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# Enhancement and Detection of Melanoma in Skin Images Using Local Binary Pattern (LBP)

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***Abstract— Although in recent advances many diagnostic systems were developed for detecting melanoma in the patients. In this we describe why recent developments could not be more adequate for detecting melanoma. It has noticed that the melanoma detection does not come out accurately from the background due to its intermixing with the similar color range in the RB color map. In this paper, a k-means clustering will be used which further followed by Local Binary Pattern (LBP). A k-means clustering will not only assist us to detect the melanoma but this also segment the cancerous part from the digital skin image. Further, the image is analysed by using Local Binary Pattern for dimensional analysis of skin cancer.***

***Keywords— K-Means Clustering, LBP, Dermoscopy Images, MATLAB***

## I. INTRODUCTION

Melanoma is not much known like other skin cancers. However, melanoma is very harmful if it is not treated in the beginning. It may causes the majority i.e more than 50% of deaths related to skin cancer. Globally, doctors diagnose about 160,000 new cases of melanoma annually. In women, the most familiar spot is the legs and in men, melanoma mostly found on the back. It is particularly common among Caucasians, especially in the northern Europeans and northwestern Europeans living in sunny weather. There are higher frequency of the melanoma in Oceans, North America, Europe, South Africa(SA), and Latin America. This geographic marking reflects the primary cause, ultraviolet light (UV) exposure crossed with the total of skin pigmentation among the people.

The healing involves the surgical diagnosis of the tumor. If cancerous melanoma may found during early stages, while it is still small like a spot and thin, and if it is completely off from the position it occupied, then the chance of healing may much high. The possibility for the second time of melanoma will depends upon how deeply it has gone inside the skin. For the melanomas that come back or spread, treatments for that melanoma include: chemo and immunotherapy, radiation therapy. According to the World Health Organization (WHO), near about 50,000 melanoma related deaths occur over worldwide per year.

The skin represents the body's first line of defense against the exterior environment. As skin is the soft cover of the human body, and although it covers the whole body, skin has the extent surface area with respect to all other organs. Skin prevents or reduces the attacks of viruses, bacteria, chemical substances and even UV light. It controls the body temperature by blood flow and evaporation through sweat. The secretion of sweat and skin lipid cause the elimination of a number of harmful substances resulting from internal metabolic activities. Also, skin keeps the body safe from friction and impact wounds gratitude to its flexibility and toughness. Moreover, skin can act as a sensory organ as well, since it has a large volume of nerve fibers and nerve endings. When skin visible to sunlight it produce vitamin D, which is a necessary substance for the body. These activities of the skin tend to vary according to age, race, gender and individuals health status. When the skin gets older, it tends to lose its flexibility and toughness.

### 1.1 Dermoscopy Image

Digital Images are not required. As Digital Camera is not capable of taking the inside images of the skin. For this a Dermoscope is required. Dermoscopy images are used by the dermatologist to identify or analyse the skin lesions.

### 1.2 Image Processing

Images are processed by using computer algorithms to improve the image acquisition artefacts. Processing is done to examine the image objects. So that required operations can be easily performed.

## II. RELATED WORK

Malignant melanoma (cancerous) among all is the most rapidly increasing cancer over the geographic. Image border detection step is often the beginning to identify skin lesion for the follow up to the computer-aided diagnosis. [1] As the current developed segmentation techniques able to locate the sharpest pigment change in the skin images taken by dermatoscope, the detected skin object borders are mostly lie inside the borders marked manually by the dermatologist.

Computer vision-based food identification should be used to evaluate a foods carbohydrate content for the diabetic patients. This research proposed a methodology for automatic food recognition, that rely on the bag-of-features (BoF)

 

method [2]. An extensive technical survey was conducted for the purpose to identify and optimize the best performing components involved in the BoF model and design, as well as the evaluation of the corresponding parameters.

Image Border detection of dermoscopy image is an important step to help physicians for identifying the skin lesions in the dermoscopy images. In this paper, they proposed a new technique to mark the skin lesions. [3] The technique involves the two steps: Image pre-processing and Image segmentation.

Induced pluripotent stem cells (iPSC) can be extracted from fully differentiated cells of adult human beings and used to obtain any other type of cells of the human body. This suggests numerous prospective applications of iPSCs in regeneration of medicine and drug evolution.[4] In order to get a suitable cell culture, a superiority control process must be used to locate and drop abnormal iPSC colonies. Computer vision based systems that inspect visual characteristics of iPSC colony health can be mainly useful in automating and improving the superiority control method.

Although in earlier advances in the region of computer vision various assisted diagnostics systems were developed for the detection of cancerous melanoma in the patients. Texture feature and color feature are considered as two fundamental characteristics which are vital for melanoma diagnosis. [5] This research proposed the use of combination of two fundamental features: texture and color features, for the classification and identification of dermoscopy images.

Earlier detection of melanoma, the death dealing form of skin cancer, has the possibility to minimize morbidity and mortality rate. However, clinical diagnosis of melanoma is not trivial even for skilled dermatologists, as it is composite and subjective.[6] Thus, it is vital to build up an automated computer-aided diagnosis (CAD) system for melanoma detection, which makes objective judgments that depends on quantitative analysis.

An automatic technique for the segmentation of skin images taken by dermatoscope and other pigmented lesions are presented. [7] Firstly the system reduces a color (RGB) image into a greatness image and more over segments the image by its intensity threshold. Then, by using image edges it clarify the segmentation process. An image region, where a skin lesion boundary potentially exists, is focused by using double thresholding. After that image edges are used to localize the boundary in that skin lesion area.

In this paper, they proposed a novel method popularly known as automatic segmentation of the skin lesion in usual macroscopic images. Many more algorithms or can say techniques have been proposed to diagnose the deadliest form of skin cancer.[8] A literature survey is done to review the state-of-art approaches for skin cancer diagnosis at the very beginning; Level Set Active Contours (LSAC), Skin Lesion Segmentation (SLS) and Multidirectional Gradient Vector Flow (MGVF) had given considerable results.

This paper at the very first step studies the past and current techniques for detecting skin cancer along with their relevant tools and techniques.[9] Then it further goes on discussing brief study about fundamental characteristics, features, advantages or drawbacks of each of the approach used. Then we discuss the mathematics preliminary mandatory to analyse the image of skin cancer lesion using our proposed methodology.

Early detection of skin cancer(melanoma) has the potential to reduce the mortality rate and morbidity. This work presents the two hybrid techniques for the identification and classification of the skin lesion images to predict it if exists. [10] The proposed hybrid approaches that consists of three steps, namely, texture and color feature extraction, dimensionality reduction (DR), and classification. At the first step, we have got the features related with images using discrete wavelet transformation (DWT).

The application of image processing for diagnostics purpose is a non-invasive approach.[11] There is a immense interest in the prospects of automatic image examination techniques for image processing, both to give quantitative information about a skin lesion, which can be relevant for the clinical, and as a standalone early warning technique/tool.

Skin cancer has been the most widespread and represents mostly 50% of all types of new cancers detected yearly. [12] if the cancer detected at an early stage, simple and economic healing treatment may cure it mostly. Accurate and valid skin lesion images segmentation is critical in automated early diagnostic systems. It gives both the shape feature and the region of interest for texture survey

## III. ALGORITHM

**GLCM:**

A statistical technique of examining texture feature that considers the spatial relationship of the pixels is the Gray-Level Co-occurrence Matrix (GLCM), well also well-known as the Gray-level Spatial Dependence Matrix. The function of the GLCM is to identify the texture feature of an image by calculating how frequently pairs of pixel with precise values and in a specified spatial relationship get place in an image, creating a GLCM, and then extract statistical measures from this matrix. The proposed work is divided into following stages:

- Image Acquisition
- Conversion to Gray Scale Image
- Enhancing image by using Histogram Equalization
- Histogram Computation of enhanced image
- K-means clustering for melanoma extraction
- Segmentation of melanoma from clustered image
- Dimensional Analysis of melanoma for size estimation.

Histogram of image is defined as the graph between no. of pixels of gray value Vs gray value. This is shown in below figures:

 

Fig. 1 Original Image

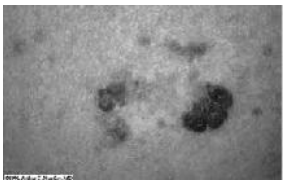

Fig. 2 Gray Image

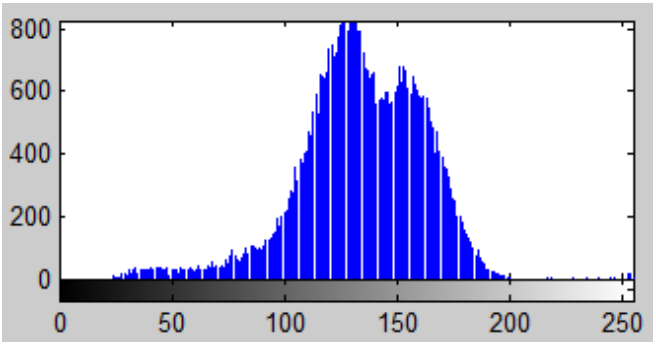


Fig. 3 Histogram

**K-MEANS CLUSTERING:**

Simply saying, it is an algorithm to classify or to group objects based on their fundamental properties into a k number of groups. K is a positive integer number. If we have a more objects in a image and each object have different properties and we want to classify them based on their fundamental properties, then we can simply apply this algorithm.

**LOCAL BINARY PATTERN:**

Local binary pattern (LBP) is a powerful feature proposed to capture the texture in objects. In the basic LBP method, a gray scale image is processed such that a binary code is generated for each pixel in the image. This encodes whether the intensities of the neighboring pixels are greater or less than the current pixel's intensity. So for instance in a 3x3 matrix with the current pixel being the centre, a binary code of length 8 is generated consisting of 0's and 1's, according to the relative intensities of the neighbours.

## IV. RESULTS AND CONCLUSIONS

When we apply the K-means clustering algorithm to the color image shown in fig. 1, following four clusters are obtained:

Fig. 4 Cluster-1

Fig. 5 Cluster-2

Fig. 6 Cluster-3

Fig. 7 Cluster-4

The clustered images are now binarized using the otsu algorithm to get the binary i.e. black and white images with white as background and black as the object of interest. The object of interest is analysed with respect to its size, dimension, diameter and location for estimating the skin disease order.

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