



# An Approach for Removal of Occlusion Using Exemplar Based Image Inpainting Technique

Usha D. Tikale<sup>1</sup>, Prof. S. D. Zade<sup>2</sup>

*M.Tech Scholar Department of Computer Science and Engineering PIET Nagpur India<sup>1</sup>,*

*Asst. Professor Department of Computer Science and Engineering PIET, Nagpur,India<sup>2</sup>.*

**Abstract** - Facial recognition is also known as the face recognition it describes to predict and to establish individual identity by using face. Face recognition systems is to works by using computer application and to identify people in real-time application. In image processing hair, mustache, beards, sunglasses of face by scarf and other clothing accessories etc. this are some reasons for occlusion refers to facade of the facial image. The IMAGE INPAINTING TECHNIQUE based method such as Exemplar based inpainting technique, extraction of features and Fast weighted principal component analysis etc. are used in face recognition. In this project express the restores occluded part of image or the removed occlusion of images using Exemplar based image inpainting technique, Combination of fast weighted principal component analysis (FW-PCA) and extraction of feature.

**Keywords:** Detection of Face: Extract the feature: Restore Image: FW-PCA Occlusion; Inpainting Technique; Exemplar based inpainting technique.

## I INTRODUCTION

Manipulation and analysis of digitized image is done in order to improve the class in image processing. In various technical field such as medical field, remote sensing, video processing, robot vision, etc are impacted by digital image processing (DIP). In today's era analysis of human biometric such as hand, fingerprint, ears, eye face recognition are required lot of attention in image processing in the research area.

### 1.1.1 Overview of Occlusion:-

As defined an any unneeded object or obstacle in image disturbing the recognizing process is known as Occlusion. The view of an object is to refers as an hindrance in the occlusion and it can be synthetic as well as natural. In real time occlusion occur via accessories like:

- Hand on face
- Sunglasses, hat, scarf, beards, mustache
- Face behind any obstacle
- Face images texture, etc.

### 1.1.2 Causes of Occlusion:-

Several problems may occur due to presence of occlusion. Some of them likely to be stated as -

- Someone a system developing which tracks an object such as cars, people, etc. then by another object occlusion occurs if the object are hidden image is tracking.
- Where you do not have any information of the occlusion areas people are using a range of camera.
- Most of the critical issue in this research papers in many face recognition system is the facial occlusion such as in video surveillance.
- The problems of any image are corrupted by noise, scanning old photo resting dust on the scratching images or scanner of a scanning glass or others have stamps or logos.

## II LITERATURE SURVEY

A lot of research has been done on Recognition of Faces to get more accurate result in the given facial images under different environmental conditions and on various approaches available in occlusion is to solving the many problem in face Recognition. The methodology used in our project is taken from various researches and sources. Several techniques like Image Inpainting with Exemplar based techniques, Dataset Clustering, Face Detection, FW-PCA(Fast Weighted-Principal Component Analysis) & Extraction of Feature are referred from various research papers and from research organizations as mentioned.

For the formation of this project, main focus has been given in the area of-

- Image Inpainting & its techniques
- Face Recognition under uncontrolled conditions
- Feature Extraction
- Principal Component Analysis(PCA)
- Fast-Weighted PCA
- Face detection

The algorithms has been defined recognition under a large variety of conditions in the face image. In recent years, partially the problem are received considerable attention is that of hidden faces. Since the work a variety of methods has proposed by Martinez partially matching images is not occluded training sample but test images are occluded. Goal of this algorithm is to define a matching process that the errors of large matching process of occlusions while concern with some of the non-occluded faces. In research article "In the Training and Testing Sets Recognition of Face with Occlusions", by Aleix M. Martinez and Hongjun Jia [1]. They redefine as a reconstruction process of the face recognition problem.

By Christine Guillemot and Olivier Le Meur in jan-2014 introduced two new technique overview and recent advances in IMAGE INPAINTING[2]. The first methods of this category, known as diffusion-based inpainting technique. These methods is to completing curves, straight lines, and for small regions inpainting face. However, these methods are not suited for reconstructing the large areas of texture, but is to blur image. In other technique, the texture to be synthesized is learned from the known part of the image or similar regions in a sample texture. Exemplar is taken known part of the image and stitching together patches by copying and sampling that learning is done. This methods also called as exemplar-based inpainting techniques. Diffusion based techniques is better than the Exemplar based methods and sparse based methods for large texture areas. Diffusion based inpainting technique or Exemplar based inpainting technique this two techniques they have to proved the major application in disocclusion of an image and in order is to improve accuracy and result such systems may be discovered.

### III ANALYSIS OF EXISTING SYSTEMS

**A. Image Inpainting:** Image inpainting is a technique used of recovering the image lost or detected parts. Basically image inpainting is a process of recovering missing or damaged region in an image. Exemplar is taken known part of the image and stitching together patches by copying and sampling that learning is done.

**B. Fast Digital Inpainting Method:** All the in painting techniques is depends on the size of the gap is to needs to be filled and to require minutes and hours. Thus, the conventional in painting techniques is very speed up of the new class of fast inpainting techniques are developed.

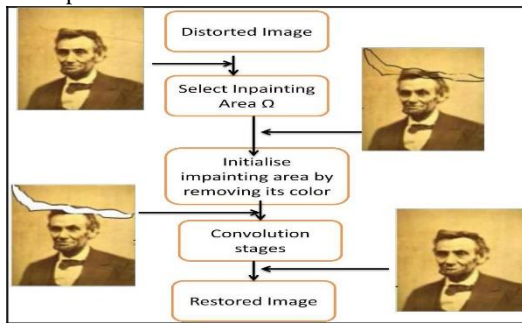


Figure 1 : Block Diagram of Convolution based Image Inpainting Method

**C. Exemplar-based Image Inpainting:** Based on similar work on texture synthesis having a goal of better recovering texture of the damaged area the other category of image inpainting method has appeared in last decade. The image inpainting technique is slightly different from texture synthesis problem.

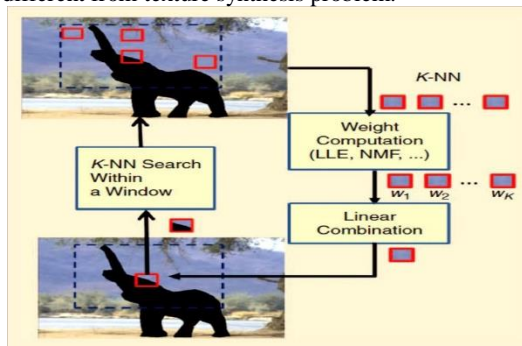


Figure 2 : The estimation of unknown pixels with neighbour embedding

The terminology *exemplar-based inpainting* now mostly refers to these methods that synthesize entire patches by learning from patches in the known part of the image.



Figure 3 : Result of Exemplar Based Inpainting using KNN

**D. Face Recognition by Using Principal Component Analysis(PCA):** The recognized images can be normalized by using the Principal Component Analysis. PCA is various transformed the possibly correlated variables into a smaller number of

uncorrelated variables by using a mathematical method [13].

**E. Comparative Analysis:** The accuracy of the proposed approach is compared with some existing approaches is recognition of the face. To measure the biometric recognition accuracy is to compute false rejection rate (FRR) and the false acceptance rate (FAR) is the common way.

### IV METHODOLOGY

The proposal is to design a robust Occlusion Removal System so that it would be convenient to restore occluded facial images and retrieve occlusion free image so that Face Recognition System would recognize the required face. The Recognition system challenge will be reduced to certain extent and accuracy to be improved. Presenting system would provide input image to Face Recognition System after the removal of occlusion.

In this work, an approach for restoring facially occluded images is proposed. A task is to obtain occlusion free image from partially occluded facial images for Face Recognition purpose.

#### Flow of Project:-

The model of the proposed system are follows:-

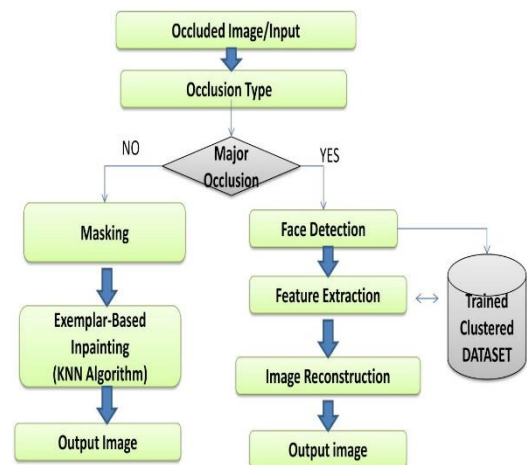


Figure 4 : Flow diagram of project

#### 1. Input Image –

The first stage in input image process is select the image which is find occluded and browsing the origin in the organization and classify image in the category minor and major occlusion depending on the basis of occlusion.

#### 2. Occlusion type –

Occlusion may be categorized either as Minor Occlusion or as Major Occlusion. The differentiation done is on the basis of background texture present in image.

#### 3. Masking –

After selecting Inpainting technique, the first step is to find the occluded area is to be masked. Wherever occlusion present in image is to be selected which is known as masking of occluded region. As the occluded area in image is masked, the algorithm get X1,Y1 coordinates by on click event of mouse and respective X2,Y2 coordinated by click release event of mouse.

#### 4. Exemplar Based Image inpainting Technique –

The technique uses KNN algorithm which could remove the occluded pixels using nearest background pixels. Thus, the technique is to be selected

here is INPAINTING. The need of mentioning these techniques is to reduce complexity on the basis of Occlusion.

Three process of Major Occlusion are as follows:- A) Detection of Face, B) Extraction of Face, and C) Reconstruction of Face

**A) Detection of Face -**

Before begins the further process then the input image is to organized. Here, only facial image is detecting and extracting from entire image excluding surrounding region. They need for extracting facial image from entire image is because to perform further processes with better accuracy and efficiency for replacement tasks. The output image is found to be organized and relevant for further process.

**B) Extraction of Face and Clustering -**

It gets the obtained image by face detection which is to be organized. In this, extracted of feature in the form of vectors and reproduce as the 66 line of code like color segmentation, texture and edges. The dataset was initially trained and clustered. K-medoids is a widely used algorithm which uses Euclidean distance among feature vectors of each image.

By obtaining matching vectors, particular cluster is retrieved on the label.

**C) Reconstruction of Face - S**

Every image remained relevant, it is possibly to simply detect occluded part of input image thereafter those pixels are substituted with the pixels of relevant images and output will be recreated or reconstructed image which seems to be dis-occluded.

Thus it can be stated as Occlusion is removed virtually and produced occlusion-free image. Get the image is occlusion free image.

**V RESULT AND DISCUSSION**

Input: Facially occluded Image

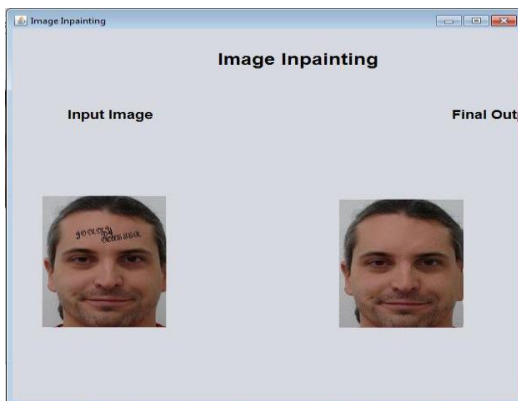
Output: Occlusion free Restored Image

The user has to classify the occlusion whether it is minor occlusion or major occlusion. Following is the process how the system works or different cases.

**Experiment 1: When Occlusion Is Minor**

First case considered here is when image consisting Minor Occlusion which can efficiently be removed or restored with Image Inpainting technique simple by Exemplar based method which uses KNN algorithm.

Processing of KNN algorithm after entire iterations the occluded area seems to be restored and output image can be stated as dis-occluded image.



**Figure 5 : Final output of Occluded Image**  
**Experiment 2: When Occlusion Is Major**

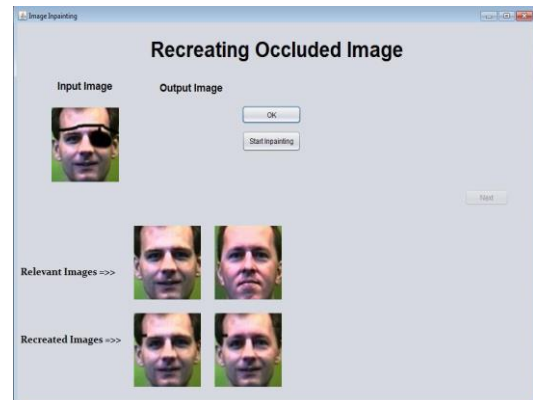
In Second case, the occluded image is categorised as major Occlusion. Such occlusion

generally consist of sunglasses, goggles, beards, scarfs, masks, etc. these category of occlusion are not possible to remove by Simple direct Inpainting technique. So, alternative is matching process.



**Figure 6 : Matching Process**

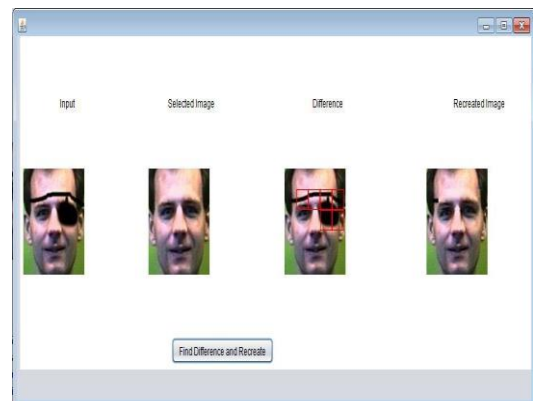
Next step is to compare input image with number of images available in retrieved cluster. Now one to one comparison is done again with Euclidean distance formula, the images with lesser difference with input image is shortlisted for next process since less difference describes maximum match.



**Figure 7 : Relevant images with Image reconstruction**

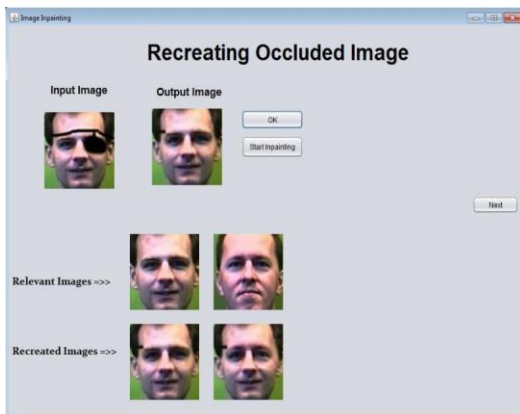
**\* Reconstruction of occluded parts:**

It finds differences between input image and selected image within a threshold value. While calculating the difference between occluded input image and selected image, FW-PCA is used to detect occlusion automatically and replace with parts of selected image.



**Figure 8 : Reconstruction of occluded image**  
Same process of Reconstruction mentioned above is applied for all relevant images and all recreated images

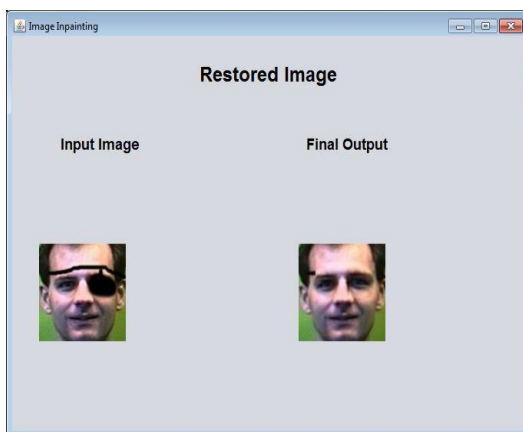
are displayed. Among all recreated images user has to select one image optimally seems best to matching with the input image as shown below.



**Figure 9 :** Selection of best match image

**\*Selecting best matching image for Final Output:**

The image selected would be considered as the final output image and best matching to input image. After entire process, the image found output is considered as a final output image.



**Figure 10 :** Final Output Image to occluded input image

**IV CONCLUSION**

To challenges to reduced the face recognition ‘Reconstructing the Occluded Facial Image’ with quick relevant to output image. It is observed that combination of KNN algorithm, Voila Jones Algorithm, Feature Extraction, and FW-PCA in a single system make it possible to remove facial occlusion as well as restoration of occluded image provide good result with better accuracy within a second.

**REFERENCE**

- [1] Hongjun Jia and Aleix M. Martinez “Face Recognition with Occlusions in the Training and Testing Sets”, 2008-IEEE.
- [2] Christine Guillemot and Olivier Le Meur in jan-2014 introduced two new technique “overview and recent advances in IMAGE INPAINTING”.
- [3] Tomoki Hosoi, Sci Nagashima and Koichi Ito, “Restoration of Occluded Regions Using FW-PCA for Face Recognition” 2012-IEEE.
- [4] P’adraig Cunningham1 and Sarah Jane Delany2 “k-Nearest Neighbour Classifiers” *Technical Report UCD-CSI march-2007.*
- [5] Mahroosh Banday and Richa Sharma, in july-2014”Image Inpainting- An Inclusive Review Of the Underlying Algorithm and Comparative Study of Associated Technique”.
- [6] Rui Min and Jean-Lue Dugelay,” Inpainting of Sparse Occlusion In Face Recognition” Feb-2012 IEEE transaction
- [7] Irene Kotsia, Ioan Buciu, Ioannis Pitas, “An Analysis of Facial Expression Recognition Under Partial Facial Image Occlusion”, 2008.