# Facial Quality Enhancement Based Vector Segmentation

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**ABSTRACT:** Human face is the most common biometric used for the identification of different persons. Face gives the information about the exact match for the purpose of security. Many computer vision researchers and Machine Vision researchers are working in this field of Face recognition and detection by the system. This approach covers many areas like Security, Surveillance, and Forensics etc. In this we proposed one method of face recognition from and image by using skin colour segmentation approach and connected region approach. Automatic recognition of people is a challenging problem which has much attention during recent years due to its many applications in different fields. Face recognition presents a challenging problem in the field of image analysis and computer vision. The security of information is becoming very significant and difficult. Security cameras are presently common in airports, Offices, University, ATM, and Bank and in any locations with a security system. Face recognition is a biometric system used to identify or verify a person from a digital image. Face recognition system should be able to automatically detect a face in an image. This involves extracts its features and then recognize it, regardless of lighting, expression, illumination, ageing, transformations (translate, rotate and scale image) and pose.

## I. INTRODUCTION

In the past decades, handling common image flaws has gradually improved with the use of more sophisticated image priors and models. Early methods used pixel-based statistics, such as smoothness, piecewise smoothness, total-variation, pixel correlation, or wavelet decomposition for image reconstruction. In recent years, nonparametric patch-based methods, such as Nonlocal Means and BM3D, exploited local and nonlocal self-similarities. Other patch-based, training-based methods were using Markov Random Fields and dictionary learning. Today's main state-of-the-art methods are based on square patches with little if any semantic context. In recent years, using generic image priors has started to reach an optimality bound; for example, for super-resolution and denoising. For facial images, facial priors were then used to break this limit; For example, face hallucination, or image compression using K-SVD. We propose an alternative concept of using large non-rigid patches with high semantic value.

We aim to use non-rigid processing of semantic patches of facial features, while preserving structure and context coherency, to overcome the classical processing limits. Given today's highly available mobile photography devices, our model assumes using high-quality personal priors but no knowledge of the degradation model. The degradation can involve noise following possible nonlinear processing, resolution reduction, a certain degree of motion blur and contrast and color changes. Our approach suggests to solve the problem indirectly by a mechanism which is invariant to low-to-moderate quality reductions. We also assume that no

matches of high quality (HQ) and low quality (LQ) data are available for learning. As there is no degradation model, one also cannot generate faithfully LQ images by degrading HQ images (e.g. adding noise to a clean image). Experimental results are demonstrated on the problem of dark cellular image enhancement.

## II.EXISTED SYSTEM

The existed system is to be composed of a number of sub-systems according to each stage of iris recognition. These stages are:

• Image acquisition: Image acquisition means capturing image of eye.

• Segmentation: locating the iris region in an eye image is known as segmentation

• Normalization: Normalization means creating a dimensionally consistent representation of the iris region

• Feature encoding: Feature encoding creates a template containing only the most discriminating features of the iris.

The input to the system will be an eye image, and the output will be an iris template, which will provide a mathematical representation of the iris region.

**A. Image Acquisition:** The iris image is rich in iris texture as the feature extraction stage is based on the image quality. The following attentions have been taken care at the time of grabbing the image.

• High resolution and good sharpness: It is necessary for the detection of outer and inner circle boundaries accurately.

• Good lighting condition: The system of diffused light is utilized for preventing spotlight effect.

**B. Segmentation:** The initial stage of iris recognition is to isolate the actual iris region in a digital eye image. The iris region can be approximated by two circles, one for the iris/sclera boundary and another for the iris/pupil boundary. The success of segmentation depends on the quality of eye images. The center of pupil can be utilized for detecting the outer radius of iris patterns. The iris inner and outer boundaries are located by finding the edge image by utilizing the Canny edge detector.
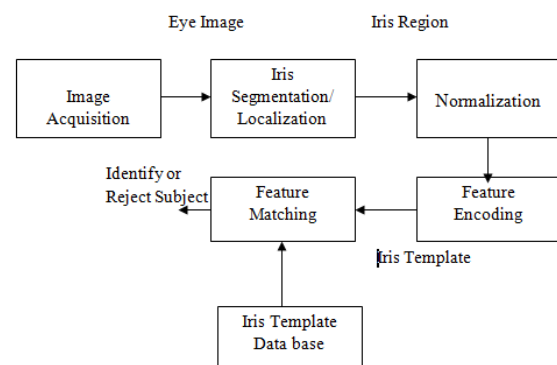


**Fig 1. Iris Detection System**

The algorithm runs in 5 separate steps:

1. Smoothing: Filtering and blurring of the image is for removing noise such that pixels creating indifferent spots can be reduced.

2. Finding gradients: At the points/pixels where color pattern falls in the similar threshold region are grouped together. The edges should be marked where the gradients of the image has large magnitudes.

3. Non-maximum suppression: The image portion to be processed is non linear and circular or convex. Hence, boundary region matching the closets shape is taken out for only local maxima and then should be marked as edges.

4. Double thresholding: Potential edges are regulated by the thresholding.

5. Edge tracking by hysteresis: Final edges are determined by suppressing all edges that are not connected to a very certain (strong) edge.

**C. Image Normalization:** After the iris region is segmented the next stage is to normalize this part for enabling generation of the iris code and their comparisons. Since variations in the eye such as optical size of the iris, position of pupil in the iris, and the iris orientation change person to person, it is required to normalize the iris image. Hence, the representation is common to all with similar dimensions. Normalization process is unwrapping the iris and transforming it into its polar equivalent. It is done by utilizing Daugman's Rubber sheet model. The centre of the pupil is assessed as the reference point and a remapping formula is utilized for converting the points on the Cartesian scale to the polar scale. Feature extraction is done to detect the iris.

### III.PROPOSED SYSTEM

The objective of proposed system was to design and implement face recognition in MATLAB which will detect human faces in an image similar to the images of training. A wide spectrum of techniques have been utilized which including color analysis, template matching, neural networks, support vector machines (SVM), maximal rejection classification and model based detection. It is difficult for implementing the algorithms that work for all illuminations, sizes and geometries, face colors, and image backgrounds. As a result, face detection remains as an art as science. Our method utilizes the rejection based classification.

The face detector consists of a set of weak classifiers which rejects the non-face regions. The non-skin color regions are rejected by utilizing segmentation of color. A set of morphological operations are applied for filtering the clutter. The remaining connected regions are classified based on their geometry and the number of holes. Template matching is utilized for detecting zero or more faces in each connected region. A block diagram of the proposed system is shown in Figure 1.
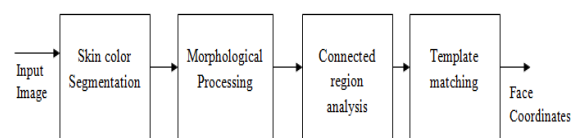


**Fig 2. Block diagram of proposed system**

**a. Skin Color Segmentation:** The skin color segmentation is for rejectng the non-skin color regions from the input image. Segmentation is based on the color of the human face across all races which agrees closely in its chrominance value and varies mainly in its luminance value. We select the RGB (Red, Green, Blue) color space for segmentation. Since, it decouples the chrominance information from the luminance information. Thus, we can focus on the hue and the saturation

component. The faces in each training image were extracted by utilizing the ground truth data and a histogram was plotted for their color components.

The histogram reveals that the RGB color components for faces are clustered. This information was utilized to define appropriate thresholds for RGB space which correspond to faces. The threshold values were embedded into the color segmentation. During the execution of the detector, segmentation is performed as follows:

1. The input image is sub sampled for improving the computational efficiency

2. The resulting image is converted to RGB color space

3. All pixels that fall outside the RGB thresholds are rejected (marked black).

**b. Morphological Processing:** The skin color segmentation is for rejecting non-skin colors from the input image. However, the resulting image has a bit of noise and clutter. A series of morphological operations are performed to clean up the image. The goal is to end up with a mask image which can be applied to the input image to yield skin color regions without noise and clutter.

A description of each step is as follows:

1. Since morphological operations work on intensity of images, the color segmented image is transformed into a gray scale image.

2. Intensity thresholding is performed for breaking dark regions into several smaller regions. They can be cleaned by morphological opening. The threshold is set to low enough. So that it doesn't chip away parts of a face but only create holes in it.

3. Morphological opening is performed by removing very small objects from the image while preserving the shape and size of larger objects in the image. The definition of a morphological opening of an image is the erosion which is followed by dilation utilizing the same structuring element for both operations.

4. Hole filling is done for keeping the faces as single connected regions in anticipation of a second much larger morphological opening. Otherwise, the mask image will consists of many cavities and holes in the faces.

5. Morphological opening is performed for removing small to medium objects that are safely below the size of a face.

**c. Template Matching:** The basic idea of template matching is for convolve the image with another image (template) which is representative of faces. Finding an appropriate template is a challenge. Since, ideally the template (or group of templates) should match any given face irrespective of the size and exact features.

**Viola – Jones Technique:** The Viola–Jones object detection is the initial object detection for providing competitive object detection rates in real-time. It is proposed in 2001 by Paul Violaand Michael Jones. It can be trained for detecting a variety of object classes and it was motivated by the problem of face detection.

**Feature types and evaluation:** The features employed by the detection framework universally including the sums of image pixels within rectangular areas. As such, they bear some resemblance to Haar basis functions, which have been utilized previously in the image-based object detection. However, since the features are utilized by Viola and Jones all rely on more than one rectangular area, they are generally more complex. The figure at right illustrates the four different types of features are utilized in the framework. The value of any given feature is always simply the sum of the pixels within clear rectangles subtracted from the sum of the pixels within shaded rectangles. As is to be expected, rectangular features of this sort are rather primitive when compared to the alternatives such as steerable filters. Although they are sensitive to vertical and horizontal features, their feedback is considerably coarser.

However, with the utilization of an image representation known as the integral image, rectangular features can be evaluated in constant time which gives them a considerable speed advantage over their more sophisticated relatives. Each rectangular area in a feature is always adjacent to at least one other rectangle.
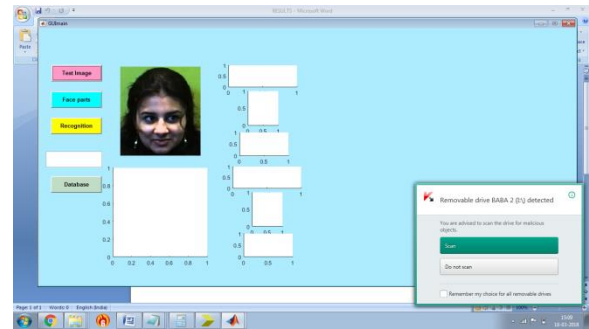
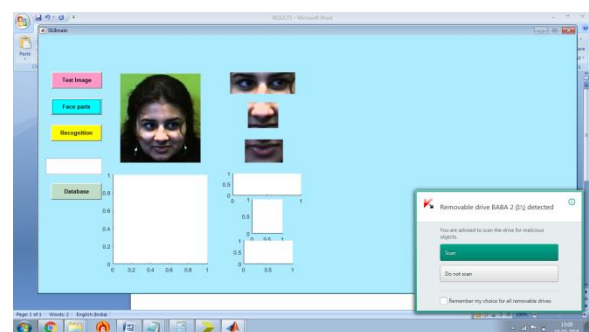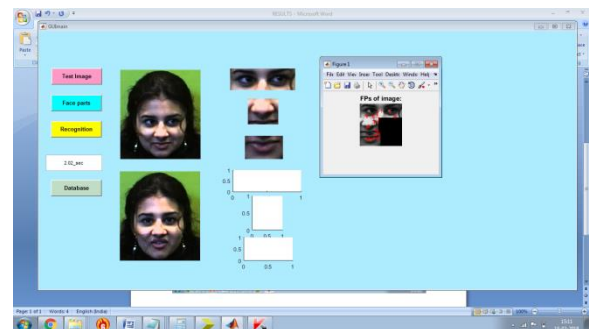### IV. RESULTS



**Fig 3. Test Image**



**Fig 4. Face Parts**
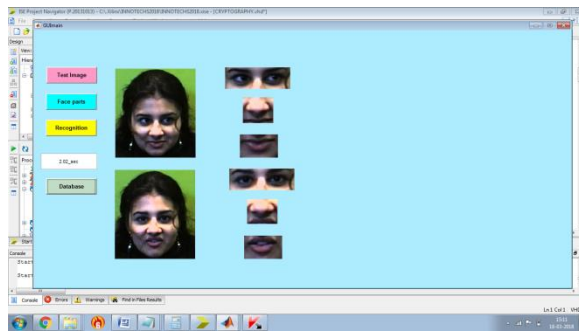


**Fig 5. Recoganisation of Face**

**Fig 6. Data Base**

## V. CONCLUSION

In this project, we surveyed the various face recognition methods and issues faced in real life and how to overcome these issues that can be solved using various image processing techniques and their advantages. To handle issues such as facial ageing, pose, occlusion, etc. Different techniques are used independently. In this project, we have discussed on the various stages of face detection technique. Recently, face detection techniques have been employed in different applications such as face recognition, facial feature extraction, detection of facial expression.

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