Detection of Moles and Skin Marks from Color Skin Image

Sangeetha. S.  
IV SEM M.Tech (DEC) Dept of ECE, SaIT, Bengaluru, India

Abstract – Mole design identification is important clues in distinguishing medicinal related diseases and here and there it as a sign for recognizing criminals. Initial step is to note mole design changes from skin pictures, this paper displays a system to detect and label moles on skin pictures within the presence of clutter, occlusions and varying imaging conditions. The input RGB picture is processed with cascaded blocks to obtain moles and skin marks pictures. This strategy includes searching of entire input image for skin regions and processed further utilizing a Relative Permanent Pigment Vascular Skin Marks (RPPVSM) algorithm to discover possible mole candidates of differing sizes. Mole candidates are classified moles in the last stage utilizing a trained support vector machine. The execution of the composed framework is evaluated with input images and the test comes about show the viability of the proposed mole localization scheme.

Keywords – Skin, Mole, Skin Marks, Color Skin Image.

I. INTRODUCTION

Skin is the outermost covering of human body. It is a protective layer of the body which acts as first line of defense against foreign particles entering into the body. There are many diseases or conditions that affect the skin, so many marks which can be seen up on skin. Mole design discovery is essential signals in recognizing medical related diseases and now and again it as a clue for identifying criminals. A normal mole is usually an evenly colored brown, tan or black spot on the skin. It can be either flat or raised. It can be round or oval. Moles are generally less than 6 millimetres.

In this paper, a PC vision-based mole restriction framework is presented, which can possibly be important in enlisting mole designs naturally. Picture preparing strategies are widely utilized as a part of grouping moles as either harmful or kind confining moles in a bigger skin picture have gotten less consideration. Mole confinement framework is presented, which can conceivably be profitable in enrolling mole designs consequently. A rich descriptor is used to classify moles using a support vector machine. This method involves searching of entire input image for skin regions and processed further utilizing a Relative Permanent Pigment Vascular Skin Marks (RPPVSM) algorithm to find possible mole candidates of varying sizes.

II. METHODOLOGY

The proposed architecture illustrates RPPVSM identification system respectively. RPPVSM are detected from the segmented image.

Given an input RGB image moles uncovering method is used visualize moles and skin marks pattern from RGB images. Then extracted image pattern undergoes preprocessing method which improves the image data patterns that suppresses unwanted distortion or enhances some image features important for doing remaining process. For the extracted images RPPVSM algorithm is applied. Feature classification involves separation of moles images patterns and determination of skin marks.

3.1 Skin Segmentation

The skin color location approach utilizes factual techniques, for example, histogram and Gaussian blend model to characterize the scopes of skin color values in different shading spaces. Utilizing the created display, skin areas in pictures are restricted by thresholding look into table, guileless bayes classifier, or more mind boggling design acknowledgment methods. Then again, the picture division approach applies general picture division procedures, for example, bunching, thresholding, edge recognition, and locale developing to isolate picture into various districts in light of the intermittence or homogeneity of the pixel values in the picture. In this examination, skin division calculation is utilized as a preprocessing venture to presume databases which are generally gathered in controlled situations, for example, the detainee databases and the sex guilty party registries. Because of their expansive sizes, these database pictures request substantially more programmed handling than proof pictures gathered from wrongdoing scenes, which can be prepared physically or semi-consequently by legal officers.

For calculation advancement and framework assessment, shading pictures of different body parts were gathered. To reproduce a presume database, pictures were gathered in a standard posture and perspective condition, while to reenact prove pictures, pictures were gathered in changing stance and perspective conditions. Two regular qualities were seen from the pictures gathered in the institutionalized setting. In the first place, pixels of skin speaking to various parts of the human body (e.g., back, mid-section, arm, and thigh) shape homogeneous gatherings of pixels in the pictures, and second, skin is normally the biggest homogeneous district in the pictures. In view of these two properties, the Fuzzy C-Means (FCM) calculation, which is a famous bunching technique, was received for skin division. The preparatory adaptation of the RPPVSM discovery calculation has additionally been enhanced by altering the past static thresholding operation to a dynamic approach. What's more, a combination conspire amongst RPPVSM and vein designs for a multimodal ID in subjects with set number of RPPVSM is additionally proposed in this project.

3.2 RPPVSM Detection

RPPVSM are automatically detected from the skin segmented image in three steps - preprocessing, RPPVSM...
candidate detection, and classification. Given a skin-
segmented RGB image, its blue channel is extracted and
normalized by adjusting its intensity values to range
between 0 and 1. Blue channel is used because skin marks,
located at the surface of the skin, are more sensitive to the
wavelengths of the blue channel compared to the
wavelengths of the green and red channels, which
penetrate into the deeper layers of the skin. A
homomorphic filter is then applied to the blue channel
image to normalize its brightness and increase its contrast.
RPPVSM candidates with different sizes are detected by
Laplacian of Gaussian (LoG) filters with five different
scales ($\sigma = \sqrt{2}, 2, 4, 6, 8$) and a kernel size of 20×20. An
optimal response image defined as
$$IM_{opt}(x, y) = \max IM_{LoGS}(x, y),$$
where $IM_{LoGS}$ is the response image from the LoG
filtering operation with scale $S$, is then inverted so that the
RPPVSM candidates appear darker than the surrounding
skin pixels. To enhance the RPPVSM candidates, a third
rank-order filter with a kernel size of 5 × 5 is applied to
the optimal response image. The third rank instead of the
first rank is used to avoid amplifying the noise together
with the RPPVSM candidates. RPPVSM candidates in the
enhanced image are subsequently segmented from the
neighboring skin by a thresholding operation.

III. RESULT & SNAPSHOTs

Above fig (1) shows the input image of the mole of
individual person. This image is used for the extraction of
moles from skin images.

Fig. 1. Input image

Dilated gradient mask is obtained by dilating the binary
gradient mask by using the vertical structuring element
followed by the horizontal structuring element. This
method is used to get proper the outline of the image quite
nicely.

Fig. 3. Dilated gradient mask
The image obtained from the dilated gradient mask, can see holes in the interior of the cell. These holes can be filled imfill function in mat lab.

The image which is needed has been successfully segmented, but it is not the only object that has been found. Any objects that are connected to the border of the image can be removed using the im clear border function. The connectivity in the im clear order function was set to 4 to remove diagonal connections.

Image segmentation is used to locate objects and boundaries in images. It is a process of assigning a label to every pixel in an image so that pixel of same label shares certain characteristics.

Edge detection is used to find the boundaries of objects within images. It works by detecting discontinuities brightness. The need to detect brightness of image is to locate the variation in images borders and change in the characteristics.
Gradient magnitude is used to detect the amplitude edges at which each pixel changes their gray level suddenly. Gradient is high at the borders of the objects and low inside the objects.

Opening by reconstruction is one of the morphological techniques to clean up the image. Opening is erosion followed by dilation, where opening by reconstruction is erosion followed by a morphological reconstruction. These operations will create flat maxima inside each object that can be located using imregionalmax.

Reconstruction based opening and closing are more effective than standard opening and closing which removes small blemishes without affecting the overall shapes of the objects.
Thresholding opening and closing by reconstruction is the last method which is used to get clear and proper edges of a mole images.

**Fig. 13.** CMC curves of RPPVSM identification using the proposed RPPVSM detection algorithm, preliminary method, single-space LoG filtering method and FRST-based method

**Table I: The Accuracy of the Proposed RPPVSM Detection algorithm**

<table>
<thead>
<tr>
<th>ALGORITHM</th>
<th>RANK 1</th>
<th>RANK 5</th>
<th>RANK 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>preliminary method</td>
<td>59.23%</td>
<td>74.74%</td>
<td>79.61%</td>
</tr>
<tr>
<td>single-space LoG</td>
<td>50.13%</td>
<td>74.10%</td>
<td>78.97%</td>
</tr>
<tr>
<td>FRST-based method</td>
<td>37.31%</td>
<td>60.26%</td>
<td>67.82%</td>
</tr>
<tr>
<td>Proposed algorithm</td>
<td>77.99%</td>
<td>85.26%</td>
<td>88.97%</td>
</tr>
</tbody>
</table>

Figure 13 and table I shows the performances of the proposed RPPVSM detection algorithm, the preliminary RPPVSM detection method, the single-scale LoG filtering method, and the FRST-based method. The last two techniques were already proposed for distinguishing facial imprints. Keeping in mind the end goal to have a reasonable correlation, all the methods were applied to the blue channel of the shows the cumulative matching characteristic (CMC) curves of RPPVSM identification using SVM, neural network (NN), and decision tree (DT) classifiers. SVM achieved the best results with rank-1 and rank-10 accuracies of 73.33% and 82.8% respectively, followed by neural network with 71.03% and 84.87%, and decision tree with 54.23% and 72.8%. This is similar to our preliminary finding in [38] that SVM classifier is superior to neural network.

The proposed RPPVSM detection algorithm outperforms all the other methods with significant margins. The RPPVSM arrangement methodology in the proposed calculation avoids precarious skin marks, bringing about more steady recognizable proof. Besides, the proposed RPPVSM recognition calculation, which utilizes an element thresholding approach, handles illumination and difference varieties better and along these lines expands the framework, has rank-1 and rank-5 identification accuracies of around 77% and 85% respectively, and rank-10 identification accuracy of almost 90%.

**CONCLUSION AND FUTURE WORKS**

Relative Permanent Pigment Vascular Skin Marks (RPPVSM) algorithm is used to obtain entire input image for skin regions and to find possible mole candidates of varying sizes. Mole candidates are classified as moles in the final stage using a trained support vector machine. The performance of the designed system is evaluated with 10 input images, and the experimental results demonstrate the effectiveness of the proposed mole localization scheme.

**REFERENCE**


**AUTHOR PROFILE**

Sangeetha. S.
Place: Bengaluru, D.O.B. 15/08/1992 received the Bachelor of Engineering degree from HMSIT, Tumkur in 2014. Currently, she is pursuing M.Tech in the stream of Digital Electronics and Communication in Sambhram Institute of Technology, Bengaluru, India.