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# A Frame Work for Detecting Melanoma Using Deep Learning

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**ABSTRACT**: Melanoma is a kind of cancer which occur in our skin due to the deficiency of melanin present in skin. Melanoma is easily curable when it is detected in initial state. But detecting melanoma in initial stage is critical due to lack of experience of physician. In order to get experience one has to go through studying the troublesome picture characteristics includes changing shapes and their irritated sizes, feathery sore limitations, particular dermis covering sorts and closeness of hair.To defeat these constraints, new programmed melanoma location technique for dermoscopy pictures through multi-scale injury one-sided portrayal and joint opposite arrangement. All this study is done by using dermoscopic images which are designed specifically relating to detect the skin lesion which are unseen by human naked eye. MLR used with JRC for melanoma discovery. JRC model permits us to use a great deal of solidly related histograms to determine additional information. Study done on an open dataset of dermoscopy images and exhibit preferable portrayal execution pondered over the present top tier strategies.

**KEYWORDS**: MLR, JRC, Dermoscopic image.

## I. INTRODUCTION

Melanoma is the most frequent type of skin cancer and its incidence has been rapidly increasing over the last few decades. Never the less, it is also the most treatable kind of skin cancer, if diagnosed at an early stage. The clinical diagnosis of melanoma is commonly based on the ABCD rule, or the 7-points depending on color, shape, and texture. The hair which is present on skin can be segmented as lesion because of dark pixels being classified as lesion against lighter pixels which will be categorized as skin. Dermatoscope is provided with ruler markings for measurement of diameter of lesion. These markings will be there in acquired image. The air bubbles and black frame affects the accuracy of segmentation process and further diagnosis of skin cancer. So these artifacts must be removed from image. In some of the cases, contrast between skin and lesion can be very poor. Improved contrast between the lesion and skin improves the accuracy of further diagnosis steps. Melanoma is the most frequent type of skin cancer and its incidence has been rapidly increasing over the last few decades. Never the less, it is also the most treatable kind of skin cancer, if diagnosed at an early stage. The clinical diagnosis of melanoma is commonly based on the ABCD rule, or the 7-points depending on color, shape, and texture. Figure 1 shows the picture of melanoma, while uploading for the detection test. The hair which is present on skin can be segmented as lesion because of dark pixels being classified as lesion against lighter pixels which will be categorized as skin. Dermatoscope is provided with ruler markings for measurement of diameter of lesion. These markings will be there in acquired image. The air bubbles and black frame affects the accuracy of segmentation process and further diagnosis of skin cancer. So these artifacts must be removed from image. In some of the cases, contrast between skin and lesion can be very poor. Improved contrast between the lesion and skin improves the accuracy of further diagnosis steps.Melanoma is a condition or a disorder that affects the melanocyte cells thereby impeding the synthesis of melanin. A skin that has inadequate melanin is exposed to the risk of sunburns as well as harmful ultra-violet rays from the sun. skin disorder has been proven to be unpredictable, as it is characterized by development of lesions in the skin that vary in shape, size, color and texture. Researchers have suggested that the use of non-invasive methods in diagnosing melanoma requires extensive training unlike the use of naked eye. For a clinician to be able to analyze and interpret features and patterns derived from dermoscopic images, they must undergo through extensive training.

Clinicians are often discouraged to use the naked eye as it has previously led to wrong diagnoses of melanoma. Scholars encourage clinicians to embrace routinely the use of portable automated real time systems since they are deemed to be very effective in prevention and early detection of melanoma.

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## II. RELATED WORK

A. *HAND-CREATED HIGHLIGHT BASED TECHNIQUES*

"ABCD" is one of the rule which has become one of the standard in the dermoscopy for gathering pigmented skin wounds toward charitable conversely melanoma. Various programmed arrangement strategies dependent on this standard have been created. For example, Ganster embraced the blend of hand-planned highlights (shape, outskirt angle and shading descriptors), include advancement system and KNN to separate melanoma from generous sores.

B. *PROFOUND BASED ON CNN STRATEGIES*

The model of CNN contains various getting ready layers in order to learn different degrees of depictions. Joining these dynamic features spares incredibly discriminative and ground-breaking significant depictions. There are predominantly two distinct methods of applying CNN to dermoscopy picture affirmation.[1] Methodology used is Photogrammetric based total body scanning system. Advantages are the power of the framework as for various body sizes and shapes will be set up. It permits check of the past condition of any PSL, and not simply those thought important by a dermatologist during a past assessment. The framework performed well on wide scope of the skin types. Body hair influences both sore perceivability and conceivably between investigation coordinating. Detectable body areas which decline like the bottom of the feet, the palms of the arms, the internal surface of the arms, the scalp and the zone behind the ears. The scanner is limited to patients who have a pitiful body hair and for an absolute skin evaluation, palms, scalp, soles and interior arms should be caught truly. [2] Methodology used is a double order in whatever place melanomas are characterized within slight or density. Three class plot (slim, middle of the road, and thick). Clinical discoveries that relate certain attributes present in dermoscopic pictures and tumor profundity. Advantage is its interpretable model, which additionally gives probabilistic classes task and perform include choice during the learning stage. Disadvantage is its only 55% accurate. [3] Methodology used are a coordinated solicitation to which melanoma is collected into small or massive. 3 classes contrive (small, center and chunky). Clinical discoveries that corresponds certain qualities present in dermoscopic pictures and tumor profundity. Advantages are it's an interpretable model, which additionally gives probabilistic classes' task and perform highlight choice during the learning stage. The Technique gain a predominant agreement between the shows got for every level and diminishes the degree of failures. Disadvantage is that there is No edge-based strategies were tried and just a single measurement was utilized to assess the techniques. [4] Methodology used is image recognition technique. Advantage is that the malignant melanoma is early discovery and anticipation. Disadvantage is the unsupervised learning and fine-grained skin lesion classification is not present. [5] Methodology used is Back propogation (BP) auditory systems with fluffy neural systems to accomplish revised execution. Advantages are effectively describe outskirt inconsistencies on both complete sores and fragmented injuries. Improved performance and was more accurate than others. Disadvantage is that it consumes more time to detect and show results. [6] Methodologies used are Deep convolution neural networks (CNNS) and Fully convolution residual network (FCRN). Advantages of the system are Ensure systems profit by the presentation gains accomplished by expanding system profundity. Accurate skin injury division, and further improve its capacity by joining a multi-scale logical data coordination conspire. Framework empowers the arrangement system to remove progressively delegate and explicit highlights dependent on divided outcomes rather than the entire dermoscopy pictures. One disadvantage is insufficiency of preparing information. [7] Methodology used was a combination of the following Jaccard separation to kill the need of test re-weighting. Automatic structure which is dependent on profound convolution neural system for skin sores. Segmentation performed on dermoscopic pictures. Advantages are boosting the division execution. Remove the necessity for data rearranging, when the amount of nearer view and establishment pixels are significantly inconsistent. Robust for different picture antiquities and imaging securing conditions while utilizing least Pre and Post handling. Disadvantage is only 2 databases were used to train and they are ISBI and PH2. [8] Aim is to abuse the inherent self-consideration capacity of DCNNS. Lacked in an unaided learning and fine-grained skin sore arrangement is absent. Using methodology named Attention Lingering Learning Convolution Neural System (ARL-CNN).

## III. PROPOSED ALGORITHM

I. Experimental Design

A. *Image Acquisition*

In image acquisition the input images are acquired in the form of dataset. The melanoma dataset is taken from the well recognized repository UCI machine learning repository. The dataset contains Image data, ground truth, disease state value. The image format will be JPG and PNG format, resolution=640*480. The images are captured using dermscopy instruments.

B. ***HAIR REMOVAL SEGMENTATION***

In this module the hair is considered as upper noise, which interfere the cancer area. It can't be removed clinically

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on the infected area. With the help of **BIT layer segmentation** the hair can be removed and only the melanoma data can be retained.

Algorithm:

Step 1: Start

Step 2: Load original image "I"

Step 3: Apply Bit plane slicing on I such that

$I_S = I - I_F$

Where,

$I_S$= segmented image

$I_F$= foreground image

I= original image

Step 4: Stop

C. *PREPROCESSING*

In this two important processes stage are done.

- Image enhancement and
- Noise removal

Image enhancement contains contrast enhancement, saturation and smoothness and sharpens. Noise Removal contains guassian algorithm used for removing noise such as blur.

D. *LOCAL SEGMENTATION*

In this module segmentation techniques are applied for separating melanoma area with skin area. Bounding box algorithm is used to locate ROI.

E. *IMAGE MORPHOLOGY*

In this module the external boundary of ROI is mapped. Four important techniques are applied they are

- Image erosion
- Image dilation
- Morphological opening
- Morphological closing

F. *IMAGE FREQUENCY CONVERSATION*

In this module the special information is converted to frequency by using Fast Fourier Transformation (FFT). The obtained wave obtained waveform from FFT is converted into wave by applying DWT discrete wavelength transformation. Once wavelength information is extracted it has to be converted to wave by applying "iDWT" inverse discrete wavelength transformation.

G. *IMAGE FEATURE EXTRACTION*

In this module the feature such as color, standard deviation, mean, variance, shape, orientation, width, height, length, Jacob coefficients.

H. *FEATURE TRAINING*

In this module the feature are trained by neural network such as CNN. The trained features are selected based on 70:30 ratio of dataset.

I. *CLASSIFICATION*

In this module the test features are trained features are classified by using support vector machine. The classified result ratio, melanoma and its stage with more than 95% and above accuracy.

J. *ANALYSIS*

Confusion matrics is used for calculating accuracy, sensitivity and precision.

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## II. System Architecture of Melanoma Detection

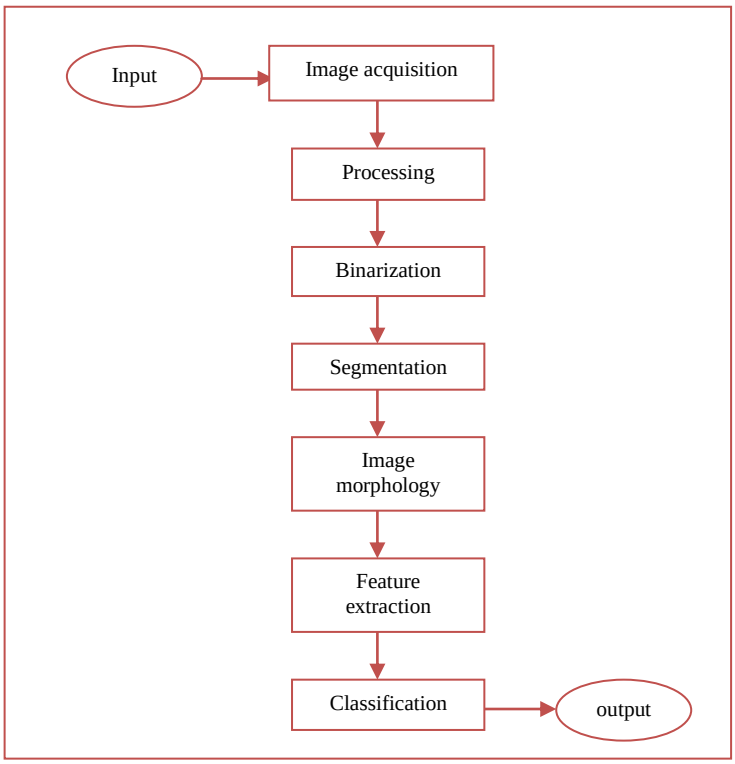


Fig 2: System architecture of melanoma detection

System architecture of melanoma detection is as shown in above diagram. Input shows the user interface. Image acquisition is to select the input uploaded by the user for testing. Processing to get details of image and binarization to do further details segregation. Segmentation to remove the extra noise from image, it can be skin or hair. Next step is to channelling in different channel to get dermoscopic details of image. Classification is to check whether it is melanomical cancer of not, if it is malonoma then at what stage it is. Last is to display the output to the authority.

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## IV. PSEUDO CODE

Step 1: Start
Step 2: Selection of GUI for image acquisition
Step 3: Image filtering to remove the noise
Step 4: Gray scale conversion and get the threshold value of the image
Step 5: Image segmentation using binary conversion
Step 6: Morphological segmentation
Step 7: Get the segmented results which gives background image and segmented region.
Step 8: Feature extraction segment which contains five segments

- **Transformation**
- FFT transformation is done and shown in display and it is stored for calculation.
- **Color feature**
- Color feature extraction transformation is done and shown in display and it is stored for calculation.
- **Dimensional feature**
- Shape feature extraction transformation is done and shown in display and it is stored for calculation.
- **Pattern feature**
- Intensity pattern feature extraction transformation is done and shown in display and it is stored for calculation.
- **Display**

Shows the result of the selected transformed image
Step 8: Pigment network feature set the calculation is done in this section
Step 9: Classification of train feature and test feature
Step 10: Stop.

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## V. SIMULATION RESULTS

In session one we uploaded a image for testing in this session let's see how the process of result is obtained and how it is shown to the authority.

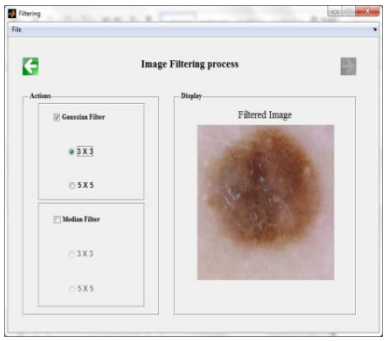


Fig 3: Image noise removal using Gaussian operation

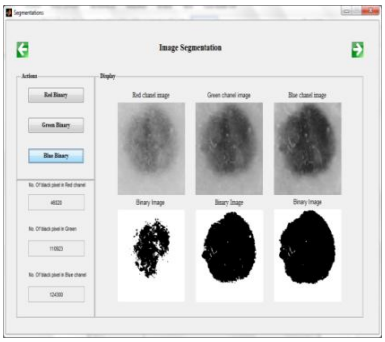


Fig 4: Channel wise band separation

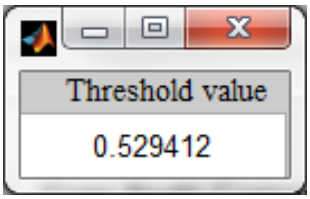


Fig 5: Threshold of grey scale image

Each channel is used to dim level picture. Grey scale pictures are additionally utilized for estimating the power of light in pictures. All the RGB binary segmentation is done, which is shown in the above picture. The channel separation is done now we have got the threshold value of the grey scale. For colour image it won't give proper values due to combination of bands. Fig 3 shows Image noise removal using Gaussian operation and next it will do the median operation Fig 4 shows Channel wise band separation which is done by first doing red channel separation followed by green and blue and then by grey channel to get the detailed picture Fig 5 shows Threshold of grey scale image which is used to get the threshold value.

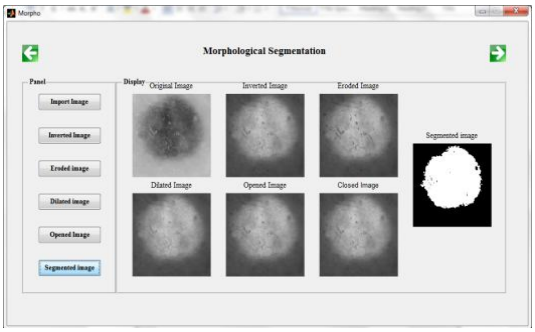


Fig 6: Image morphological segmentation final view after selecting all the panels

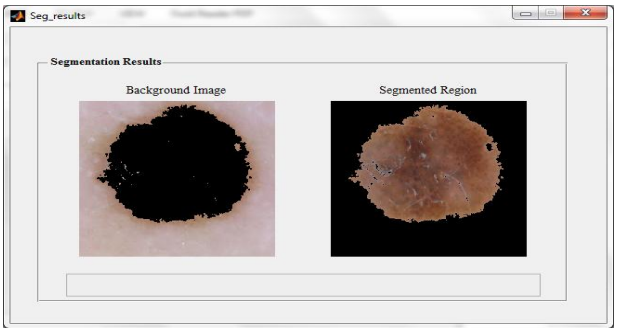


Fig 7: Segmentation result of image.

Figures in above shows Morphological image and pre final result The 6 figure show the Image morphological segmentation final view after selecting all the panels and the 7 picture shows the segmentation result of image

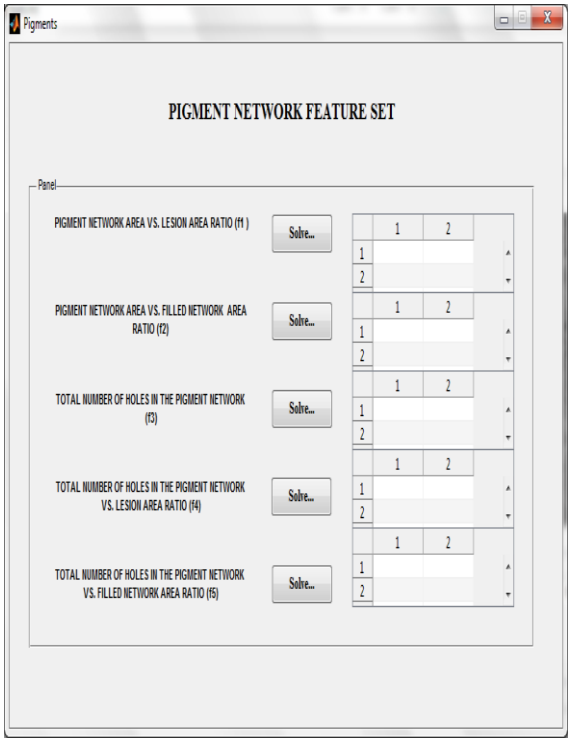


Fig 8: Initial page of Pigment network feature set

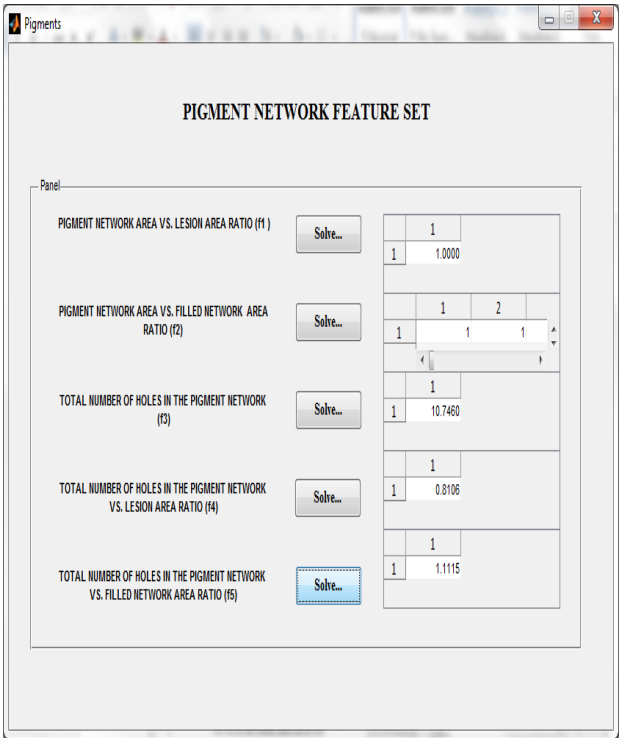


Fig 9: Final page after selecting all value of Pigment network feature set

The 8 picture shows pigment network feature set final page after selecting all the values and the 9 figure show the feature extraction result of shape feature transformation.


Fig 10: Classification initial page


Fig 11: Result shown out in Classification final page whichindicate class1

The a picture shows classification initial page and the figure b show the classification final page where the result shows that it is melanoma at stage one which is written as class 1 benign. The above result shows that the classifier A show stage 1 or 2 or 3 where one is curable and 3 is serious stage. Classifier B shows benign which means curable otherwise it would have shown malignant means serious stage not easily curable. Classifier C shows the cause is it due to melanoma or non melanoma in the above case it due to non melanoma so shows as benign otherwise it would have shown melanoma.

## VI. CONCLUSION AND FUTURE WORK

The developed system helps once to get the result of melanoma in few minutes with greater accuracy. The proposed system not only helps to detect accurately but also informs about the stage and whether it is curable or not. The only requirement is that we need the dermascopic image of the part of the body where the damaging part is present on patient's body.it is the necessary for a patient to get the service only when he has gone to a physician for checkup. It characterise the various level of examinations on the significance of sore division, shading standardization, and assessment measurements. At long last, it likewise indicated that the methodology contrasts well and other cutting edge techniques. Future work should concentrate on approving these outcomes on a bigger dataset that includes more classes of non melanocytic lesions. In future it may be possible to get the app which help the patient to get the result of his disease and to get consult by doctor directly. Patient may be provided with some sensors which helps the patients to get knowledge of how much sunlight he has received or will receive and the patient is guided by the alert in the form of notification or message.

## VII. ACKNOWLEDGMENT

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## REFERENCES

[1] Konstantin Korotkov, Josep Quintana, Susana Puig, JosepMalvehy, and Rafael Garcia "A New Total Body Scanning System for Automatic Change Detection in Multiple Pigmented Skin Lesions" IEEE Trans. Med. Imag VOL. 34, NO. 1, Jan 2015.

[2] Aurora Sáez, Javier Sánchez-Monedero, Pedro Antonio Gutiérrez, and César Hervás-Martínez, "Machine Learning Methods for Binary and Multiclass Classification of Melanoma Thickness FromDermoscopic Images" IEEE Trans. Med. Imag VOL. 35, NO. 4, April 2016.

[3] R. Kasmi and K. Mokrani, "Classification of malignant melanoma and benign skin lesions: Implementation of automatic ABCD rule," IET Image Process., vol. 10, pp. 448–455, 2016.

[4] FengyingXie, Haidi Fan, Yang Li, Zhiguo Jiang, RusongMeng, and Alan Bovik, Fellow, IEEE "Melanoma Classification on Dermoscopy Images Using a Neural Network Ensemble Model" IEEE Trans. Med. Imag., VOL. 36, NO. 3 March 2017.

[5] Lequan Yu, Hao Chen, Qi Dou, Jing Qin, and Pheng-Ann Heng, "Automated Melanoma Recognition in Dermoscopy Images via Very Deep Residual Networks" IEEE Trans. Med. Imag., VOL. 36, NO. 4, April 2017.

[6] L. Yu et al., "Automated melanoma recognition in dermoscopy images via very deep residual networks," IEEE Trans. Med. Imag., vol. 36, no. 4, pp. 994–1004, Apr. 2017.

[7] Yading Yuan, Ming Chao, and Yeh-Chi Lo "Automatic Skin Lesion Segmentation Using Deep Fully Convolutional Networks With Jaccard Distance" IEEE Trans. Med. Imag., VOL. 36, NO. 9, Sept 2017.

[8] Jianpeng Zhang, YutongXie, Yong Xia, and ChunhuaShen, "Attention Residual Learning for Skin Lesion Classification", IEEE Trans. Med. Imag., VOL. 38, NO. 9, Sept 2019.

## BIOGRAPHY

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