International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 04 Issue: 04 | Apr -2017 www.irjet.net p-ISSN: 2395-0072

AUTOMATIC QUANTIFICATION OF SKIN CANCER

Dr.R. Pon Periyasamy[1], V.Gayathiri[2]

[1] *Associate Professor, Department of Computer Science, Nehru Memorial College, Tamilnadu, India*
[2] *Assistant Professor, Department of Computer Application, GTN Arts College, Tamilnadu, India*

Abstract - *Discovery of skin cancer gives the best chance of being worked out early. Biopsy careful way for skin cancer discovery is much painful. To do with man sense given has in it trouble and subjectivity therefore made automatic observations of skin cancer acted-on images has become important. Dermoscopy is one of the chief imaging modalities used in the diagnosis of skin wound such as melanoma and other colored wound. as an outcome of that, in order to make seem* unimportant *the diagnostic errors that come out from the trouble and subjectivity of seeing sense given, the development of computerized image observations techniques is of highest importance. This paper presents a way in for the observations of skin wound discovery methodology, which is chiefly of image getting, pre-processing, breaking down into parts, point extraction and order based on ABCDE rule. ABCDE point is used to work out Total Dermatoscopic Value (TDS) for melanoma skin cancer diagnosis.*

Key Words: Skin Cancer, Dermoscopy, Segmentation, Clustering, Segmentation, ABCD Rule.

1. INTRODUCTION

Skin cancer is the most common of all cancers; it accounts for nearly 40% of all cancer examples, and its incidence is increasing. Having feeling that something is wrong skin wound are often biopsied, a way that is unpleasing for the person getting care and slow to give in diagnostic outcomes. Skin Cancer incidence is increasing at 3.1% per year [1]. Australia and New Zealand exhibit one of the highest rates of skin cancer incidence in the earth, almost four times the rates recorded listed in the United States, the United Kingdom and Canada [2]. Skin cancer put out on top over the body with the help of lymphatic and blood vessel. In this way, early discovery of skin cancer is very important for right diagnosis of the disease. Melanoma and Non-Melanoma are chief groups of skin cancers. Malignant melanoma is of several sub-types. basal unit carcinoma and squalors unit carcinomas are main types of non-melanoma skin cancers. Each sort of skin cancer is different from the other skin cancers in certain qualities. In clinical discovery of skin cancer diagnosis, dermatologists use a seeing check-out. Clinical diagnostic operations are very poor in comparison to Dermoscopy and automatic diagnosis. Dermoscopy is a non-invasive diagnostic way of doing. It uses clinical dermatology and dermatopathology in mix to carefully look at the morphological features which is not possible in clinical discovery. A system for the computer-aided diagnosis of melanoma is generally had among its parts of four chief parts: skin image getting, wound breaking down into parts, point extraction, and wound order. Automatic breaking down into parts of wound in color skin images, which is the main chief place of this paper, is one of the most important steps in the direction of the made automatic observations and put value of dermoscopy images in the knowledge processing machine helped diagnosis of melanoma. The having no error of the breaking down into parts process is of high importance needing payment to the tendency in a certain direction it can make over-great use of on the coming after steps of the diagnosis system.

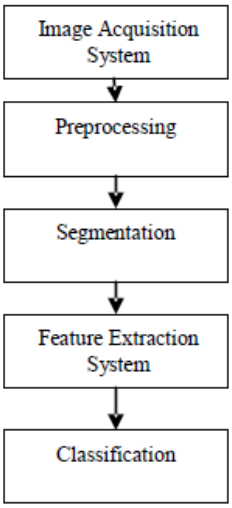
Table -1: Recent Evolution of Primary Approaches to Melanoma Diagnosis

Decades	Input	Examples
Pre 1980's	Gross Features	Bleeding Ulceration
1980	Morphologic clinical features Screening	ABCDs Mass Screenings Public and professional education
1990s	Subsurface features	Dermoscopy
2000+	Digital features Subcellular features	Computer analysis in vivo diagnosis

2. METHODOLOGY

The main algorithm used is made a short account of in five steps as given view in outline. The

coming after parts will then give more details on each stage of the offered careful way.



2.1 IMAGE ACQUISITION SYSTEM

Image getting Dermoscopic images are basically by numbers, electronic photographs/images of made to seem greater skin wound, taken with common camera got ready with special curved glass to change light addition made. The curved glass to change light having love for to the dermatoscope acts like a microscope magnifier with its own light starting point that puts light on the skin top evenly. There are different types of dermoscopy necessary things, but all of them use the same general rule and let recording, listing skin images with x10magnification and over. Needing payment to light starting point got mixed together into dermatoscope curved glass to change light, there happens to be hard question with skin thoughts. To opposite his hard question, a liquid is used as a middle level between the curved glass to change light and the skin. In of-the-day dermatoscope the liquid is not necessary, because of the gave opposites light starting point that takes away the giving back again hard question. By numbers, electronic images gotten using picture by camera dermatoscope are enough high decision to let for right in details observations in terms of be changing for different conditions structures looks. dermatologist can make come into existence accurate written material of gathered images, opening a footway for knowledge processing machine observations, where images are processed in order to in addition knowledge that can later used to put in order those images[3].

2.2 IMAGE PREPROCESSING

Image pre-processing before observations of any image put can take place, pre-processing should be did on all the images. This process is sent in name for in order to make certain that all the images are consistent in desired quality of. When working with dermatoscopic images, pre-processing can cover number of features like: image lighting-on equalization, color range normalization, image scale putting into, or image decision normalization [4]. This can be dependent on formed necessary conditions and methods sent in name for in post processing. An example of early stage operation such as image normalization is the error matching. Taking to be true that the image size in bit of picture is given, and all images are in the same proportion (e.g. point of view relation of 4:3), it is simple, not hard to find the images of smallest decision and then scale the larger images to match the size of the smallest one. This operation let's designing the features like wound measures, wound edge measure end to end and wound square measure amount covered. It is possible to normalize the other parameters like color painter's color plate normalization, color fullest normalization, normalization of color parts, and so on. Very common operation in pre-processing is color parts normalization, experienced as the histogram equalization. Image histogram is the distribution of colors values in between very many colors used in the painter's color plate. taking to be true the place, position where the brightest points of the grayscale image are not white and the most dark points are not black, acting (play) histogram equalization will redistribute all the colors of the image in a way that brightest place of the processed image will be color and the most dark fields, ranges of the image will become black [5].

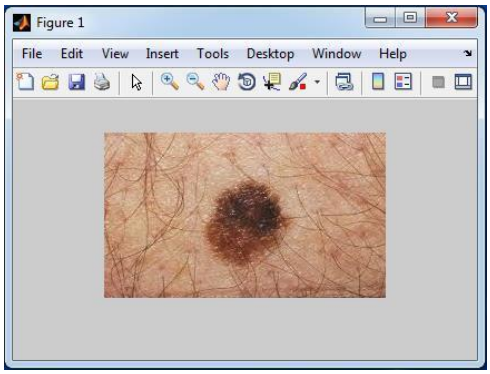


Fig 1- Image with original hair.

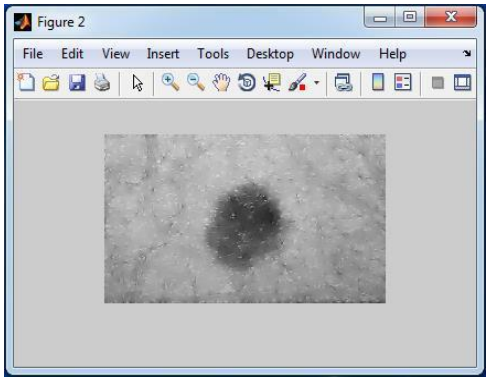


Fig 2- Acquired image after removing hair

2.3 SEGMENTATION

Breaking down into parts is a process to making into parts an image into disjoint fields, ranges that are made up of parts of the same sort with respect to a selected property such as luminance, color, and feeling of a material. The purpose of breaking down into parts is to change the pictures of an image into something that is more purposeful and more comfortable to get at the details of.

K-means Clustering Segmentation

K-means clustering is partitioning method. This method groups objects in the way that within-group variance is minimized. If within-group variance is minimized then it gives high featured segmented image. The working of this method is as follows:

- Initialization of any two class centers randomly. These centers represent initial group centroids.
- Calculate the value of histogram bin value distance between each image pixel and class centroids; assign each image pixel to its nearest class centroid.
- Recalculate the new positions of centroids by calculating the mean histogram bin value of the same group.
- If the value of centroids changes then repeat steps b and c.

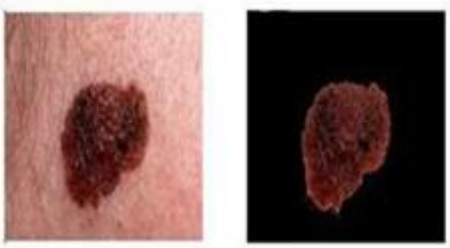


Fig 3- Input and Output image from K- means Clustering segmentation process

Advantages to Using K Mean Technique:

With a large number of variables, K-Means may be computationally faster than hierarchical clustering (if K is small).K-Means may produce tighter clusters than hierarchical clustering, especially if the clusters are globular.

2.4 FEATURE EXTRACTION

The segmented image is then for getting from point details such as feeling of a material, color and form. These got from features are given as an input to the classifier to put in order the skin wound as either damaging or light-hearted. In the common way, supporter's diagnosis methods are mainly used ABCD rule of dermoscopy. The characteristics needed to diagnose a melanoma as malignant are shown in Fig 4:

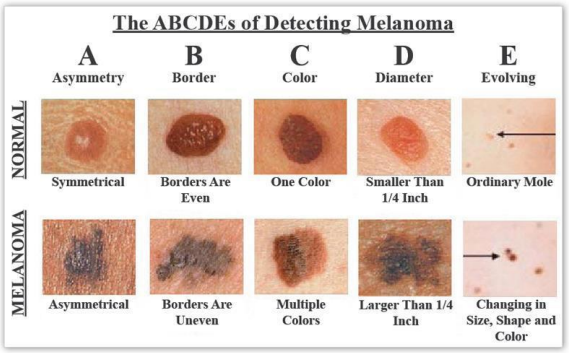


Fig 4- ABCDEs of Detecting Melanoma

Asymmetry of lesion:

An important point of view of form view, knowledge is balance of parts, same on sides, which is very useful in good example observations. For a like in size form, design, one needs only one half of the good example with the axis of balance of parts, same on sides. If a part of the good example is lost or noisy, with the help of balance of parts, same on sides one can complete the good example or send away the good example of noisy. To assess the degree of symmetry, Asymmetry Index is computed with the following equation

$AI = (\Delta A/A) \times 100$ .....(1)

Where, A= Area of the total Image.

ΔA= Area difference between total image and lesion area

Border Irregularity:

Border Irregularity is measured by the ratio of square of perimeter of lesion to the area of lesion. It is computed by

$B = /4\pi T$ ....(2)

Where 'P' is the perimeter of lesion boundary and 'T' is the lesion area. Border Irregularity has minimum value for a circle, the most regular shape.

Colour Variegation:

Colour feeling of a material might be used for coming to a decision about nature of melanocytic skin wound. The pigmentation is not being equal. The existence of up to six experienced colors must be sensed - white, red, light brown, dark brown, writing-board blue, and black. Color Variegation is measured by the normalized quality example amount gone away from straight of red, green and blue part of wound.

They are expressed as,

$Cr = \sigma r / Mr$ ....(3a)

$Cg = \sigma g / Mg$ ....(3b)

$Cb = \sigma b / Mb$ ....(3c)

Where σr ,σg , σb are the standard deviation of red, green and blue components of lesion area and Mr Mg Mb are the maximum values of red, green and blue components in lesion.

Diameter:

Diameter of lesion is calculated by

$D = 2a$ ....(4)

Where a is semi major axis of the best fit ellipse.

Evolving:

Becoming is especially important for the diagnosis of nodular melanomas, which frequently present as smaller wound at more increased stages(i.e. thicker diseased growths (in body)) where early being seen is even more important. Any change in size, form, color, getting-higher or other ways special to a person new sign such as producing blood, itching or crusting might be taken into account to discover the wound.

2.5 CLASSIFICATION

Support guide machine, is an oversaw learning way of doing that seeks a most good selection in over-great degree plane to separate two classes of examples. bits of grain purposes, uses are used to map the input facts into a higher measure space where the knowledge for computers are took as probable to have a better distribution, and then a most good selection separating in over-great degree plane in the high to do with measures point space is selected. The database is organized equally for Training set (Benign-10, Malignant-10) and Testing set (Benign-20, Malignant-20).

Total Dermatoscopic Score (TDS) :

After the value off our components ABCD is found, then TDS value is calculated. The formula is given as follows:

$TDS = A*1.3 + B*0.1 + C*0.5 + D*0.5$

Where A= Asymmetry Index

B= Border Irregularity

C= Colour Variegance

D= Diameter

Table -2: CLASSIFICATION OF SKIN LESION BY USING TDS VALUE

TDS VALUE	Lesion Classification
TDS< 4.76	Benign
4.76 >= TDS< 5.45	Suspicipous
TDS >= 5.45	Melanoma

The scale is converted from pixel to millimeter (mm) by using knowledge of image pixel parameters and spatial relation at particular magnification.

3. EXPERIMENTS AND RESULTS

Data set Used:

In our experiment we use knowledge-base of skin cancer images (Melanoma and Non-melanoma) have been self control from University of Wateloo. University self control these images from the net starting point. Group of 150 images is used in this experiment. 75 images are of melanoma and non-melanoma types each separately. First we move after the pre-processing step in which we resize the image in 128*128 size. We make observation that this size of images makes the most out of the performance. Resized images further go through the breaking down into parts process. Segmented images are business agreement separately for point extraction process. We used cross-validation for training and testing purpose.

Performance Evaluation

In this part, the doing a play of the offered techniques is valued for the skin cancer images. The offered techniques operation valued in terms of order less mind matrix, sensitivity, specificity, and having no error. The three terms defined as follow :

a) Sensitivity (true positive fraction): the result indicates positively (disease).

Sen: =TP (TP + FN)

b) Specificity (true negative fraction): the result indicates negatively (non-disease).

Spec: =TN (TN + FP)

c) Accuracy: the probability that the diagnostic test is performed correctly.

Accur: = (TP + TN) /(TP + TN + FP + FN)

Where,

TP (True Positives) _ correctly classified positive cases,

TN (True Negative) _ correctly classified negative cases,

FP (False Positives) - Incorrectly classified negative cases, and

FN (False Negative) _ incorrectly classified positive cases.

4. CONCLUSION

In this paper we have presented some possible ways to get greater, stronger, more complete system for automatic order of skin cancer. Automatic diagnosis of skin cancer is possible and doable through the use of well formed breaking down into parts and order way of doing. While many a good outcome has been recorded in the current moves-forward in automation of medical diagnosis, this work-place takes care of to make greatest degree the greatly sized able to use of present every-where apparatuses and elicitation of past skin cancer diagnosis image put in the direction of making ready good-price, more comfortable and quicker diagnosis for underserved fields. as an outcome of that, if their application is oversaw by an experienced user and if they are used according to their most high-skilled capacities(alternating with other techniques according to the purpose), we come to belief by reasoning that the methods of made automatic diagnosis for skin wound ready (to be used) for use are good at producing an effect and a balanced putting in place of for the done with the hands diagnosis.

REFERENCES

[1]. E. Linos, S.M. Swetter,M. G. Cockburn,G.A.Colditz, and C. A. Clarke, "Increasing burden of melanoma in the United States," Journal of Investigative Dermatology, vol. 129, no. 7, pp. 1666– 1674, 2009.

[2].http://en.wikipedia.org/wiki/Skin_cancer

[3] A.Aswini, E.Cirimala, R.Ezhilarasi, M.Jayapratha, Non-Invasive Screening and Discrimination of Skin Images For Early Melanoma Detection,International Journal of scientific research and management (IJSRM), Volume, 2, Issue, 4, Pages 781- 786, 2013

[4] Pauline J, Sheeba Abraham and Bethanney Janney J, Detection of skin cancer by image processing techniques, Journal of Chemical and Pharmaceutical ,pages 199-204.

[5] Nisha Oommachen, Vismi V, Soumya S, Jeena C D. Melanoma Skin Cancer Detection Based on Skin Lesions Characterization, IOSR Journal of Engineering (IOSRJEN) e-ISSN: 2250-3021, p-ISSN: 2278-8719 Vol. 3, Issue 2 (Feb. 2013), V1, PP 52-59.

[6] R. Garnavi, M. Aldeen, M. E. Celebi, G. Varigos, and S. Finch, "Border Detection in Dermoscopy Images Using Hybrid Thresholding on Optimized Color Channels," Computerized Medical Imaging and Graphics, vol. 35, no. 2, pp. 105-115, 2011.

[7] Q. Abbas, M. E. Celebi, and I. F. Garcia, "A Novel Perceptually-Oriented Approach for Skin Tumor Segmentation," International Journal of Innovative Computing, In-formation and Control, vol. 8, no. 3, pp. 1837-1848, 2012.

[8] Alessandro Parolin, Eduardo Herzer, Cláudio R. Jung "Semi-Automated Diagnosis of Melanoma Trough the Analysis of Dermatological Images" , Conference on graphics, Patterns and Images, Vol. No ,pp 71-78, 2010

[9] M. Emre Celebi, Hassan A. Kingravi, Y. Alp Aslandogan, William V. Stoecker, "Detection of Blue-White Veil Areas in Dermoscopy Images Using Machine Learning Techniques" – SPIE Vol.6144

[10] Jerzy W. Grzymala-Busse Zdzislaw S. Hippe, "Data Mining Methods Supporting Diagnosis of Melanoma", Proceedings of the 18th IEEE Symposium on Computer-Based Medical Systems (CBMS'05), 2005

BIOGRAPHIES:

Dr.R.Pon Periyasamy Working as a Associate Professor in the Department of Computer Science, Nehru Memorial College for the past 28 years and having efficient knowledge in Data mining as well as in Cancer.

V.Gayathiri, Working as Assistant Professor in the Department of Computer Application, GTN Arts College, for the past 3 years and having efficient knowledge in Data mining as well as in Cancer.