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COUNTING NUMBER OF SWEAT GLANDS USING IMAGE PROCESSING

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Abstract - More than about fifty thousand people per year are victim to abnormal skin diseases. Especially SGs (sweat glands) are one of the major causes of these diseases. Counting the number of sweat glands gives medical professionals an edge to diagnose them. Number of sweat glands determine the flow of heat in the body and health of skin; it is also closely related to heart diseases. Calculating the exact number of sweat glands is unreliable via naked eye, and previously designed methods have high inaccuracy. The modern day tools are highly accurate but at the same time are very expensive costing more than $400 per set. This paper presents a method that can be used for object counting of number of sweat glands, at very high accuracies than the previously used methods. We are designing a method by using Image Processing through which we can calculate the number of sweat glands on a sample image, and help dermatologists diagnose some of the commonly occurring skin diseases. The results can be exported to CSV format file or Google Sheets to critically analyze the depth of skin disease. The methodology is efficient in terms of both economical and statistical basis.

Keywords - Sweat Glands, Image Processing, CSV.

I. INTRODUCTION

Our sweat glands generate sweat to maintain the heat stress. Also with that sweat release the body give out vitals elements like sodium and potassium in terms of electrolyte. We also have the depletion of minerals which can be recovered easily. But some people may have abnormalities in their sweat gland region. Such abnormalities are usually seen in the focal areas such as palm, face, feet etc. If such a situation is not identified with care, then problems like heart problems, anxiety, hyperhidrosis, infection etc. may takes place.

There are two types for the abnormal sweat glands. Firstly, more flow of sweat will cause serious diseases (sweat on palm) e.g. toxic thyroid gland, goiter, tuberculosis, diabetes, heart disease and others. Secondly, less flow of sweat will cause, for example, psoriasis, prickly heat, migraine and others.

Nowadays, numbers of the SGs reported from Institute of Dermatology normally are counted by human eye from an image captured by a camera. However, there are two problems of counting number of the SGs. Firstly, the captured image is too small and not too clear, therefore; it may mistake for counting them. Secondly, if glands of sweat overlap, then it will cause difficult to count the glands.

This paper shows the result of counting number of the sweat glands using image processing. The process of image processing is used by a method as follows. The cropped image of the sweat glands is resized for an extensive size and it is converted to gray image. Then, unsharp filter is used for clarity of the sweat glands. The image enhancement needed Quality of the image it enhanced by using adaptive histogram equalization. The regional minima of the H- minima transform, is used for counting number of the sweat glands. The experimental results show that the accuracy, sensitivity

and precision are approximately at 70.31%, 77.38% and 88.89%, respectively. It saves time to analysis of the sweat glands.

II. EXISTING SYSTEM

The existing systems are not efficient in terms of determining the exact count. It could generate an error. The glands are counted manually i.e. with the help of human eye. The existing system follows number of steps to count the number of sweat glands in the image which are as follows:

- Painting iodine and sprinkling power on the foot.
- Standing on the paper.
- Capturing the image on the affixed paper.
- Cropping the image.
- Counting number of the sweat glands using human eye.
- Doctor diagnosis.

There isn't any proper user interface in the existing systems. It is time consuming and not accurate. Also, versions are not purely software based.

III. PROPOSED SYSTEM

This system has the procedure of determining accurate count using various algorithms and performing various numerous iterations for accurate analysis. In this we will take the image of hand palm because that place have more count of sweat glands. The approx count of sweat glands are near 700. This system is more efficient and accurate. It saves time and generates more accurate report. All the calculations are software based.

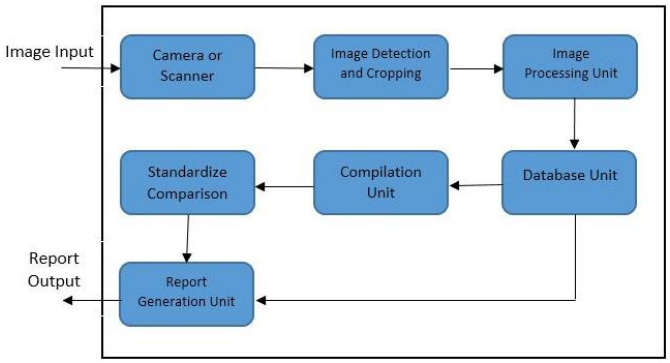

Fig.1 System Design

The cropped image of sweat glands:

Image is then processed and 1×1 square inch area of the part of the palm which has highest no of sweat glands density is traced. That part is then undergoes a series of image processing algorithms.

Resizing the image and converting RGB to gray image:

For a single set of disease, which is hyperhidrosis and ichtyohydrosis we have set standards of percentage density and no of sweat glands that must be present in that particular patch of area. In image processing module. We first resize the image x10 - x20 times to get a clear view. This is done to increase the accuracy of the output. The same image is then converted to grayscales Grayscale conversion will let us focus more on the actual spots of sweat glands. Then the image is subjected to Histogram equalization which will increase the contrast to best fit the clarity of the image.

Unsharp filter and extended maxima-minima transform:

Then the image is subjected to Histogram equalization which will increase the contrast to best fit the clarity of the image. Then the image undergoes an extended maxima-minima transform, which basically means that we invert the colors. So, now all the spots are white in color. To count the no. of sweat glands we are using labeling and object counting algorithms, which would connect the dots (sweat glands) till all the dots are visited. The no of dots visited is the actual count of number of sweat glands.

.**Counting number of sweat glands based on labeling:**

Finally we compile this data, into database of a single user and take minimum 5 samples of the same image at different locations and average the data so as to reduce the margin of error. The final output would be a CSV/ Excel file showing analysis of user's number of sweat glands, intensity of sweating and degree at which it is affected or needs diagnosis. Complementary suggestions on diet / exercise are suggested based on the given output.

Table 1: Comparison between existing system and proposed system

Existing system	Proposed System
This system is not efficient in terms of determining the exact count.	This system has the procedure of determining accurate count.
There isn't any proper user interface in this methods.	This system has a proper user interface including various units like image detection, standardized component unit etc.
There are more chances of errors.	There are less chances of errors.
This systems are more time consuming	It saves time and generates more accurate report.
Existing systems are not purely software based.	All the calculations are software based.

IV. SCOPE

The methodology covers only finite set of diseases namely: 'Hyperhidrosis' and 'Anhydrosis' and certain stages of Diabetes. Project covers only statistical part of dermatological analysis. This method can be used by doctors and physician to find range of a problem that can abide with excessive sweat. This method can be developed by gathering lot of samples and experience of different subjects from the start.

This can assist as well as subjects will be able to use them by their own. Finally this method can help to guide a subject to specialized doctors with knowledge of different organs.

V. CONCLUSION

The proposed method can count the number of the SGs using image processing. The image processing can help to improve clearly the SG image for suitable analysis to count the total number of SGs. It also saves the time to count them for recording and sending the data to the doctor analysis. However, this proposed method can be improved for higher accuracy than those results through the use of a new technique.

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