# Skin Cancer Detection using Image Processing Techniques

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**ABSTRACT**

Human suffered with lot of skin disease even though fearful skin disease is tumour. Tumour is one type of skin cancer, its cure able when detected in early stages. Skin cancer are classified as basal cell carcinoma, squamous cell and melanoma. Image Processing, one of the familiar methodologies provides evident solution for all types of image related research. Skin abnormalities like skin rash, dandruff, acne and eczema are identified through classification techniques using color, texture and shape features. This paper summarizes the detection of skin abnormalities through various features in Image Processing techniques.

**KEYWORDS:** Ubiquitous Computing, Healthcare Monitoring System, Wireless Network, Network Surveillance, Health care Management

## INTRODUCTION

Skin is the outermost covering of human body and it is the major organs of the human body with a weighted an average of four kilogram, cover an area of two square meters. It is a protective layer of the body which acts as first line of defense against foreign practices entering into the body like bacteria. It helps to normalize body temperature and permit the sensation of touch, heat and cold. Skin has three layers such as epidermis, dermis and hypodermis.

Epidermis is the outmost layer of the cell in the human skin. Cells in the skin are highly effective barrier against germs and also act as waterproof. Melanocytes are special cell have ability to produces pigment melanin and itis located at the bottom layer of the skin. It has the capability to regrow and replace the damaged cells. It is the collection of 4 to 5 layers depending on the region of skin include stratum corneum, stratum lucidum, stratum germinativum, and stratum spinosum and stratum basale.

Dermis is the layer of skin appeared between epidermis and hypodermis tissues. It contains connective tissues act as cushion of the body to protect from stress and strain. Dermis is categorized into two layers namely, stratum papillary and reticular layer. It is tightly connected to epidermis through a basement membrane. It also contains Mechanoreceptors which provides the sense of heat and tough, sweat glands, sebaceous glands and blood vessels [1].

## SKIN ABNORMALITIES

Skin abnormality is an abnormal condition of a part, organ, or system of an organism which is caused by infection, redness, or genetic defect and characterized by an identifiable group of signs, symptoms or both. Few abnormal conditions that occur on skin are rash, dermatitis, Eczema, psoriasis, dandruff, acne, cellulitis, skin abscess and rosacea.

Skin rash is a change of the skin which affects its color, appearance or texture. It might be caused because of food allergy, fungal infection, exposure to sun or heat. The shedding of dead skin cell from scalp is called dandruff. Dandruff is formed due to causes like dry skin, eczema and produced by the epidermis layer continually replaced by pushing the cells outward where they eventually die and flake off.  Medical term of acne is called acne vulgaris. It is one of the chronic skin conditions resembled like blackheads, whiteheads, pimples, greasy skin. A noncontiguous inflammation of the skin, characterized chiefly by redness, itching and the outbreak of lesion that may discharge serous matter are the symptoms [2,3].

## APPLICATION OF IMAGE PROCESSING ON SKIN ABNORMALITIES DETECTION

Application of image processing is important for detecting skin abnormal condition like mole detection, melanoma and skin infection. Various phases in image processing techniques helps to detect normal skin from abnormal skin condition.

### Color and texture-based detection

Based on color and texture feature nevi, dysplastic nevi, dots, lentigines and squamous cell carcinomas are diagnosed using standard back-propagation neural network. Granularity also called as peppering or multiple blue-grey dots is defined as a gathering of small, blue grey granules in dermoscopy images. Granularity is most closely associated with a diagnosis of malignant melanoma. It analysed the areas of granularity with color and texture measures to discriminate granularity in melanoma from similar areas of non-melanoma skin lesions [4,5].

### Blotch detection

Dots, blotches and globules are detected based on this color and shape features. Absolute color thresholding based methods are used to segment blotch-like regions where threshold values are placed on the red, green, and blue (RGB) color planes in of skin lesions images. Structure less areas such as dots, blotches and globules have similar color characteristics, size constraints are applied to the threshold regions to find blotch-like areas.

### Blue-White veil detection

One of the most important features for the diagnosis of melanoma in dermoscopy images is the blue-white veil. Pixel based classification techniques are used to classify blue-white veil images. The methods are comprised of several steps including pre-processing, feature extraction, decision tree induction, rule application and post processing. The detected blue-white areas were characterized using numerical features.

### GENERAL ARCHITECTURE OF ABNORMAL DETECTION

The general process of abnormal skin detection can be categorised into several process which can be shown in Fig.1.

**Image Acquisition**

Image is formed by combining illumination and reflection of energy from source. Images can be either two dimensions (2D) or three dimensions (3D) depending on the applications. Image acquisition can be categorized into single sensor where it consists of only one sensor for example photodiode, sensor strips in which sensors are arranged in a sequence and sensor arrays in which numerous sensing devices are arranged in an array format. Acquisition is the process of collecting an image that is already represented in digital form.
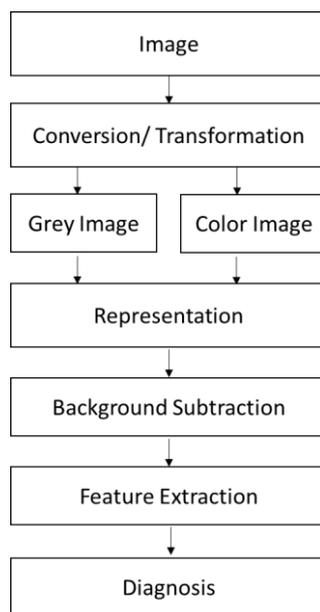
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Fig. 1 General Architecture of skin abnormal detection

**Image Conversion or transformation**

Conversation or transformation is a process of converting RGB image into grey image or binary image. Binary images are simply known as bi-level or two levels which stores single bit in each pixel. Grey scale digital image is an image where the value of each pixel is a single sample and stores only intensity information [6]. Color image are often built of several stacked color channels, each of them representing value levels of given channel. Grey image and color image are shown in Fig.2 (a) and (b) respectively.
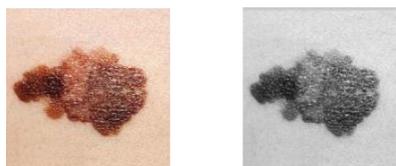
Fig.2 (a) Grey scale image      (b) Color image

## Image Representation

Image representation is the process of converting an input data into a suitable form for computer processing. Boundary representation focused on external shape characteristic, such as corner and inflections [7]. Regional representation is appropriate when focus is on internal properties such as texture or skeleton shape.

## Background subtraction

Background subtraction is a common technique for detecting moving objects and also known as foreground detection. Background image is referred as reference image. The rationale in the approach is to detect the moving objects by calculating the difference between current frame and a reference frame, often called as "background image", or "background model" [8]. Background subtraction is mostly done as a part of video stream. It provides an important cue for numerous applications in computer vision.

## Segmentation

Segmentation is a process of subdividing an image into perceptually similar regions with relevant information. It separates the region of interest from its background. Segmentation can be either region based or boundary based. Thresholding is the most commonly used segmentation technique which separates the object based on its threshold value. Boundary based segmentation detects the edges of an object and it is further considered for shape detection. Active contours are another technique used to detect objects in a given image using techniques of curve evolution [9]. It is also known as shape based or silhouette method which evaluates the boundary of an object using edge detection technique. Segmented skin images are shown in the Fig.3.
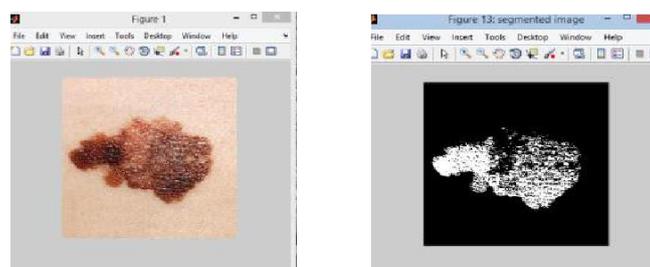


Fig.3 (a) Original image          (b) segmented image

**Feature Extraction**

Feature Extraction involves reducing the amount of resource required to describe a large set of data. Huge number of features involved large amount of computation power and memory on performance analysis. While using classification algorithm which overfits the training sample and poor generalization for new data. Feature extraction is a general term for generating combination of variables with production of high accuracy [10]. After segmentation, output of this segmented image is given as an input for extracting features such as texture, shape and color. The extracted texture features are given in the below table 1.

| Images | Contrast | Correlation | Energy | Homogeneity | Entropy | Variance |
|---|---|---|---|---|---|---|
| 1 | 0.028636 | 0.36637 | 0.99849 | 0.99949 | 0.33729 | 1.9192 |
| 2 | 1.1484 | 0.74332 | 0.90282 | 0.98256 | 0.33729 | 113.8333 |
| 3 | 2.0934 | 0.91733 | 0.47895 | 0.96508 | 0.33729 | 532.7649 |
| 4 | 1.2961 | 0.8869 | 0.7782 | 0.98023 | 0.33729 | 267.0761 |
| 5 | 2.7822 | 0.78678 | 0.69715 | 0.95298 | 0.33729 | 376.8865 |
| 6 | 0.62094 | 0.92013 | 0.85373 | 0.99053 | 0.33729 | 164.7043 |
| 7 | 0.83194 | 0.96513 | 0.63135 | 0.98913 | 0.33729 | 427.3693 |
| 8 | 1.4107 | 0.76293 | 0.88445 | 0.98054 | 0.33729 | 164.6579 |
| 9 | 0.62094 | 0.68602 | 0.94905 | 0.98932 | 0.33729 | 94.7868 |
| 10 | 1.5478 | 0.81397 | 0.87079 | 0.98221 | 0.33729 | 212.5843 |

Table.1 Feature Extraction

**Diagnosis**

Extracted features are given as input to classifier to classify pigmented areas. Classification techniques is used to classify whether benign or melanoma. Various classification methods are presented in image processing techniques.

**CONCLUSION**

In this paper classification method is used to classify the skin images and extract texture features of abnormal image. Features are extracted using co-occurrence matrix to reduce feature space dimensionality and the formal five features from the co-occurrence matrix are extracted. Skin abnormalities like skin rash, dandruff, acne and eczema are identified through

classification techniques using color, texture and shape features. This paper summarizes the detection of skin abnormalities from various extracted features.

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