

Approach of ANN in Dermatoscopic Images for Skin Cancer Classification

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Abstract: Among the various types of cancers skin cancer is also one of the most deadly cancers, so detection of skin cancer in early stages can save patient's life. There are advance technologies for early detection of skin cancer but depends based on expertise of clinician. However many of these tests are extremely complex and subjective. In this paper we discussed about the artificial neural network (ANN) approach for detection of Mole as malignant Melanoma type of skin cancer based on its features collected from Dermatoscopic Images (DI). The detection system involves in image processing techniques and artificial intelligence.

Keywords: ANN, DI, Skin cancer

1. INTRODUCTION

In the scenario of human body the largest organ which serves as outer layer is skin, which protects human body from environmental invades such as bacteria, fungus, viruses etc. But due to over exposure to UV rays and once own individual habits leads to un controlled growth and spread of abnormal cells in a specific layers of the skin leads to skin cancer. Among the various types of skin cancers melanoma is a deadly cancer were new cases of melanoma are diagnosed each year only few of diagnosed skin cancers but more of skin cancers are related to deaths. Moles are most commonly seen, used and listen in our daily life for various reasons like identification marks beauty spot etc. A mole is a small dark spot on the skin called as Melanocytic nevus (mole) in a scientific name that contains nevus cells.



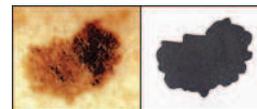
Fig. 1. Image of mole

2. CLASSIFICATION RULES

Melanoma is not as common as other types of skin cancer, but it's the most serious and potentially deadly. Possible signs of melanoma include a change in the appearance of a mole in size, shape, color & irregular edges.

ABCDE's of melanoma: Melanoma typically presents as a brown or black spot with irregularities in symmetry, border and color.

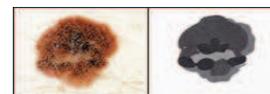
Asymmetric: One half doesn't match the other half.



Border Irregularity - The edges are ragged, notched or blurred.



Color - The pigmentation is not uniform. Shades of tan, brown, and black are present. Dashes of red, white, and blue add to the mottled appearance.



Diameter - The width is greater than six millimetres (about the size of a pencil eraser). Any growth of a mole should be of concern.



Evolution: the symmetry, border, color, or diameter of a mole has changed over time.

3. DERMATOSCOPYIMAGES

Dermatoscopy refers to the examination of the skin lesions with a Dermatoscope. Using Dermatoscopy, the pigmentation of lesion is evaluated in terms of colours and structure. During Dermoscopy assessment, the PSL (Pigmented skin lesion) is covered with a liquid (usually oil or alcohol) and examined under a specific optical system.

Applying oil reduces the reflectivity of the skin and enhances the transparency.



Fig. 2. Dermatoscopy Fig. 3. Dermatoscopic image

4. METHOD

The detection of mole as a malignant Melanoma type skin cancer can be cured and can save the patient’s life unless it is diagnosed earlier, the current process is methodological highly subjective and expertise. The work carried out involves Image processing techniques for dermoscopic images like

- i. Pre-processing
- ii. Segmentation
- iii. Feature Extraction

i. **Pre-processing:** As the captured image using dermatoscope may contains noise like body hair and pores etc. These noises cause inaccuracy in classification. To avoid this one of the pre-processing technique smoothing is done to the image which removes the noises of the images.

ii. **Segmentation:** segmentation is the process of focussing on the interested area for noticing and pointing out. It includes in removing the healthy skin from the captured image and fallows in highlighting the pointed area.

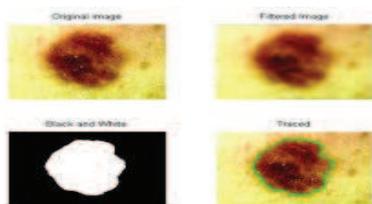


Fig. 4. Segmented Image

iii. **Feature Extraction:** In this process the important features of image data are extracted from segmented images. Based on the extracted features the image data is distinguished between Malignant and Benign Melanoma.

5. ARTIFICIAL NEURAL NETWORK CLASSIFIER

An Artificial Neural Network is an adaptive, most often nonlinear system that learns to perform a function (an input/outputmap) from data. After the training phase the Artificial Neural Network parameters are fixed and the system is deployed to solve the problem at hand (The Recognition/Testing phase). Back-propagation ANN's used in this study consist of one input layer, one or two hidden layers, and one output layer. With back-propagation, the input data (Extracted Features) is repeatedly presented to the Artificial Neural Network, with each presentation the output of the neural network is compared to the desired output (Grade of Tumor) and an error is computed. This error is then fed back (back-propagated) to the Artificial Neural Network and used to adjust the weights such that the error decreases with each iteration and the neural model gets closer and closer to producing the desired output.

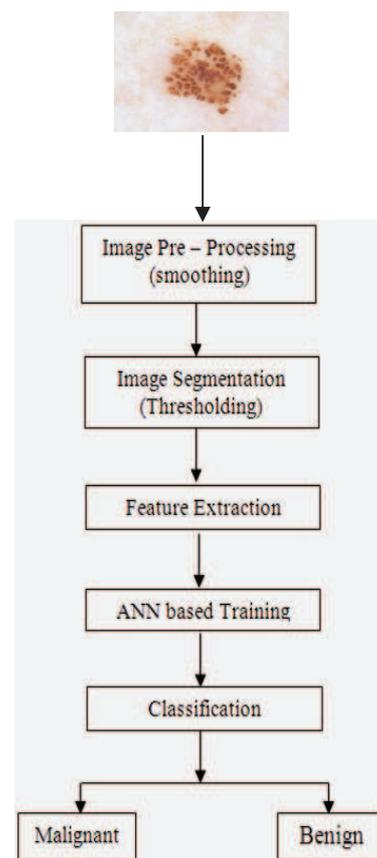


Fig. 5. Classification system

6. RESULTS

Neurolab is the software used for ANN classification. It is ANN simulation software which gives good results in classification. The network is trained using known values of Malignant and Benign Melanoma features. 31 combination of Malignant and Benign Melanoma features were given for classification. The output of the classifier is either '0' or '1'. one represents cancerous condition and zero represents non-cancerous condition.

Row	Output
1	0
2	1
3	0
4	0
5	0
6	1
7	0
8	1
9	0
10	1
11	0
12	0
13	0
14	1
15	0
16	0
17	1
18	0
19	0
20	0
21	0
22	0
23	1
24	0
25	0
26	1
27	0
28	0
29	0
30	0
31	0

Fig. 6. Classifier output

7. CONCLUSION

The proposed system gave good results in classification of Malignant melanoma type cancer. The results obtained using ANN provides good accuracy. The research work can be further progressed by implementing dynamic classification using dermatoscopic images.

8. REFERENCES

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