IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 9, September 2016

A Review of Melanoma Skin Cancer Detection Techniques using Medical Image Processing

Shefali Laddha[1], Komal Paliwal[2]

Department of Computer Engineering & IT[1, 2]

Abstract: Skin cancers are the most common forms of human malignancies in fair skinned populations. Although malignant melanoma is the form of skin cancer" with the highest mortality, the non-melanoma skin cancers" (basal cell carcinomas and squamous cell carcinomas, etc.) are far more common. The incidence of both melanoma and non-melanoma skin cancers is increasing, with the number of cases being diagnosed doubling approximately every 15 years. In this manner, early finding of skin cancer can diminish mortality and dreariness of patients. In this paper we are investigating various techniques for early stage melanoma skin cancer detection.

Keywords: skin cancer, Region growing, segmentation, Texture analysis, Edge detection etc.

I. INTRODUCTION

Melanoma skin sores are broke down by ABCD examination which predicts the sickness with its components, for example, asymmetry, color, shading and distance across. Numerous specialists have been led in view of every element to analyze the melanoma precisely furthermore at as early stage as could be expected under the circumstances.

The essential operation or procedure to analyze the melanoma is to isolate the melanocytic sore from the skin with clarity and without commotions. It makes the further strategy to be executed effortlessly. For skin location numerous strategies are created to accomplish the outcome with more clarity and precision.

The following stride is to preprocess the picture so that the picture can be in the organization, from which some critical components can be determined. Those elements will be utilized as a part of analysis of melanoma at multiplication stage. Next utilizing the four parameters of ABCD investigation, the inputted skin injury can be recognized whether it is melanoma or different sorts of skin malignancy.

Every parameter is subjected to evaluation with the end goal that the measures will be utilized to foresee which sort of skin tumor it is: Image acquisition, Preprocessing, Segmentation, Feature extraction, Post processing, Classification. The above said steps are utilized to analyze a skin sore and arrange whether it is dangerous or generous as appeared in the Fig. 1. There are numerous investigates occurred on all the real parameters to analyze the melanoma at early stage, so that the patient can be given legitimate treatment. The study is involved a review taking into account different parts of diagnosing melanoma utilizing its notable elements of asymmetry, outskirt, shading and distance across. Before order, the influenced skin injury ought to be isolated from the ordinary skin.

II. LITERATURE SURVEY

Pigmented Skin Lesions Classification Using Dermatoscopic Images:
In 2009, German Capdehourat et al. proposed a machine learning way to deal with order melanocytic lesions in harmful and generous from dermatoscopic pictures. The picture database is made out of 433 benevolent sores and 80 benign lesions. After a picture pre-processing stage that incorporates hair evacuation filtering, every picture is consequently fragmented utilizing well known image segmentation algorithms. At that point, every lesion is portrayed by an element vector that contains shape, shading and composition data, and additionally local and global parameters that attempt to reflect structures utilized as a part of medical diagnosis. The learning and classification stage is performed utilizing AdaBoost.M1 with C4.5 decision trees. For the automatically segmented database, classification conveyed a false positive rate of 8.75% for a sensitivity of 95%. The same classification procedure connected to manually fragmented pictures by an accomplished dermatologist yielded a false positive rate of 4.62% for an sensitivity of 95%.

These outcomes are promising and appear to be better than those reported in the literature. Be that as it may, execution assessment is delicate because all every single reported result were gotten utilizing distinctive databases. As of right now, development of a vast database of dermatoscopic pictures that could be utilized as reference test-bed appears of being an essential issue.

Automatic Diagnosis of Melanoma: a Software System based on the 7-Point Check-List:
In 2010, G. Di Leo et al. shown new analytic system, the "ELM 7 point agenda", characterizes an arrangement of seven components, taking into account and texture parameters, which portray the malignancy of a lesion. It has been displayed as speedier and with the same exactness than the customary ABCD criteria in the determination of melanoma.

Copyright to IJARCCE

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 9, September 2016

They proposed a automatic estimation framework for the analysis of melanoma in light of 7-focuses check list connected on epiluminescence microscopy (ELM) skin lesion pictures. The accomplished execution is exceptionally encouraging and the entire demonstrative framework will be utilized for both screening effort and follow up of suspicious lesions.

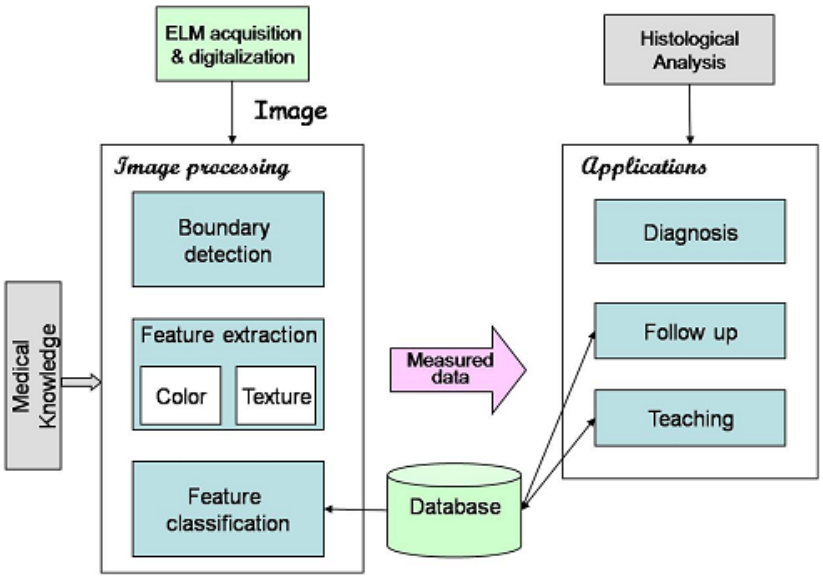

Fig. 1: Scheme of the proposed software tool for the diagnosis of pigmented lesion

Moletest: A Web-based Skin Cancer Screening System:

In 2011, Jonathan Blackledge et al. proposed an online skin growth Screening Framework known as Moletest. Moletest depends on a procedure for actualizing applications that is worried with two key undertakings: The partial examination of a picture as far as its fractal structure and the fractal properties that describe that structure; The utilization of a fuzzy logic engine to characterize an item taking into account both its Euclidean and fractal geometric properties. The blend of these two perspectives has been utilized to characterize a handling and picture examination engine that is extraordinary in its usual methodology however completely nonexclusive as far as the applications to which it can be connected.

The picture examination innovation produced for Moletest is a piece of a more extensive examination concerning the various utilizations of example acknowledgment utilizing fractal geometry as a central processing kernel. This incorporates the outline of example acknowledgment calculations including the calculation of parameters notwithstanding those that have been utilized to create Moletest, for example, the data measurement, relationship measurement and multifractals. The consideration or generally of such parameters regarding enhancing frameworks, for example, Moletest stays to be caught on. On the other hand, it is clear that composition based investigation alone is not adequate so as to outline an acknowledgment and arrangement framework. Both Euclidean and fractal parameters (and additionally different measurements identifying with coltheir composites) should be joined into a component vector keeping in mind the end goal to build up an operational picture examination framework which incorporates objects that have textural properties, for example, those connected with medicinal imaging and on account of Moletest, Tele-Dermatology.

With skin tumor rates expanding, Moletest could conceivably screen a huge number of instances of kindhearted and safe moles far from GP surgeries - leaving the NHS to focus on higher danger patients.

Automatic Detection of Melanoma Skin Cancer using Texture Analysis:

In 2012, Mariam A.Sheha proposed a mechanized strategy for melanoma determination connected on an arrangement of dermoscopy pictures. Highlights removed depend on dim level Co-event network (GLCM) and Utilizing Multilayer perceptron classifier (MLP) to characterize between Melanocytic Nevi and Harmful melanoma. MLP classifier was proposed with two distinct procedures in preparing and testing process: Programmed MLP and Conventional MLP. Results demonstrated that composition investigation is a helpful technique for segregation of melanocytic skin cancer with high precision. At to begin with, Pre-handling alter all pictures to a settled scale [512*512] to bolster extraction of precise components; so can acquire obvious off distinction between two sorts of sores. They have examined a grouping of dermoscopy pictures utilizing GLCM highlights. The composition highlights acquired from co-event lattice contain 23 adequate components. The most

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 9, September 2016

critical components were chosen utilizing fisher score strategy. Notwithstanding fisher's score straight forwardness, has all the earmarks of being a decent component determination system. By score strategy 12 elements were chosen that speak to the most critical components. A short time later, arrangement procedure was executed utilizing MLP classifier that was proposed in two methods. The exhibitions of the classifier procedures displayed distinctive grouping precision. The principal system: Programmed MLP proposed 93.4% and 76% for preparing and testing exactness individually. The second method: Customary MLP, proposed 100% and 92% for preparing and testing precision separately. The outcomes showed that the Conventional MLP yielded the better execution when contrasted with the first.

Comparison between Different Classification Methods with Application to Skin Cancer:
In 2012, Yogendra Kumar Jain et al. concentrates on the improvement of a skin cancer screening framework that can be utilized as a part of a general practice by non-specialists to classify ordinary from anomalous cases. The advancement process comprises of Highlight Discovery and Order Procedure. The components are separated by decomposing pictures into various recurrence sub-groups utilizing wavelet change. The yield of Discrete Wavelet Change gets to be information to the Order Framework which group whether the data picture is dangerous or noncancerous. The characterization framework depends on the utilization of Probabilistic Neural System and Grouping Classifier.

The proposed framework is assessed on 80 pictures for order of skin growth utilizing Probabilistic Neural System and Grouping Classifier. Out of these order systems they closed from the outcomes that the grouping utilizing Probabilistic Neural System is better when contrasted with Bunching Classifier. This is a huge change when contrasted with the before strategies proposed in the same area. PNN perform superior to anything different sorts of manufactured neural systems (ANNs) and have indicated great characterization execution. As opposed to different sorts of ANNs, e.g. MLPs, PNN are not "secret elements": The commitment of every example neuron to the result of the system is unequivocally characterized and available, and has an exact translation. The preparation of PNN includes no heuristic ventures, yet comprises basically of fusing the preparation cases into the example layer. On the other hand, finding the best smoothing component for the preparation set remains an enhancement issue. PNNs endure incorrect examples and anomalies. Meager examples are sufficient for the PNN. Different sorts of ANN and numerous customary Measurable methods are hampered by exceptions. At long last, when new preparing information get to be accessible, PNN don't should be reconfigured or retrained without any preparation; new preparing information can be incrementally joined in the example layer. A hindrance of PNNs is the way that all preparation information must be put away in the example layer, requiring a lot of memory. Be that as it may, all in all, today's standard PCs have an adequately expansive principle memory limit for a productive execution of PNN. In applications where a lot of preparing cases are accessible, this contention against PNNs gets to be pertinent.

Interpretable Aide Diagnosis System for Melanoma Recognition:
In 2012, Messadi M. et al. proposed an interpretable order technique for skin tumors in dermoscopic pictures in light of shape descriptors. Their work shows a fuzzy rule based classifier to separate a melanoma. A versatile Neuro Fuzzy inference System (ANFIS) is connected with a specific end goal to find the fuzzy rules prompting the right classification. In the initial steps of the proposed work, they apply the Dullrazor strategy to lessen the impact of little structures, hairs, bubbles, light reflexion. In the second step, an unsupervised methodology for lesion segmentation is proposed. Iterative thresholding is connected to instate level set naturally. They have additionally treated the need to concentrate all the particular ascribes used to add to a portrayal approach that empowers experts to take the most ideal finding. For this reason, their proposition depends to a great extent on visual perception of the tumor while managing a few attributes, for example, shading, composition or structure. The strategy utilized as a part of this paper is called ABCD. It requires ascertaining 4 variables: Asymmetry (An), Outskirt (B), Shading (C) and Differing qualities (D). These parameters are utilized to develop a grouping module in view of ANFIS for the acknowledgment of threatening melanoma. At last, they think about the aftereffects of arrangement got by ANFIS with SVM (support vector machine) and counterfeit neural system, and talk about how these outcomes might impact in the accompanying steps: the element extraction and the last injury grouping. This system has been tried on a dermoscopic database of 320 pictures. Trial results demonstrate that the proposed system is viable in enhancing the interpretability of the fluffy classifier while protecting the model exhibitions at a tasteful level.

Dermoscopic Image Segmentation and Classification using Machine Learning Algorithms:
In 2012, G.Subha Vennila and L.Padma Suresh proposed the errands of separating, arranging and sectioning the Dermoscopic picture utilizing the machine learning calculations. The calculations, for example, Back Engendering system (BPN), Spiral Radial Basis Function Network (RBF) and Extreme Learning Machine (ELM) are utilized. The elements are separated from the Dermoscopic picture and these elements are utilized to prepare the classifiers. The prepared systems are utilized for division.

The assessment depended on the exhibitions measures computed and confirmed utilizing ground truth picture which is physically sectioned. The proposed calculation is

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 9, September 2016

reproduced utilizing MATLAB and tried with ground truth picture to investigate the division exactness of the different neural system calculations methods. The viability of the proposed methodology is tentatively decided utilizing the ground truth picture. The preparation tests are the pixels taken from the Melanoma advanced picture. The systems are prepared by the given preparing tests, sections the influenced district from the unaffected area. Here the system is prepared with 200 preparing tests and the fragmented result got is demonstrated as follows. For effective segmentation system is prepared with more number of preparing tests. In the segmented yield, the white area demonstrates the contaminated district and the dark locale show the sore non-tainted district.

The outcomes are contrasted and the ground truth pictures and their execution is assessed. The outcomes demonstrated that the ELM has better precision, quicker preparing period and it gives preferable division over the BPN and RBF neural systems.

SKINCURE: An Innovative Smart Phone-Based Application to Assist in Melanoma Early Detection and Prevention:

In 2013, Omar Abuzaghleh et al. proposed an inventive and completely utilitarian advanced mobile phone based application to help with melanoma early discovery and prevention. The application has two noteworthy segments; the first segment is a constant alarm to offer clients some assistance with preventing skin smolder brought about by daylight; a novel mathematical statement to figure the ideal opportunity for skin to blaze is along these lines presented. The second segment is a computerized picture investigation module which contains picture securing, hair discovery and rejection, sore division, highlight extraction, and order. The proposed framework misuses PH2 Dermoscopy picture database from Pedro Hispano Healing center for advancement and testing purposes. The picture database contains a sum of 200 dermoscopy pictures of injuries, including typical, atypical, and melanoma cases. The trial results demonstrate that the proposed framework is proficient, accomplishing grouping of the typical, atypical and melanoma pictures with exactness of 96.3%, 95.7% and 97.5%, individually.

Border Detection of Melanoma Skin Lesions on a Single System on Chip (SoC):

In 2013, Peyman Sabouri presented, a basic border detection algorithm developed based on ZYNQ-7000 SoC, using VIVADO High Level Synthesis (HLS) tool. They take the advantage of accelerating an embedded system design on a single SoC, which offers the required features for real-time processing of skin cancer images. Their ultimate aim is to develop novel methods to detect melanoma more accurately and faster and implement the algorithms on portable vision systems for medical imaging applications with high resolution and performance. Different edge detection approaches such as Sobel, Kirsch, Canny and LoG have been implemented on ZYNQ-7000 for border detection of skin lesions, which can be used in early diagnosis of melanoma. The results show that the extended 5×5 canny edge detection algorithm implemented on the proposed embedded platform has better performance in comparison with other reported methods. The performance evaluation of this approach has shown good processing time of 60 fps for real time applications.

However, there is a trade-off between strong edge detection and noise, this is apparent when comparing the Sobel and Prewitt operators. It was found that pre-processing of the image may, in some circumstances; result in less noise on the output. Synthesising the IP used in this application allows a real time result. This is achieved by the fact that edge detection IP is working in parallel for RGB images. The throughput is achieved by running processes in parallel rather than all out speed. Employing other optimisation techniques for the image analysis can enhance the performance. The advancement in high definition media in recent years, high–speed embedded systems and the growth of applications in healthcare systems provide the opportunity to revolutionize the skin cancer diagnosis. In this work, using the state of the art FPGA technology as an example, they implemented the fundamental image processing algorithms on a SoC and demonstrated its rapid processing power that supports such transition.

Automating Skin Disease Diagnosis Using Image Classification:

In 2013, Damilola A. Okuboyejo et al. designed and modeled a system that will collate past Pigmented Skin Lesion (PSL) image results, their analysis, corresponding observations and conclusions by medical experts using prototyping methodology. A part of the system would use computational intelligence technique to analyze, process, and classify the image library data based on texture and possibly morphological features of the images. Trained medical personnel in a remote location can use mobile data acquisition devices (such as cell phone) to generate images of PSL, supply such images as input to the proposed system, which in turns should intelligently be able to specify the malignancy (life threatening) or benign (non-threatening) status of the imaged PSL.

Lesion Segmentation in Dermoscopic Images Using Decision Based Neuro Fuzzy Model:

In 2014, Binamrata Baral et al. displayed a novel methodology for segmentation of shading their pictures. The proposed strategy is connected on various pigmented skin lesion containing dermatological pictures to perform segmentation with the expect to identify sore. Subsequent to applying proposed segmentation method, they find that the segmentation is accomplished with great exactness. This segmentation strategy can separate the injury from rest of the picture. For future work, this segmentation methodology can be connected on other sort of shading pictures for target segmentation, for example, skin

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 9, September 2016

division, and so on. The shading space organization can be changed to different configurations relying upon the ease of use and distinguishing capacity of focus in various sorts of pictures.

Artificial Neural Network for SkinCancer Detection:
In 2014, Sarika Choudhari and Seema Biday demonstrated a neural network system (NN) based method for detection of skin cancer. The different stages of detection involves collection of Dermoscopic images, filtering the images for removing hairs and noises, segmenting the images using Maximum Entropy Threshold, feature extraction using GLCM and c1assification using Artificial Neural Network (ANN). It c1assifies the given data set into cancerous or non-cancerous image. Cancerous images are classified as melanoma and non-melanoma skin cancer. Dermoscopic images were collected from different sites and they are processed by pre- processing. Dull Razor and Median Filter are used to remove hair, air bubbles etc. from Dermoscopy images. After preprocessing images is segmented using maximum entropy method. Maximum Entropy Thresholding is used to find out Region of Interest. The unique features of the segmented images are extracted using feature extraction techniques. This Methodology has got 86.66% accuracy. By varying the Image processing techniques and training algorithms of ANN, the accuracy are improved for this system and the images are classified as cancerous or noncancerous and also they able to find the type of cancer and stages of cancer.

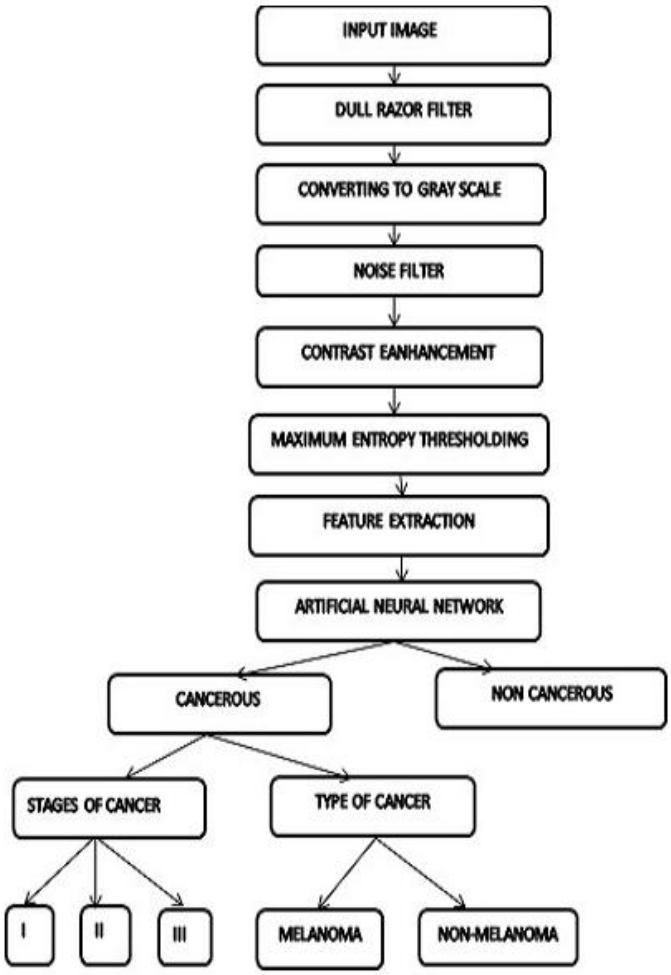

Fig: 2: Block Diagram representation

Detection and Analysis of Skin Cancer in Skin Lesions by using Segmentation:
In 2015, Amruta M. Gajbar et al. exhibited a novel calculation to recognize the nonappearance or vicinity of streaks in skin injuries, by any dissecting the looks of distinguished streak lines, and playacting a three-gathering order for streaks, Missing, Standard, and Unpredictable, in a tremendously pigmented skin lesion. Also, the directional example of found lines is examined to extricate their introduction alternatives to recognize the fundamental example. The technique utilizes a graphical delineation to display the geometric example of legitimate streaks and along these lines the conveyance and scope of the structure. Mistreatment these arranged alternatives of the substantial streaks together with the shading and composition choices of the complete skin sores, exactness is accomplished for characterizing dermatoscopy pictures into streaks Missing, General, or Unpredictable on pictures

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 9, September 2016

incorporated from chart books and in this manner the net with none rejection criteria.

So they proposed a programmed framework for recognition and characterization of the skin growth into two sorts of skin tumors: threatening melanoma, Basal cell harmful neoplastic sickness. The square measure for specific alternatives of those sorts of skin malignancies, which can be evacuated abuse right component extraction algorithmic tenet. The choices of skin injuries square measure separated standardized symmetrical dark Level Co-event Matrix (GLCM) which is essentially based surface alternatives square measure removed from everything about four classes and given as information to the Support vector machine that is utilized for the grouping reason. It characterizes the given data set into one in the whole carcinoma class.

Detection of Melanoma Skin Cancer Using Digital Camera Images:

In 2015, V. Jeya Ramya et al. proposed a automated framework for skin malignancy recognition with typical and anomalous classes. To start with, preprocessing of the picture was finished by the wiener channel. The great division execution is accomplished by active contour segmentation. The components utilized as a part of the framework are extricated utilizing GLCM. In an order approach with two classifications (threatening and favorable sores), an affectability of 90%, precision of 95% and a specificity of 85% is watched. The surface parameters can be incorporated into the list of capabilities to enhance the general execution of the framework the lesion boundary and in addition texture descriptors are not yet incorporated into the list of capabilities, and might yield a decent beginning stage to enhance the discriminative data in the list of capabilities.

Enhanced Skin Cancer Detection Techniques Using Otsu Segmentation Method:

In 2015, Harpreet Kaur and Aashdeep Singh proposed a automatic clustering based picture thresholding which reduce dark level picture into binary picture. According to this strategy, a picture have two classes of pixels i.e. bi-modal histogram (closer view pixels and foundation pixels) which computes the ideal limit isolates two classes for insignificant joined spread or proportionate, so that their between class difference is maximal . At that point an acquired result is contrasted with different results with decide intensity. After examination, this is registered that this strategy gives precise results.

III.CONCLUSION & FUTURE SCOPE

In this study, we have examined different strategies for the melanoma conclusion. Contrasted with clinical analysis, mix of picture preparing and delicate figuring strategies yielded more precise results to identify melanoma. The procedure of melanoma finding is completed in different stages like preprocessing, division, highlight extraction, post handling and arrangement which utilize advanced systems for getting exact results. Taking into account the review performed, when a clinical picture is prepared with middle sifting/Gaussian channel systems in the preprocessing stage, with the iterative division method in the division stage, by picking shading as a component alongside island evacuation post handling strategy, with choice tree as classifier, best results can be gotten with more exactness. At the point when these procedures are joined together and performed on a picked clinical picture, location of melanoma in the underlying stage itself can be accomplished. Apart from all these existing approaches we can conclude that neural network based classification technique is quite better than other one with one issue that it require a lot of time to train the system for suitable true detection. True detection can be increase to a significant level with lowering computation time with a development of robust algorithm.

REFERENCES

[1] Peter M. Kasson1, Johannes B. Huppa, Mark M. Davis, and Axel T. Brunger, A hybrid machine-learning approach For segmentation of protein localization data, Oxford University Press, Vol. 21 no. 19 2005, pages 3778–3786
[2] German Capdehourat, Andres Corez, Anabella Bazzano, and Pablo Mus, Pigmented Skin Lesions Classification Using Dermatoscopic Images, Springer-Verlag Berlin Heidelberg, 2009, pp. 537–544
[3] G. Di Leo, A. Paolillo, P. Sommella, G. Fabbrocini, Automatic Diagnosis of Melanoma: a Software System based on the 7-Point Check-List, Proceedings of the 43rd Hawaii International Conference on System Sciences,IEEE, 2010
[4] Jonathan Blackledge, Moletest: A Web-based Skin Cancer Screening System, Dublin Institute of Technology, 2011
[5] Dr. J. Abdul Jaleel, Artificial Neural Network Based Detection of Skin Cancer, International Journal of Advanced Research in Electrical, Elcetronics and Instrumentation Engineering, Col. 1, Issue 3, 2012
[6] Mariam A.Sheha, Mai S.Mabrouk, Automatic Detection of Melanoma Skin Cancer using Texture Analysis, International Journal of Computer Applications (0975 – 8887) Volume 42– No.20, March 2012
[7] Yogendra Kumar Jain, Comparison between Different Classification Methods with Application to Skin Cancer, International Journal of Computer Applications (0975 – 8887) Volume 53– No.11, September 2012
[8] Messadi M, Ammar M, Cherifi H, Chikh MA and Bessaid A, Interpretable Aide Diagnosis System for Melanoma Recognition, Messadi et al., J Bioengineer & Biomedical Sci, 2014
[9] Mariam A. Sheha, Automatic Detection of Melanoma Skin Cancer using Texture Analysis, International Journal of Computer Applications, Vol 42, No. 20, 2012.
[10] V. Jeya Ramya, J. Navarajan, R. Prathipa and L. Ashok Kumar, DETECTION OF MELANOMA SKIN CANCER USING DIGITAL CAMERA IMAGES, ARPN Journal of Engineering and Applied Sciences, VOL. 10, NO. 7, APRIL 2015