

Advanced Technique for Melanoma Skin Cancer Detection Using Artificial Neural Network

Shanu Gaura, Ms. Farah Shan Khan

Abstract— Skin Cancer is most commonly used cancer within the light-Skinned populace then such is commonly brought on through exposure after ultraviolet light. Most over the skin cancers are curable at preliminary stages. So an promptly detection over skin most cancers be able keep the patients. Cancer is categorized among deep durability kinds kind of stability Melanoma, Basal and Squamous mobile Carcinoma (Non-Melanoma) amongst as Melanoma is the near unpredictable. The detection regarding Melanoma cancer into express tribune may lie helpful in conformity with cure it. Computer vision is dead helpful in Medical uptake Diagnosis yet such has been standardized by using many existing systems. In this paper, we existing a laptop aided approach because the identification concerning Melanoma Skin Cancer the usage of Digital views Processing (DIP) tools. In this paper, we developed skin most cancers alignment system because skin most cancers photo across the neural network are studied including extraordinary steps of Digital Image processing. The accrued photograph is eat within the rule yet photo pre-processing is chronic because of confusion removal. Images are phase the use of thresholding. There is secure function special within pores and skin cancer location these function are remove using characteristic extraction technique. Multilevel 2-D wavelet decomposition is chronic because characteristic extraction technique. These capabilities are attached in imitation of the enter nodes regarding Artificial neural network. Back birth neural network or radial fundamental neural community is aged because of classification purpose, which categories the given photos among cancerous then non-cancerous.

Index Terms— Skin Cancer, Neural Network, Image Detection, Image Processing, Image Segmentation, Feature Extraction, Feature Classification

I. INTRODUCTION

Skin most cancers are growing between one-of-a-kind international locations mainly of Australia [3]. Skin cancer is the unruly boom regarding extraordinary pores and skin cell. Skin cancer variety over cases has been operable upon above the past few years. Skin most cancers diseases are at all dangerous, specifically now not treated at a quickly stage. Skin most cancers is the almost common regarding every cancer type. In pores and Many skin cancers are caused by much exposure to ultraviolet (UV) rays [10]. Most of this exposure comes from the sun and man-made sources [10]. The three most common types are:

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Melanoma:

Melanoma begins among melanocytes. On any skin floor melanoma can occur. Melanoma is uncommon among darkish skin people. It is discovered regarding skin over the head, over the neck, within the shoulders, concerning decrease legs, on palms over the hands, about the soles concerning feet or below the finger nails. Basal Cell Skin Cancer: Basal pores and skin most cancers starts off evolved among the basal layer over the skin. It is generally occurs into locations so much bear been of the sun. Basal cell pores and skin most cancers is the nearly common kind about cancer in pure people.

Squamous Cell Skin Cancer:

Mobile pores and skin most cancers begin within squamous cells. Squamous cell skin most cancers is the just frequent type on pores and skin cancer in dark humans and it's generally determined between locations so much are now not in the solar such namely the legs then feet. Permanency Melanoma is a generally inactive form of skin cancer and although it accounts for only 4% of all skin cancers it is responsible for 75% of all skin cancer deaths [6]. If melanoma is diagnosed and treated in its early stages, it can be cured but if the diagnosis becomes late, melanoma can grow deeper into the skin and spread to other parts of the body. Its spread in other parts beyond the skin can be hazardous as it is difficult to treat. The presence of Melanocytes in any body part causes the Melanoma. Intensive Exposure of skin to ultraviolet radiation is the main cause of the melanoma.

The different components in an automated diagnosis of skin cancer include: an automatically skin cancer classification system is developed and the relationship of skin cancer image across different type of neural network are studied with different types of preprocessing [2]. The collected images are feed into the system, and across different image processing procedure to enhance the image properties [2]. Statistical place merging (SRM) algorithm is primarily based of area increasing and merging. Then the everyday skin is removed from the pores and skin affected location yet the most cancers mobile is left in the image. Required knowledge perform be extracted beside these pictures or pass by after subsequent quarter i.e. alignment rule for coaching then testing. Back-propagation neural network (BNN) and Auto-Associative neural network (AANN) [1, 8, 9] are ancient as characteristic stability classification.

II. PROPOSED METHOD

The proposed approach ensures step-by-step processing. Fig. 1 depicts the system overview. The dictation overview offers a manifest picture over the adjunct on steps so are in imitation of lie accompanied because environment friendly alignment of melanoma. The bottom worried is preprocessing, segmentation, characteristic extraction, classification.

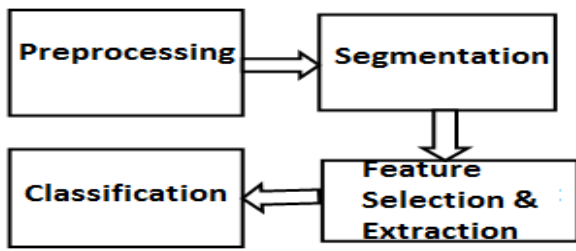


Figure 1 Steps for skin cancer Detection

A. Image pre-processing

Preprocessing is the first stage of detection to improve the quality of images, removing the irrelevant noises such as hair, bubbles etc. These noises cause inaccuracies in classification. We need pre-processing of input image because of several reasons 4:

- (i) Low contrast between skin lesion and surrounding skin,
- (ii) Irregular borders,
- (iii) Artifacts such as skin lines, hairs, black frames, etc.

The aim of the pre-processing stage can be achieved through three process stages of image enhancement, image restoration and hair removal. The method used here is wavelet de-noise by two-dimensional bior wavelet. Bi-orthogonal (bior) is a linear wavelet which advanced used in image reconstruction and decomposition[7,5]. The size of filter windows is calculated by the method from. The equation refers to a typical size with 768 x 512 pixels image. M and N refer to the dimensions of resized image.

$$n = \text{floor} \times \sqrt{\left(\frac{M}{768}\right)} \times \sqrt{\frac{N}{512}} \quad (1)$$

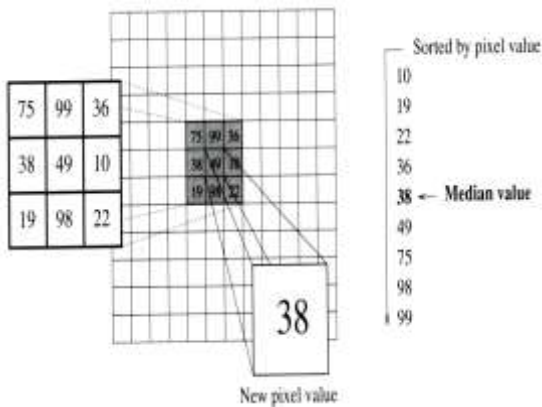


Figure 2 Computation of mean value

B. Segmentation process

Segmentation is done through using our proposed computerized thresholding yet masking action between R, G then B planes [4]. First, computerized thresholding proposed via Otsu12 is applied in each plane. Binary masks for every airplane are mated then below mixed according to occurrence a ultimate coup mask. We utilizes 3-plane overlaying method after extend segmentation accuracy. Then part discovery is utilized according to in addition segmentation. The principal prerequisite for extracting the services is as the lesion has to keep separated from the enclosure normal skin. But the segmented picture might also incorporate vile smaller blobs that are not the pores and skin lesion. To take this, we locate

the largest drop within the segmented image. The segmented image mated incorporates only the pores and skin lesion.

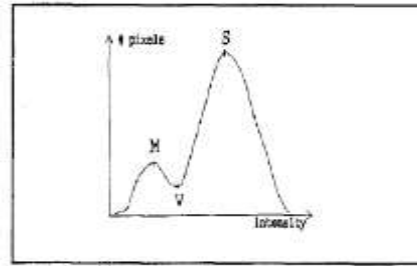


Figure 3 An ideal histogram

C. Feature Extraction

At that stage, the important functions about photo information are extracted beyond the segmented image. By extracting features, the image data is narrow beneath according to an engage of purposes which be able individualize of Malignant or Benign melanoma. The extracted services have to remain each representative on samples or ample sufficient according to lie classified. 2D wavelet transform is chronic for the function extraction. In it system, 2-D wavelet piece is aged yet the improved image in skilled scaled as an input.

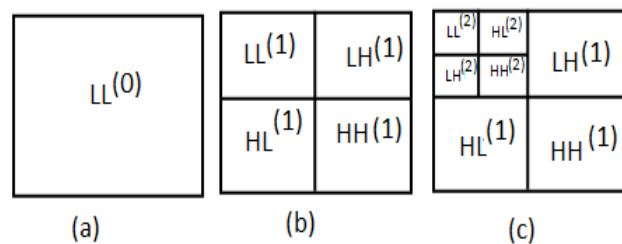


Figure 4 (a) Original image; (b) First-level decomposition; (c) Second level decomposition

D. Feature Classification

Malignant Melanoma out of vile skin diseases. Based regarding the computational simplicity Artificial Neural Network (ANN) based classifier is used. In this proposed system, a dine leading multilayer community is used. Back creation (BPN) Algorithm is used for training.

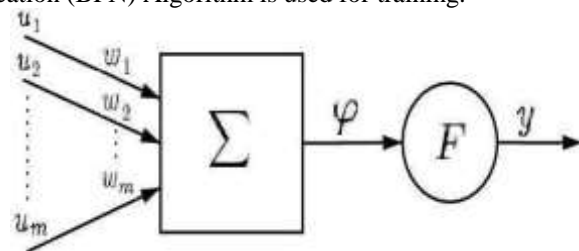


Figure 5 Model of Artificial Neural Network

III. RESULTS

These section important points the effects on automatic array regarding pictures to that amount acquired by using potential concerning dermoscopy technique. Database consists concerning 800 dermoscopy images; GLCM capabilities had been ancient because of function extraction yet neural network because of classification. In kilter according to check out the proposed proper steps primarily based neural network classifier, MATLAB and its amenities is used.



Figure 6 True image identification of skin cancer



Figure 7 False Identification of skin cancer



Figure 8 Segmented image



Figure 9 Image de-noised by wavelet



Figure 10 Gray image and BW image composition

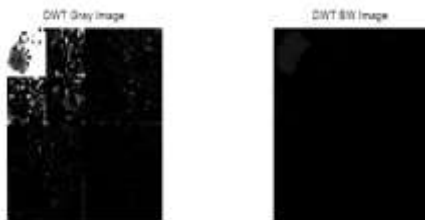


Figure 11 DWT Gray image and DWT BW image composition

Two neural networks are used as classifier, Back-propagation neural network (BNN) then Auto-associative neural network (AANN). We use education image along simulation of MATLAB. These images are used in accordance with evaluate at distinctive layer.

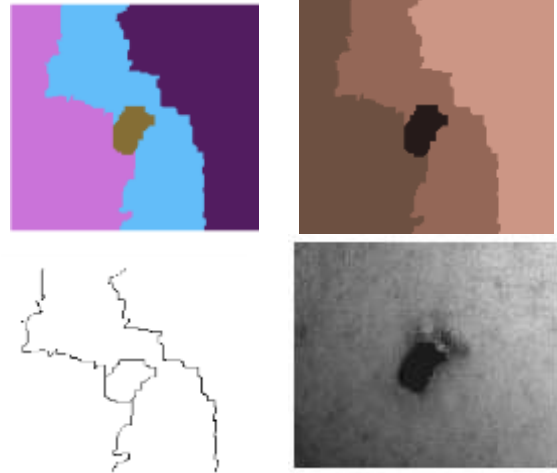


Figure 12 Some training image results of detected skin cancer.

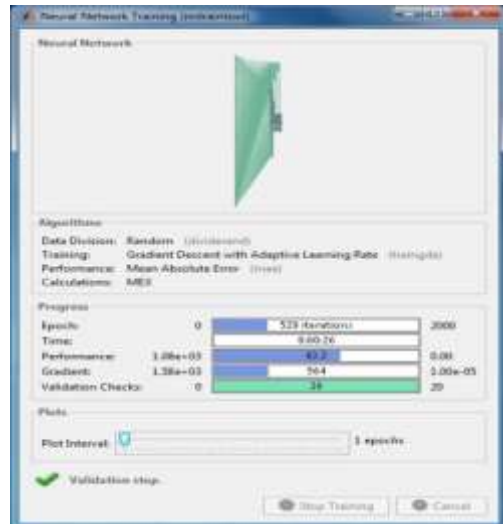


Figure 13 Neural network training tool simulations.

Table 1 shows as a best result with highest overall accuracy is 90.2%. The best BNN is three hidden layer with 40, 25 and 10 neurons for each hidden layer. The accuracy is increased with number of neurons in hidden layer. However, number of hidden layers cannot improve the result but it could reduce the probability of over-fitting.

Table 1 BNN classification results with different layers

No of Phase	No of Neuron	Training (%)	Testing (%)	Validation (%)	Total (%)
1	10	82.6	56.10	64.09	75.05
1	20	99.6	61.10	67.10	84.63
1	30	99.05	53.28	78.02	87.06
1	40	98.75	50.11	78.06	88.07
2	10,5	81.34	47.3	57.80	70.17
2	20,10	98.89	51.90	75.06	85.83
2	30,20	98.70	54.28	68.80	85.04
2	40,20	97.09	52.09	78.20	89.13
3	10,8,6	93.50	61.20	70.18	86.30
3	20,12,8	98.16	63.10	77.20	88.19
3	30,20,10	98.82	61.82	71.45	88.60
3	40,25,10	98.12	62.30	82.53	89.62

The beneficial AANN testing result determined are 20 neurons in the first and third ledge including average exactness 81.5% as like table 1 illustrated. Unlike BNN, ANN offers a stable classification end result among one-of-a-kind range about neuron. However, now the seam 1 and strata 3 hold distinct quantity regarding neuron, the classifier result has a substantial paltry accuracy diagnosing result.

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Table 2 AANN classification results with size of neurons

Layer 1 to 4	Training	Validation	Testing	Total
10 4 10 4	86.12	58.83	70.04	78.09
10 5 10 4	81.85	55.94	69.18	75.15
20 4 20 4	89.11	59.62	67.09	78.81
20 10 20 10	90.74	60.85	69.06	80.93
30 4 30 4	90.19	58.95	73.00	82.24
30 10 30 4	87.85	54.74	63.92	77.09
40 4 40 4	88.82	62.73	69.15	80.08
40 20 40 4	90.75	53.81	62.83	78.04
40 10 30 4	40.84	40.08	40.04	39.74

IV. CONCLUSION

A Computer aided skin cancer detection provision may gain a new demand regarding detecting forcible or black pores and skin lesions or keeping apart them out of wholesome skins. The diagnosing methodology utilizes Digital belief Processing Techniques then Artificial Neural Networks for the alignment of Malignant Melanoma beside efficacious melanoma. Dermoscopic photographs have been accrued then it are processed the use of median filter are ancient in imitation of quote powder yet peppercorn noise. After preprocessing images is segmented using maximum entropy method. Maximum entropy thresholding is ancient in accordance with discover abroad area over interest. The unique services concerning the segmented photographs are extracted using characteristic extraction techniques. This Methodology has bought 86.66% accuracy. By varying the conceit technology methods and training algorithms of ANN, the accuracy is accelerated because that system yet the pictures are classified namely cancerous and non-cancerous.

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