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 color segmentation approach and connected region approach.

Keywords-- Machine Vision, Computer Vision, Skin Color Segmentation, Connected Regions, Surveillance

I. INTRODUCTION

Face recognition is one of the most relevant applications of image analysis. It's a true challenge to build an automated system which equals human ability to recognize faces. Although humans are quite good identifying known faces, we are not very skilled when we must deal with a large amount of unknown faces. The computers, with an almost limitless memory and computational speed, should overcome human’s limitations. Face recognition remains as an unsolved problem and a demanded technology.

Many face recognition algorithms don’t use color as a feature. However, it could be interesting to know if color plays a key role in human face recognition process. How objects are stored in the brain is a subject of much debate. Moreover, it isn’t known if color cues play an important role in object recognition or not. It is widely accepted that color cues do not provide diagnostic information for recognition, but they are not completely unrelated to face recognition systems. They could be nearly irrelevant when we try to recognize chromatically similar objects. On the other hand, it has been demonstrated that their contribution is essential under degraded conditions. So, color cues play an important role especially when shape cues are degraded. This feature could be extrapolated to face recognition system design Nosu and Kurokawa [17].

A. Face Recognition System Structure

The input of a face recognition system is always an image or video stream. The output is an identification or verification of the subject or subjects that appear in the image or video. Some approaches define a face recognition system as a three step process - see Figure 2.1. From this point of view, the Face Detection and Feature Extraction phases could run simultaneously.

B. Challenges in Face Detection and Recognition:

- Pose variation. The ideal scenario for face detection would be one in which only frontal images were involved. But, as stated, this is very unlikely in general uncontrolled conditions. Moreover, the performance of face detection algorithms drops severely when there are large pose variations. It’s a major research issue. Pose variation can happen due to subject’s movements or camera’s angle.
- Feature occlusion. The presence of elements like beards, glasses or hats introduces high variability. Faces can also be partially covered by objects or other faces.
- Facial expression. Facial features also vary greatly because of different facial gestures.
- Imaging conditions. Different cameras and ambiental conditions can affect the quality of an image, affecting the appearance of a face.

C. Approaches to face detection

It’s not easy to give taxonomy of face detection methods. There isn’t a globally accepted grouping criterion. They
usually mix and overlap. In this section, two classification criteria will be presented. One of them differentiates between distinct scenarios. Depending on these scenarios different approaches may be needed. The other criterion divides the detection algorithms into four categories.

D. Detection depending on the scenario

- Controlled environment: It’s the most straightforward case. Photographs are taken under controlled light, background etc.
- Color Images: The skin colors can be used to find faces.
- Images in motion: Real time video gives the chance to use motion detection to localize faces. Another approach based on motion is eye blink detection, which has many uses aside from face detection.

E. Detection methods divided into Categories

- Knowledge Based Methods: Ruled-based methods that encode out knowledge of human faces.
- Feature-invariant methods: Algorithms that try to find invariant features of face despite its angle or position.
- Template matching methods: These algorithms compare input images with stored patterns of faces or features.
- Appearance-based methods: A template matching method whose pattern database is learnt from a set of training images.

II. PROPOSED ALGORITHM FOR FACE RECOGNITION

Step 1: Take a facial image.
Step 2: Apply Skin Color Segmentation to get skin color pixels.
- Find the average values of the addition of R, G, B components of each pixel in the taken facial image
- Assign white color to all the pixels having average value more than threshold value T, where T is the threshold represents the skin color
- At the end only skin pixels must highlights in the image.
Step 3: Evaluate the maximum Width and maximum Height of connected skin color pixels.
Step 4: Now assume W = max(width) and H = max(height) of connected pixels.
Step 5: if H ≤ T1 and W ≤ T1 then return. where T1 is a threshold represents the minimum number of continuous skin pixels required to have the possibility of face in an image. In proposed algorithm the value of T1 is considered as 50.
Step 6: Now check if \( \frac{H}{W} \neq 1:2 \) then return. There is no face present in the image else face is present in the image.

III. RESULTS

<table>
<thead>
<tr>
<th>Images</th>
<th>Total Input Images</th>
<th>Correct Detection</th>
<th>False Detection</th>
<th>Accuracy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Facial Images</td>
<td>150</td>
<td>148</td>
<td>02</td>
<td>98.66</td>
</tr>
<tr>
<td>Facial Images</td>
<td>219</td>
<td>216</td>
<td>03</td>
<td>98.20</td>
</tr>
</tbody>
</table>
VI. CONCLUSION

The size of an image is the biggest issue in Digital Image Processing; it affects the processing speed and storage activities. Color feature of an image gave some idea about the presence of skin pixels as skin pixels have low color range to categorize. Face recognition rates of the proposed algorithm show that Skin Color Segmentation is one of the best methods of face recognition.

REFERENCES

