

Categorising Normal Skin, Oily Skin and Dry Skin using 4-Connectivity and 8-Connectivity Region Properties

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-----**ABSTRACT**-----

Skin is the outer layer of the body in humans. It is the largest organ of integumentary system. It has multiple layers that guard the underlying muscles, bones, ligaments and internal organs. Human skin is similar to that of most other mammals. Skin health is very important as it acts as a protective layer between the inside and the rest of the world, helps normalize body temperature, acts as a natural filter and is constantly growing. There are mainly 5 types of skin type: Normal skin, oily skin, dry skin, sensitive skin and combination skin. Knowing skin type is essential in order to maintain healthy skin and to choose suitable skin products. About 1518 individuals were estimated with new cases of occupational skin diseases reported within epiderm in 2015.in this paper, we will be discussing about characterization of skin types: normal,oily and dry skin based on 4 connectivity and 8 connectivity region properties.

Keywords – Normal skin, oily skin, dry skin, region properties, 4 and 8-connectivity.

I. INTRODUCTION

The Skin types can be classified in to normal skin, oily skin, dry skin, combination skin and sensitive skin. The normal skin type is not too dry or not too oily. It has very few imperfections and has no severe sensitivity. It has barely visible pores and gives a radiant complexion. it is soft to touch and complexion is more or less even with a regular texture.Oily skin is associated with excess oils and pores caused by overactive sebaceous glands. Oily skin refers to a skin type that is shiny, thick, slipperyand heavy textured **skin** especially on the T-zone. It is frequent in younger women but as their age increases, their skin becomes much drier. Dry skin, also called xerosis, is a very frequent skin condition that occurs at all ages. Usually, it will not represent a serious problem but sometimes it can be difficult to treat. Moreover, it might be related to other skin diseases or associated to pathological conditions such as diabetes, hypothyroidism and hyperthyroidism, malnutrition etc .Dry skin is an uncomfortable condition marked by scaling, itching, and cracking. It can occur for a range of reasons like winter weather, steamy showers, moisture rubbing soaps and for many other reasons. Skin disorders differ greatly in symptoms and severity.

They can be temporary or permanent, and may be painless or painful. Some have situational causes, while others may be hereditary. Some skin conditions are minor, and others can be life-threatening. Chronic skin conditions usually aren't curable, but they can be managed using drugs and by paying close attention to the lifestyle. Eczema is phrase for a group of medical conditions that cause the skin to become inflamed or irritated. Psoriasis is a frequent skin disorder that produces thick red plaques covered with silvery scales. Although acne remains mostly a curse of adolescence, about 20% of all cases occur in adults. Rosacea is a common disorder that mainly affects facial skin .The symptoms are redness on the nose, chin, cheeks, and forehead. Skin cancer is the most frequent form of cancer. The two most common types are basal cell cancer and squamous cell cancer. They generally form on the head, face, hands, neck and arms. Another type of skin cancer, melanoma, is more dangerous but less common. Another common skin disorder is wrinkles. Your skin changes as you age. You might notice age spots, wrinkles and dryness. Sunlight is a major cause of skin aging. Cigarette smoking also contributes to wrinkles. The wrinkling increases rapidly with the number of cigarettes and years a person has smoked. Medications used to treat skin conditions include topical and oral drugs like Antibacterial which are medicines

often used to treat or prevent infection. Anti fungal creams for avoiding fungal based skin disorders and Benzoyl peroxide creams are used to treat acne and salicylic acid which forms a major component in many skin products.

Xiangli et al[1] proposed the method of region properties in comparison with some of the existing methods .S.Jitaree,et al[2] the proposed method in classifying the histological structures in breast cancer cell image and the application in improving the cell counting accuracy in the computer-aided system. NaserAlfed, FouadKhelif, et al[3] f 200 medically annotated images were obtained from the database of the Hospital and validated by the proposed system . HarunaSuzuta, et al[4] this proposed analysis system could automatically estimate human skin surface condition based on individual evaluation from various skin images. Y. George,et a[5]l in this method the pixel skin segmentation process was used in which 100 psoriasis images were taken. MdNafiulAlam, et al [6] it used automatic detection method to measure the severity of eczema using image processing.

II. METHODOLOGY

In the proposed method, three skin type images are taken for experimentation. The region of interest (ROI) is selected and then the ROI is undergone pre-processing, which consists of-

1. Image filtering by high pass filter.
2. Image enhancement by Histogram Equalization.

The formula for Histogram Equalization is as follows:

$$\sum_{i=1}^k = m_i \dots \dots \dots (1)$$

Where, n be the total number of observations and k be the total number of bins, the histogram m_i .

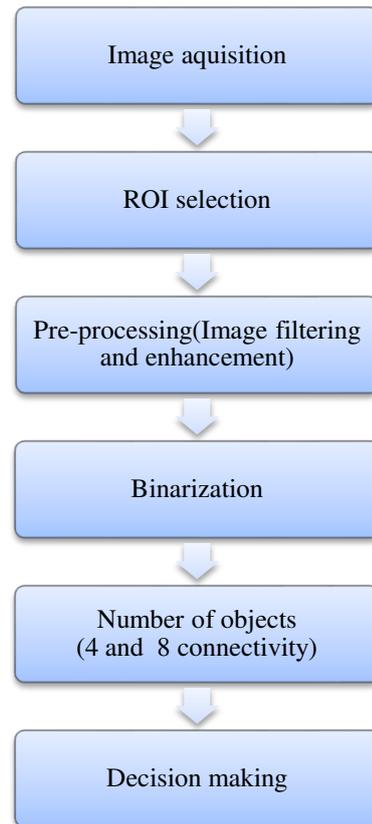


Fig1. Flow Diagram

After Pre-processing, the obtained image is converted to binary. For the obtained binary image 4-connectivity and 8-connectivity region, properties are calculated to characterise the skin types..

III. RESULTS

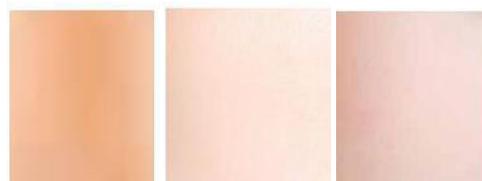


Fig2: Set of Normal Skin Images



Fig3: Set of Oily skin images



Fig4: Set of Dry Skin images

Table1: Number of Connected components

(4-connectivity)

	Normal Skin	Oily Skin	Dry Skin
Image 1	21	102	259
Image 2	31	184	367
Image 3	13	208	322

Table2: Number of Connected Components
(8-connectivity)

	Normal skin	Oily Skin	Dry Skin
Image 1	14	61	132
Image 2	14	83	157
Image 3	05	108	161

Figure2 shows the set of normal skin images. Figure3 shows the set of Oily skin images. Figure4 shows the set of dry skin images. Table1 shows the number of objects with 4-connectivity and Table2 shows a number of objects with 8-connectivity.

IV. DISCUSSION

A set of nine skin images as three in each category of normal skin, oily skin and dry skin images are taken for experimentation. A region of interest (ROI) is selected in each image. High pass filtering for noise removal and histogram equalization for Enhancement are done in pre-processing stage. 4-connectivity and 8-connectivity region property values are obtained for normal, oily and dry skin images. The results obtained are tabulated i.e. table1 which shows that the number of objects for normal skin is in the order of tens, oily skin is in the order of hundreds and dry skin is in the order of hundreds by 4-connectivity. Table2 shows that the number of objects for normal and oily skin is in the order of tens and dry skin is in the order of hundreds by 8-connectivity. By comparing the region properties of both 4-connectivity and 8-connectivity from table1 and table2 it is found that the 4 and 8 connectivity region properties is less in normal skin, slightly higher in oily skin and highest in dry skin due to which the skin types can be differentiated.

V. CONCLUSION

The proposed system is tested on three sets of normal skin, oily skin and dry skin images. It was observed that normal skin has less 4 and 8 connectivity region properties whereas oily skin has slightly higher and dry skin has the highest 4 and 8 connectivity region properties. However, more images of normal, oily and dry skin images are to be

tested for developing an expert system for computer-aided diagnosis using 4-connectivity and 8-connectivity region property.

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