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MALANOMA DETECTION IN DERMATOLOGY USING KNN

Amala Shiji G*1, Dr.Kavitha Jaba Malar*2

*1Post Graduate Scholar In Computer Science, St.John's College Of Arts And Science, Ammandivilai, India.

*2Associate Professor,Department Of Computer Science, St.John's College Of Arts And Science, Ammandivilai, India.

ABSTRACT

Due to the increase in global warming the cruel diseases has also increased day by day. Malignant Melanoma is one among them. The main organ of our human body is skin and its cancer is most predominate type that influences lot of population per annum. Today researchers have been working to reduce the death rate of skin cancer. Early stage prediction of Malignant Melanoma makes it easy to cure. The work focused the watershed based segmentation in the dermoscopic image. ABCD rule and ugly duckling sign are used for feature extraction. By using K-Nearest Neighbors Algorithm (KNN) the processed image is classified and results as Melanoma or benign.

Keywords: ABCD Rule, Benign, Malignant, Melanoma, Ugly Duckling Sign, Watershed Based.

I. INTRODUCTION

Derma malgency is the most common reason of death among human being. It is abnormal growth of cells most often develops on body exposed to the sunlight, It can produce anywhere in the body. Most of the this type cancers are curable at intial stages. So a quick prediction of dermacancer can save the pand fast detection of skin cancer can save the people's life. By the growth trending technology, the detection of derma cancer is possible at primary stage. Normal method for diagnosis derma cancer detection is Biopsy method . It is performed by erasering skin cells and the sample goes to research laboratory for testing. It is painful and the process takes more time.In this research the Derma cancer detection system using KNN for early detection of disease. It is more useful to the humans. This methodology uses Image processing technique for good efficiently. The image of derma cancer is taken observed under few pre-processing technique for noise and image enhancement.

To predict the cancer dermatologist may look at the skin to find whether the skin changes are likely to be skin cancer. Further testing may be needed to confirm that diagnosis. He may remove the suspicious-looking skin for lab testing. There are three main types of skin cancer. They are

1. Basal cell carcinoma (BCC).
2. Squamous cell skin cancer (SCC) .
3. Malignant melanoma.

Figure 1: Skin Cancer Type

II. LITERATURE SURVEY

Vimala et al., (2011) proposed that the Skin cancer is now becoming a challenging issue to identify the exact location of affection on the skin tone. A novel hierarchical k-Nearest Neighbors (k-NN) classifier is more useful to find the affected level of skin and the type of cancer disease. The k-NN classifier is comparatively simple, quick and effective. Deepti et al.,(2016) used Statistical region merging algorithm to enhance the properties of skin cancer images and proposed two neural networks for classification skin cancer images namely Back-propagation neural network and Auto-associative neural network. Barati et al., (2011) data mining is the best technology for detecting skin cancer. She used quadrat method is to estimate the population density of each

species in a given community. Population density is the number of individuals of each species per unit area. Small square areas, called quadrats, are randomly selected to avoid choosing unrepresentative samples. Salah et.al., (2011) proposed an image processing techniques, a neural network system (NN) and a fuzzy inference system for detection of different types of skin cancer. The features of human skin such as pigmentation or color variation were used in the study. Color and texture features are extracted from the images and hierarchical structure based on the k-NN classification method.

III. METHODOLOGY

The research merges few techniques to obtain an accurate and robust classification results. First, dermoscopic images are obtained from the International cancer centre at Neyoor. The database consists of 20 digital images, previously diagnosed, 10 of them are benign and 10 are melanoma. Then images are segmented and the features are extracted from that image. Normally images have texture characteristics. Here two common texture feature extraction algorithms such as Local Binary Pattern (LBP) and Gray Level Co-Occurrence Matrix (GLCM) are used. The classification is done using KNN algorithm. The skin texture measurements are obtained by varying the viewing and the light directions on the hemisphere of all possible directions. Position the lens on four points of the hemisphere characterized by polar angle and azimuthally. The lens is mounted on an articulated arm boom stand allowing six degrees of freedom. Positioning of the lens is aided by a circular pattern presenting a height marker.

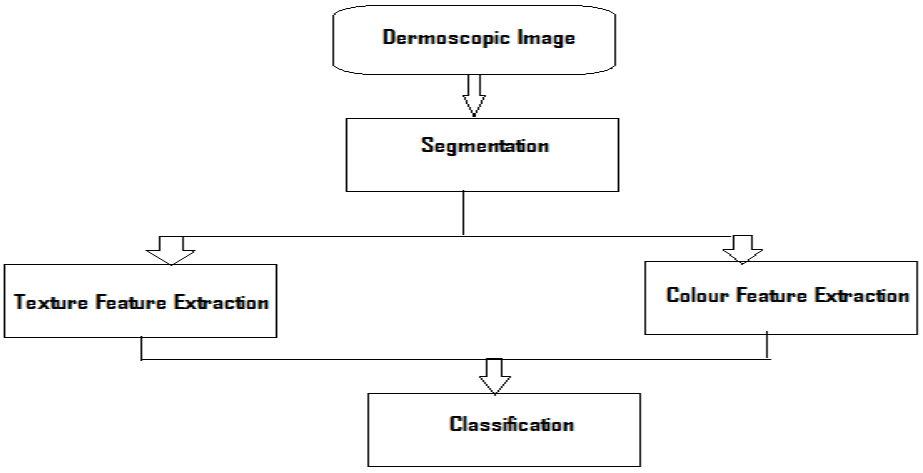

Figure 2: Proposed Architecture

Segmentation is the difficult step in image analysis. The point of observation with objects in the image composed of many pixels. Make an initial guess at and set it equal to the median pixel value, that is, the value for which

$$\sum_{k=0}^{t} h_k \geq \frac{n^2}{2} > \sum_{k=0}^{t-1} h_k$$

$$\mu_1 = \sum_{k=0}^{t} k h_k \Big/ \sum_{k=0}^{t} h_k$$

Re-estimate t as half-way between the two means.

$$t = \left[\frac{\mu_1 + \mu_2}{2} \right]$$

As per ABCD rule the features are extracted which includes Asymmetry Index Asymmetry Index is computed with the following equation

$$AI = (A1+A2)/2Ar$$

The luminance has to be removed from the colour representation in the chromatic colour space. The YCbCr conversion from RGB colour space can be accomplished by following matrix.

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$$\begin{bmatrix} Y \\ Cb \\ Cr \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 \\ 0.148 & -0.291 & 0.439 \\ 0.439 & -0.368 & -0.071 \end{bmatrix} \begin{bmatrix} R \\ G \\ B \end{bmatrix} + \begin{bmatrix} 16 \\ 128 \\ 128 \end{bmatrix}$$

Texture extraction is done by **Local Binary Pattern** (LBP) which is an efficient texture operator which labels the pixels of the skin image by thresholding the neighbourhood of each pixel and considers the result as a binary number. Due to its discriminative power and computational simplicity, LBP texture operator has become a popular approach in various applications. It can be seen as a unifying approach to the traditionally divergent statistical and structural models of texture analysis. Perhaps the most important property of the LBP operator in real-world applications is its robustness to monotonic gray-scale changes caused, for example, by illumination variations. Another important property is its computational simplicity, which makes it possible to analyze images in challenging real-time settings.

The value of the LBP code of a pixel (x_c, y_c) is given by:

$$LBP_{P,R} = \sum_{p=0}^{P-1} s(g_p - g_c)2^p \qquad s(x) = \begin{cases} 1, if\ x \geq 0; \\ 0, otherwise. \end{cases}$$

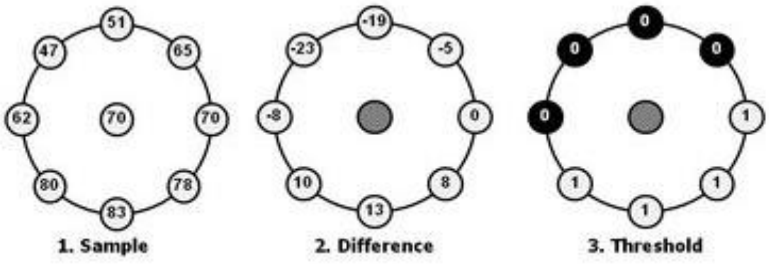

Figure 3: LBP Pixels

3.1 DERMOSCOPIC IMAGE CLASSIFICATION

Let x be the point to be labelled. Find the point closest to x. Let it be y. Now the nearest neighbour rule request to assign the label of y to x. In this process value of taken as input parameter of this algorithm then Sort the distance and determine nearest neighbours based on the K^{th} minimum

- Evaluate the distance between the query-instance and all the samples.
- Implement the simple majority of the category of nearest neighbours as the prediction value
- Collect the group of the nearest neighbours.
- Find the distance of the query instance.

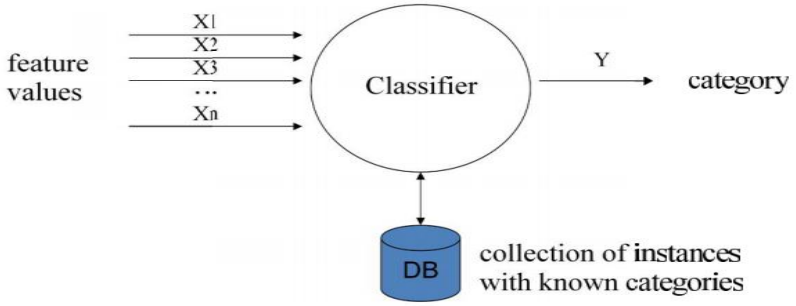

Figure 4: Proposed Classifications

IV. RESULTS AND DISCUSSION

The ceroscopy images are taken from the Cancer centre at Neyoor. The images are segmented and the texture features and the colour features are extracted. Image pre-processing before analysis of any image set can take place, pre-processing should be performed on all the images. Assume

TP-True Positive

TN- True Negative

FP- False Positive

FN- False Negative

The accuracy of the classifier is the percentage of the test samples that are correctly classified by the classifier.

Accuracy = TP+TN / TP + FP + FN + TN

Sensitivity is also referred as true positive rate that is the propagation of positive samples that are correctly identified.

Sensitivity = TP / TP+FN

Specificity is the true negative rate that is the proportion of negative samples that are correctly identified.

Specificity = TN / TN + FP

Table :1 Experimental Results

Parameters	KNN Classifier
TP	19
TN	18
FP	02
FN	01
Accuracy	93%
Specificity	95%
Sensitivity	90%

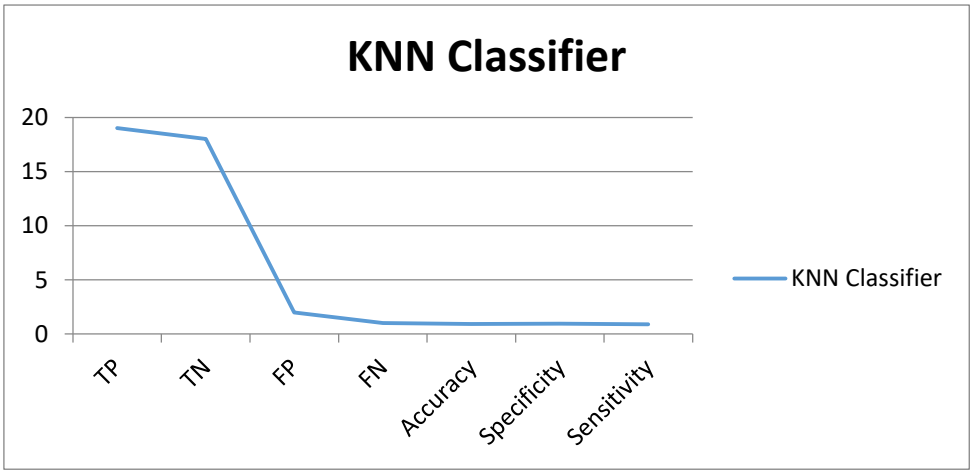

Figure 5: Performance Metric

V. CONCLUSION

The main issue of medical field is that the dermatologist are not able to detect that infected skin part which is not visible by naked eyes and therefore they only operate the visible infected part of the skin and this may cause a major problem like cancer or any dangerous disease in the future. The skin lesion from the database images are segmented by using texture distinctiveness-based lesion segmentation and color based lesion segmentation. The Color features, Shape features, Texture features and Spectral features are extracted from segmented image. In this research skin cancer classification system is developed and the relationship of the skin cancer image across KNN algorithm. The experimentation shows that the system is more effective. A better accuracy of 93% is obtained.

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