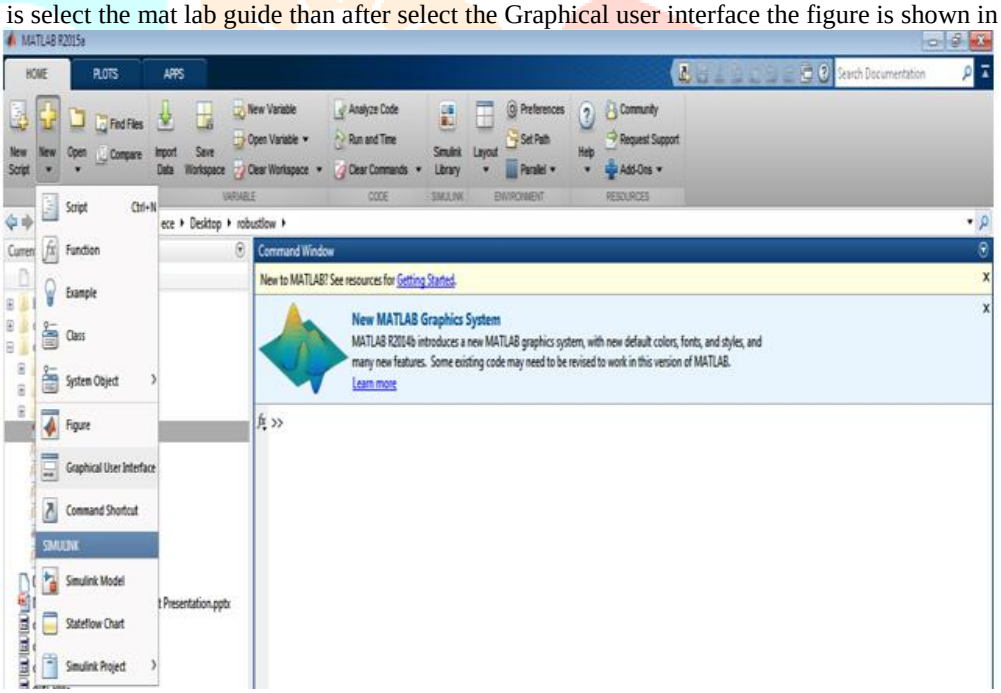
GUIDE mainly contains a set of layout tools. But, GUIDE also generates an M-file that contains a set of laws to handle the initialization and launching of the GUI. This M-file provides a outline for the implementation of the callbacks - the functions that implement as soon as users make dynamic components in the GUI.

User Interface Controls

- Push Buttons
- Sliders
- Toggle Buttons
- Frames
- Radio Buttons
- List boxes
- Checkboxes
- Popup Menus
- Edit Text
- Axes
- Static Text
- Figures

CREATING THE GUI:

step.1 first step is select the mat lab guide than after select the Graphical user interface the figure is shown in below.



Step.2: Second step is select the GUI (default box) and click the ok button, as shown in below

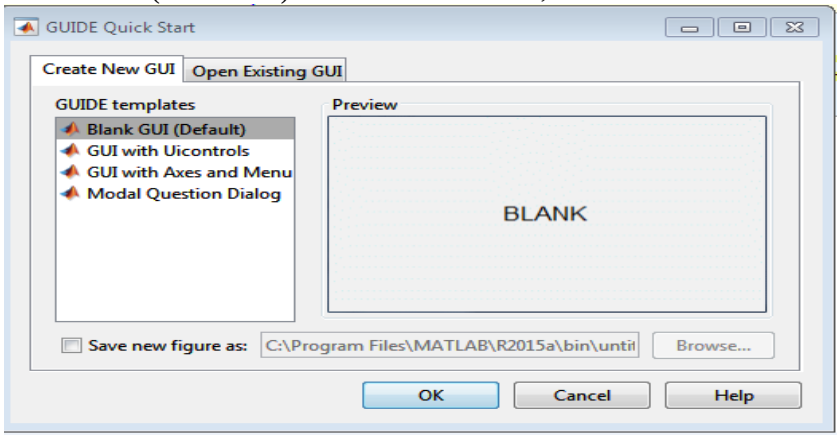


Fig.2: blank GUI

step.3:third step is select the user interface control than after select the push button, axes, edit button etc as shown in below figure

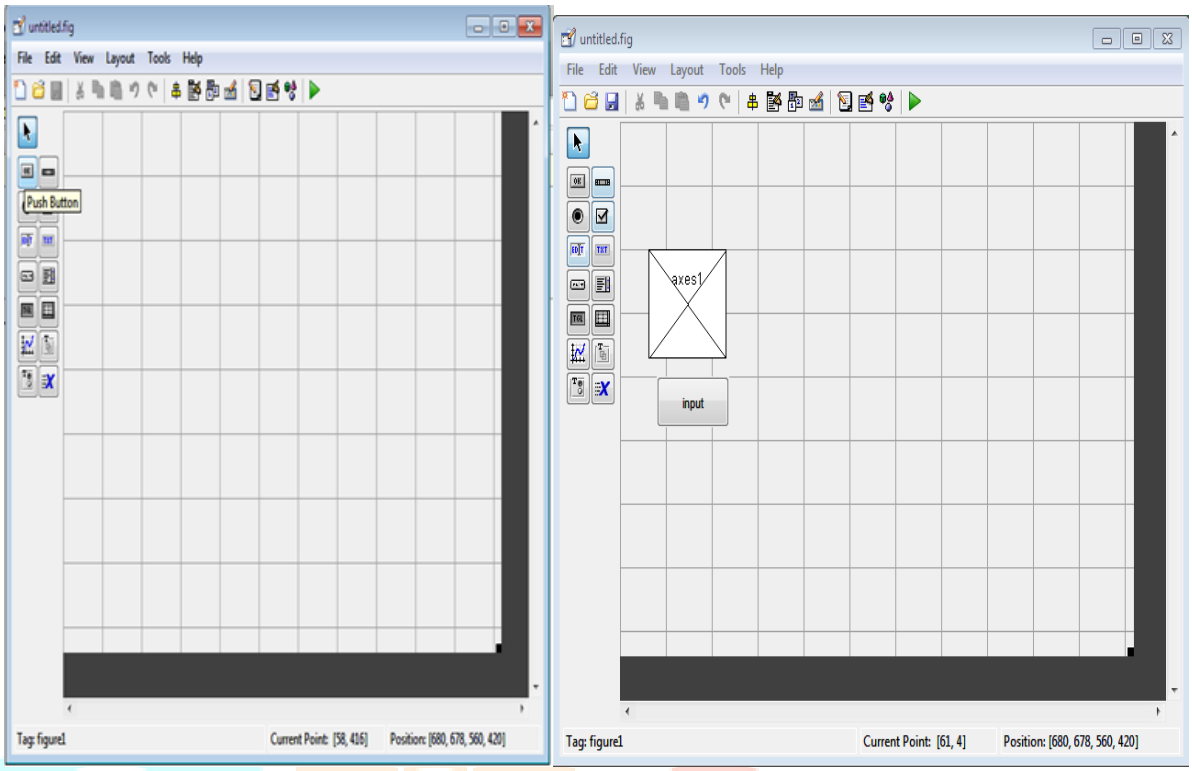


Fig.3(a) Fig.3(b)

Fig.3: user interface control buttons

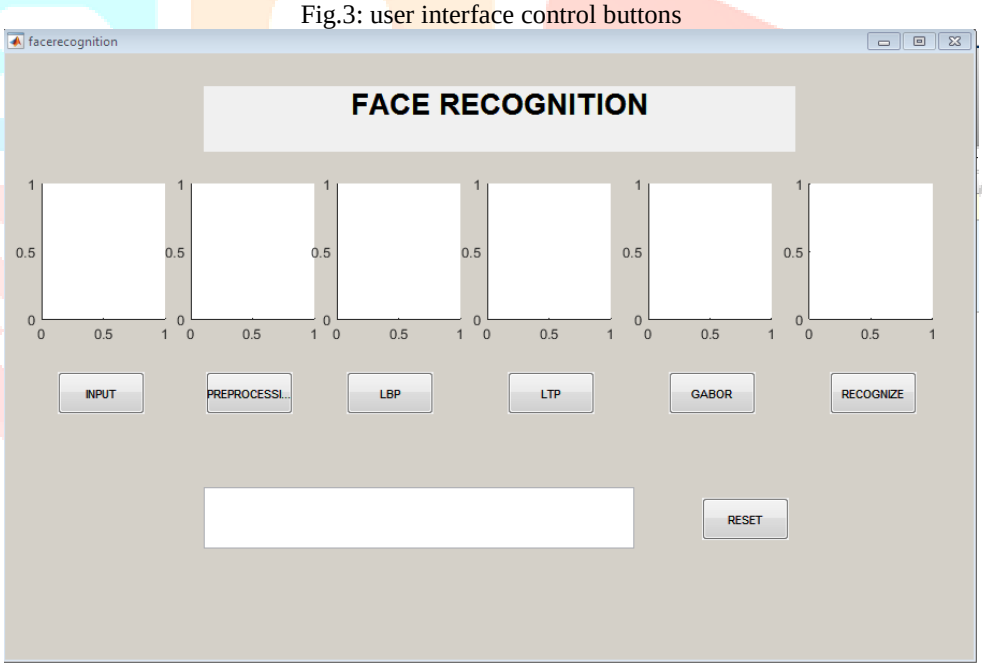


Fig.4: complete face recognition by using the GUI

Than final save the face recognition by GUI (FACERECOGNITION.fig) after write the code (M-file) save and run results as shown in section IV.

III. PROPOSED METHOD

Fig.5:nuclear norm constraint and without nuclear norm constraint.

The Fig.5: as shown in below . Fig.5 show the proposed technique consist the nuclear norm constraint. By nuclear norm constraint to solve the IRLS problem, nuclear norm constraint is to reconstruct the occluded face image through its correct classifies images. In fig.5 first row consist without nuclear norm constraint required the more time to perform the face identification and number of iteration are more, In fig.5 second row apply the nuclear norm constraint to reduce the number of iterations.

A. SINGULAR VALUE DECOMPOSITION IMAGE COMPRESSION

Compression mainly targets on comprises the images, pictures and video pictures, the compression technique required more storage space and large memory space to evaluate such a type of problem by reducing the storage space, memory space without losing the image information. By compressed the image which required the less number of bits to express a image. Image compression to model the several methods, but pervious methods are more complexity for image compression. To solve such type of problems we introduced the singular value decomposition (SVD) scheme, by using SVD method in compression to reduced the few small singular values are contained and some singular values are neglected.

SVD method is a linear algebra event it illustration the several applications they are face recognition, image compression, object detection etc. SVD method is of the form

$$B=USV^T \qquad (2)$$

Where B is a mxn matrix form and U is mxm orthogonal matrix V is nxn orthogonal matrix form. In SVD method compression consist mainly two steps first one is compressed and decompressed the image , first step exhibit less storage space and second step is compare and select the low-rank image with database image. In SVD method lowest singular values (less important) information can be neglected without changing the original image information.

B. PROPOSED SYSTEM METHODOLOGY

Proposed system exhibit mainly on 4 steps:

Step.1: is preprocessing method by applying preprocessing step in face identification to reduce the noise and also reduces the illuminated problems.

Step.2: is applying the LBP (local binary pattern), LBP encodes the corresponding pixels .

Step.3: is applying the LTP (local ternary pattern)

Step.4: fourth step is SVD method.

Step.1: Preprocessing: Preprocessing mainly contains 4 steps first one is gamma correction, DOG (difference of Gaussian) , masking , equalization of variation .Preprocessing diagram as shown in below diagram

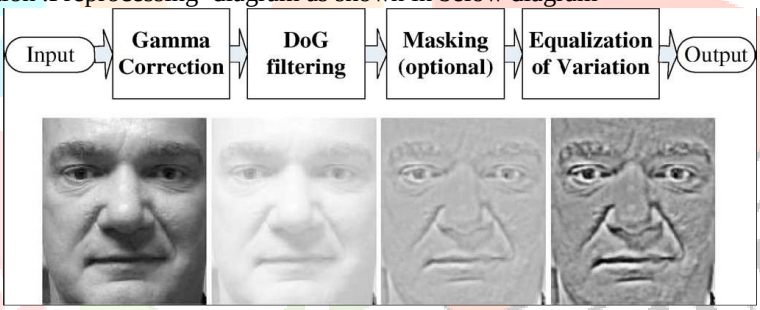


Fig.6: Preprocessing diagram

First step in preprocessing is gamma correction, gamma correction represents the relationship between pixels of gray level image. In some condition gamma correction failed for removing the shadowing effects so we used the DOG(Difference Of Gaussian) , the DOG filtering mainly used for gamma corrected image, DOG filter effectively removes the noise in a image and also enhance the illumination and reduce the shadowing effects. Next step is masking and equalization of variation , at the equalization of variation measures the overall intensity value if a image.

Step.2: LOCAL BINARY PATTERN (LBP):

Local binary pattern are used in several computer vision applications because of its simplicity, robustness at illumination variations. LBP mainly mark the pixels of an image in decimal number. LBP operates to encode the pixel difference among the neighboring pixels and center pixel the main disadvantage of the LBP is very sensitive to noise, to overcome this problem to use the LTP.LBP can be expressed as follows

$$LBP_{p,R}(x_c, y_c) = \sum_{p=0}^{p-1} s(i_p - i_c)2^p \qquad \text{Eq(18)}$$

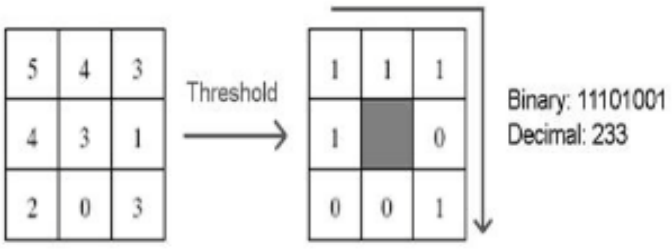


Fig.7: LBP operator.

In the above diagram central pixel act as a threshold operator, if a neighbor pixel value has greater value than central pixel it assigned as one(1) else it assigned as zero(0) .

Step.3: LOCL TERNARY PATTERN (LTP):

Local ternary pattern mainly used to solve the noise-sensitive problem occur in LBP. LTP operated works on 3-valued code, LTP encodes the pixel difference into a separate state .LTP used the threshold value to encode the pixels. LTP is as follows.

$$S(i_p, i_c) = \begin{cases} 1, i_n \geq i_c + t \\ 0, |i_n - i_c| < t \\ -1, i_n \leq i_c - t \end{cases}$$

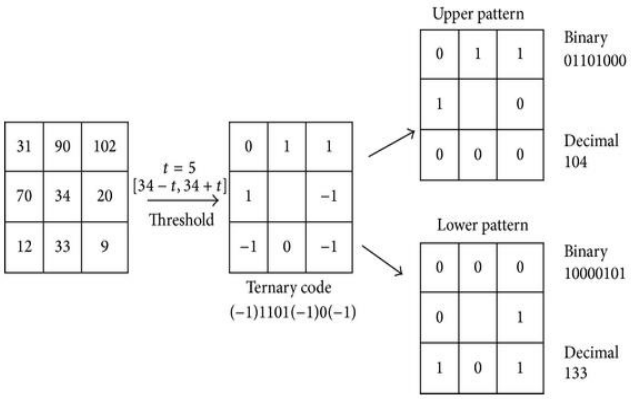


Fig.8:LTP diagram

In above diagram.5 after ternary process ternary code is split in to two parts first one is upper(positive) pattern and second on is lower(negative) pattern.

IV.RESULTS

In this paper face recognized by using the mat lab 2016a version. In database contains different types of original face images and input contains different occluded face images.

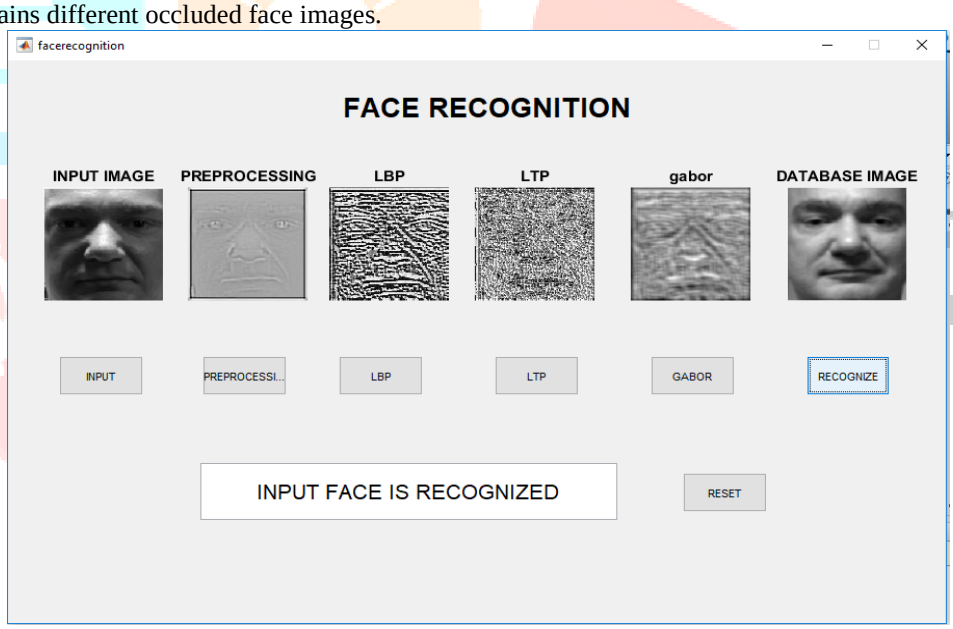


Fig.9:output image at F-LR-IRNNLS algorithm by GUI technique.

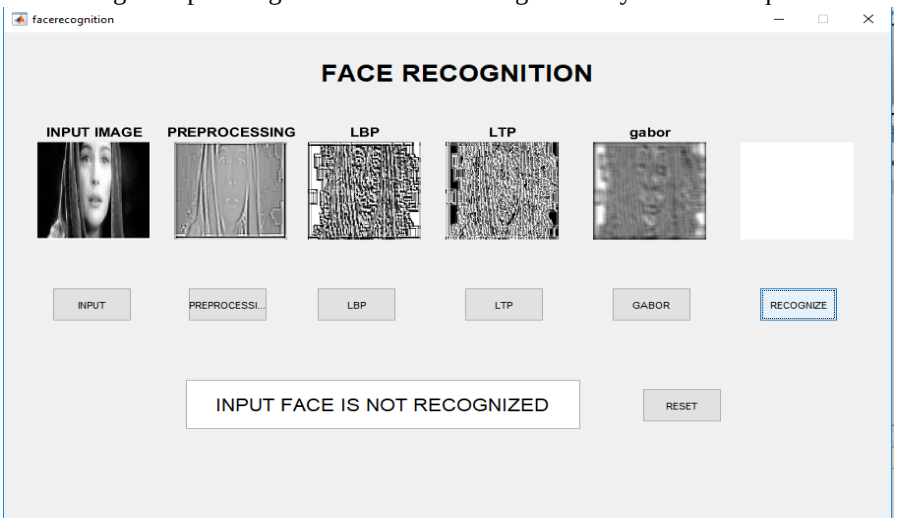


Fig.10:output of face recognition

```
Enter the decomposition level:2
Compression Ratio
   84.3304
```

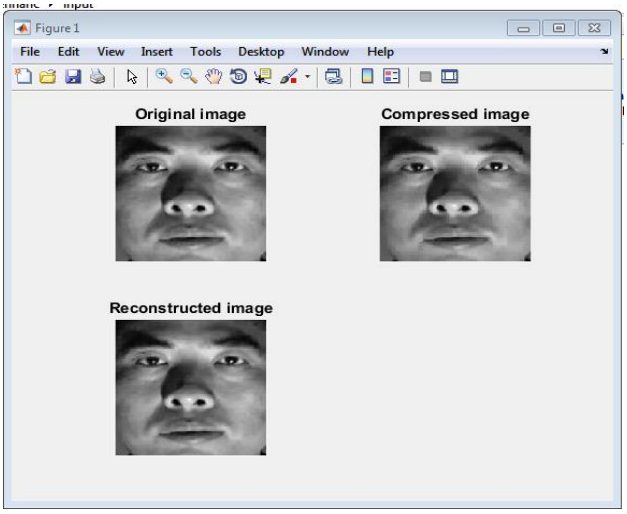


Fig.11(a)

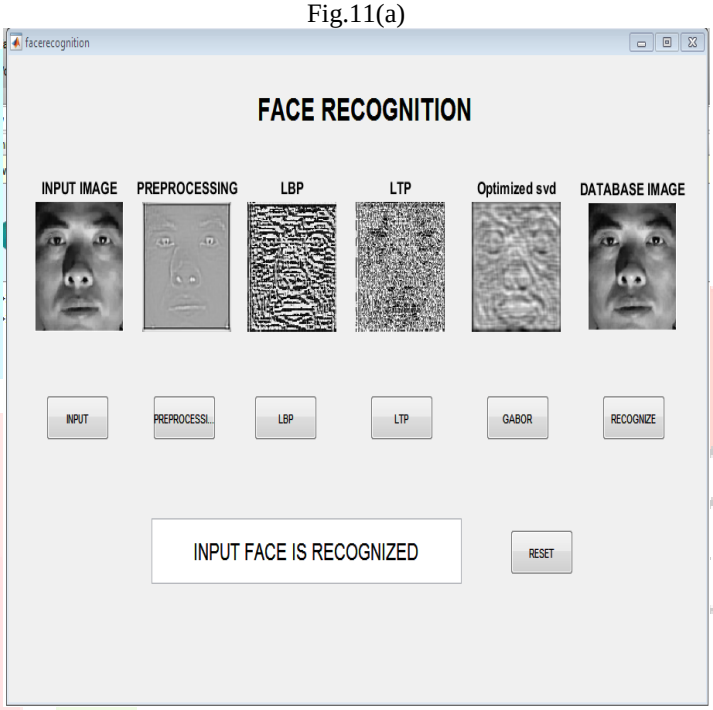


Fig.11(b)

Fig 11(a),11(b) is the SVD(main) method output and face recognition

Comparison table of proposed work with existing work:

	F-LR-IRNNLS algorithm	SVD method
Accuracy	Less accuracy	More accuracy
File size	41608	31198
Time	More time required to execute the program	Less time required to execute the program

Table.1 comparison table of proposed work with existing work

V. CONCLUSION:

To proposed a method to identify an image when block occlusion are present. The F-LR-IRNNLS method to illustrate the contiguous errors effectively base on two characteristics, first one is tailored loss function and second one is structural representation of error image (low-rank). To introduce SVD method in face compression to improve the performance of the face recognition and less time required to perform face recognition(identification) than compare to F-LR-IRNNLS algorithm.SVD method give the better compression outcome with less computational cost.

REFERENCES:

[1] Michael Iliadis, Haohong Wang and Aggelos k.Katsaggelous "Robust and Low-Rank Representation for Fast Face Identification with Occlusions", IEEE Transactions on Image Processing, vol.26, no.5, May2017.

[2] J. Lai and X. Jiang, "Class-wise sparse and collaborative patch representation for face recognition," IEEE Trans. Image Process., vol. 25, no. 7, Jul. 2016.

[3] Y. Taigman, M. Yang, M. Ranzato, and L. Wolf, "Web-scale training for face identification," in Proc. IEEE Conf. Comput. Vis. Pattern Recognit. (CVPR), Jun. 2015.

[4] Z. Ding, S. Suh, J.-J. Han, C. Choi, and Y. Fu, "Discriminative low rank metric learning for face recognition," in Proc. 11th IEEE Int. Conf. Workshops Autom. Face Gesture Recognit. (FG), vol. 1. May 2015.

[5] J. Qian, J. Yang, F. Zhang, and Z. Lin, "Robust low-rank regularized regression for face recognition with occlusion," in Proc. IEEE Conf. Comput. Vis. Pattern Recognit. Workshops (CVPRW), Jun. 2014.

[6] W. Zhao, R. Chellappa, P. J. Phillips, and A. Rosenfeld, "Face recognition: A literature survey," ACM Comput. Surv. vol. 35, no. 4,pp. 399–458, Dec. 2003.

[7]Javier Ruiz-del-Solar Int.J.Computer Technology& Applications, Vol 4 (1),84-86,2005.

[8] Guoliang Zeng, "Face Recognition with Singular Value Decomposition.", CISSE Proceeding, 2006 .

[9] Mande M., Singular Value Decomposition, Department of computer science of the Technological Institute of Bombay India, august 2003.

[10] S.G. Kong, J. Heo, B.R. Abidi, J. Paik, and M. A. Abidi. Recent advances in visual and infrared face recognition review. Computer Vision and Image Understanding, 97(1):103{135, 2005.