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Skin Cancer Detection Using Image Processing

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Abstract

In today's world, Skin cancer is a major cause that leads to death amongst humans. Abnormal growth of skin cells is known as skin cancer. Mostly it develops on places where body is exposed to sunlight, but it also can occur anywhere on the body. Usually, Skin cancers are curable when treated on their early stages. So it is vital to detect skin cancer as early as possible to save the life of the patient before the cancer reaches terminal stage where treatment is very tough and ineffective. By using latest technologies, it is possible to detect skin cancer at the initial stage itself. Traditional methodology of detecting skin cancer involves Biopsy method. The patient has to undergo skin cell removing for lab tests which is effective but causes pain to the patient and also a time-consuming method for detection of cancer detection. Our technology detects cancer present in our human skin by the utilization of an Artificial Neural Network. This methodology utilizes Image enhancement techniques for better results than the existing industrial methods which are using MATLAB. The affected skin area image will be to go through dermoscopy image prepossessing techniques for noise elimination and then followed by image enhancement techniques. The enhanced image will be then subjected to go segmentation by Thresholding. Where some features are unique for skin cancer and those features makes it possible to identify whether the processed image is cancerous or not. Those features were extracted by one of our feature extraction model called 2D WTM. These features are fed to the neural network as input. BPN is utilized for grouping purpose. Where it groups the provided information group into Melanoma or Nevus.

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1. Introduction :

Human skin consists of three layers of cells namely squamous cell layer, basal cell layer, melanocytes cell layer. Cancer in Squamous and basal cells are termed as non-melanoma. Non-melanoma always responds to appropriate treatment and do not often spread to other skin lesions. Melanoma is the most perilous cancer than the other types of skin cancer we mentioned above. If not detected on early stage, it may quickly invade to nearby tissues and can cause cancer to nearby cells of the body making it complex by growing to large area. Existing technology to detect skin melanoma by using Biopsy test. Biopsy is a model to expel a part of tumour from patient body. The patient has to undergo skin cell removing for lab tests which is effective but causes pain to the patient and also a time-consuming method for detection of cancer detection. Latest image processing diagnosis will fasten the pace of melanoma diagnosis which acts according to symptoms. The even looking nature of skin lesion makes the detection of cancerous tissues a tedious task. However there happens some unique features of cancer, such as: ABCD parameters. Asymmetry is missing of symmetricalness in lesion. Border Irregularity is the uneven nature of border found in tumour captured lesion image samples. Color gradient variation is irregular on tumour regions. Melanoma with radius greater than 3mm making the diameter that exceeds 6mm.

2. Image Acquisition:

Our initial step of our project is to capture the Suspected skin region using dermatoscope. The captured image is going to be processed, because the shape of the lesion is unique for cancer affected lesion that can be identified by ABCD parameters. So it is necessary to Capture the lesion precisely.

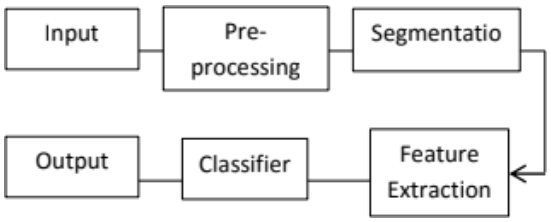

Fig1.Steps involved in image processing

Image Processing:

Image pre-processing is the key step to identify weather the lesion is Melanoma (Cancerous) or Nevus (Non-Cancerous). Before doing processing, the image contains unwanted noises such as bubbles and hairs. These noises may lead to inefficient results and need to be processed prior to the next step. To stay away from that, images are made to pass through image processing algorithms like Contrast enhancement and Noise filtering using median filter.

Image Segmentation:

In our Project Segmentation extracts 3 images. Based on
The processed image is fed to segmentation, here we use threshold segmentation, using threshold segmentation the image is splitted and grouped into three layers based on the areas having similar pixel intensity levels. It is done via taking the entire image divided into pixels and classifying each of them as object.

Feature Extraction:

The significant features of the given sample are collected from the segmentation done results. By only extricating details, the information from the picture is

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limited down to a bunch of features which is indistinguishable as Melanoma or Nevus. 2D wavelet transfer is set for feature acquirement in our project. In this point significant features of sample are taken from processed image. On doing this, the sample image data is limited to a list of features which will be easily recognized as Cancerous and Non-Cancerous. The extracted features must be detailed enough to be classified. After each progression of deterioration, the wavelet from sample image is partitioned as approximate and further 3 high resolution images which show the fundamental information, diagonal info respectively. The features like mean and L1, L2 norms took by the usage of wavelet analysis and also Standard deviation is taken.

Artificial Neural Network:

Classifier is used for distinguishing Melanoma from other skin tumours. In view of the computational effortlessness Artificial Neural Network derived classifier is utilized. In our proposed model, a FFN is used. Back propagation Algorithm (BPN) was utilized for training. There should be at least an input layer, and at least a single hidden layer.

3. Segmentation :

Segmentation is used to remove the normal skin from the image so that we can get the image having only cancer region . For our project we use thresholding for segmentation. Thresholding will do segmentation by difference in intensities in the region having cancer and region not having cancer so that it can separate it as foreground and background image. Grey scale image or colour image is the input to threshold operation. In segmentation our entire image is scanned to similar pixel intensity levels. It is done via taking the entire image divided into pixels and and classifying each of them as object

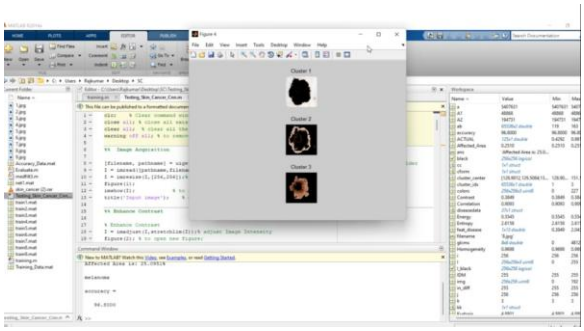

Fig 2: Segmentation Classification

3.1 Artificial Neural Network :

The final step is Classifier where it identifies the given image as melanoma or non-melanoma. Here in our project artificial neural network-based classifier, FFN is used. BPN is utilized for training. There have to be three important layers like input layer, atleast a hidden layer and an output layer. Depending on the error in classification the hidden and output layer adjust its weights. In BPN the signal flow is fed forward and error will be propagated back & weights are adjusted accordingly to avoid error. By modifying the weights according to the error making it more reliable in prediction.

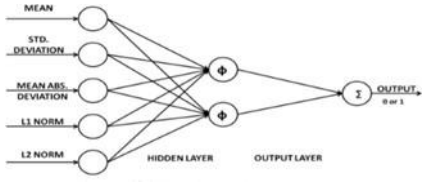

Fig 3: Neural network representation

4. Methodology:

The Melanoma detection of an infected lesion can be done in five steps which include image acquisition to ANN classifier. In this proposed

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method we include all the processes in detail. Basically, in this project we Detect Melanoma cancer infected regions by capturing images of lesions. The quality of image plays a vital role in the accuracy of end results produced by our project. First, the image acquisition is done by using a dermatoscope because naked eyes and other forms of camera modules cannot produce accurate image samples that are precise enough to process for accurate results. And then we do image processing for removing noise for finding the boundary and symmetrical nature of the lesion. Followed by the Processing the next step is Segmentation Which is used to remove the normal skin from the image so that we can get the image having only cancer region . For our project we use thresholding for segmentation. The next process involves Feature extraction where the data from the image is reduced to distinguishable features which makes it easier to identify as Cancerous or Non-Cancerous. The Feature extracted image is then processed by using ANN In our proposed idea a FFN is used. Back propagation (BPN) Algorithm is utilized for training. The proposed methodology involves 5 steps which are elaborated below.

In bipolar neural networks the weights are initialized with random value and it produces the output for the given training. Here we use the supervised learning technique. The result is contrasted and the required output is not the same, so we can declare the error has occurred. If an error occurs, the error is propagated back with an adjusted hidden and output layer until the error is not happening. After training the network with known values, it can decide the results.

In this proposed method we have used five features as an input FFN. In the neural network we have used a layer which is hidden with two neurons in hidden level, one output neuron and linear function as linear function which gives the output as 0(nevus) and 1(melanoma). The network is made to train by known information of melanoma and non-cancerous information. The training goes on until the RMS error is negligibly less. The features from cancerous and non-cancerous images are given as input for classification and classifiers produce output as melanoma or nevus.

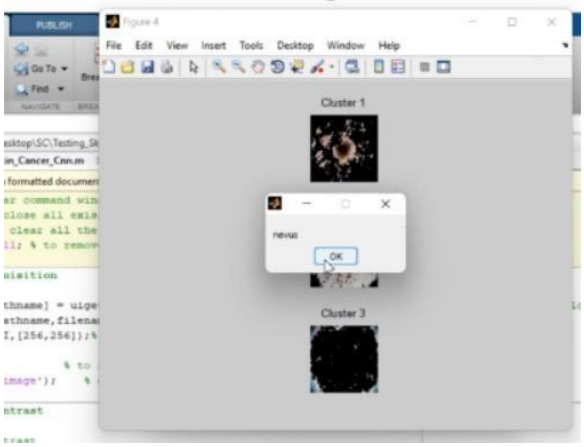

Fig 4: Nevus(Non -Cancerous)

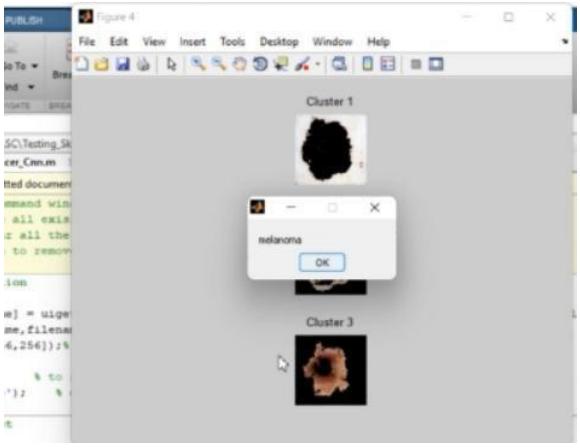

Fig 5: Melanoma (Cancerous)

5. Results And Discussion:

Our technology detects skin melanoma using the Artificial Neural Network. This method uses Image enhancement techniques. The affected skin area image captured using dermatoscope considering the feasibility we have used dermatoscope image samples from the internet and the source image undergoes through pre-processing techniques for disturbance signal called distortion removal and then followed by sample enhancement techniques. The enhanced image is then subjected to segmentation by Thresholding. Some features are unique for skin cancer and those features make it possible to identify whether the processed image is cancerous or not. Those features were extracted by one of our feature extraction techniques called 2D Wavelet Transform method. These details are given input to the FFN. BPN is utilized effectively for classification purposes. It classifies the given data set into Melanoma or Nevus

6. References:

1. Ho Tak Lau and Adel Al-Jumaily, Automatically Early Detection of Skin Cancer: Study Based on Neural Network Classification, International Conference of Soft Computing and Pattern Recognition, IEEE , pp 375-380, 2009
2. Fikret Ercal, Anurag Chawla, William V. Stoecker, Hsi-Chieh Lee, and Randy H.Moss, Neural Network Diagnosis of Malignant Melanoma From Color Images, IEEE Transactions on Biomedical Engineering. vol. 41, No. 9, 1994
3. li AI-Haj, M.H.Kabir Wavelets Pre-Processing of Artificial Neural Networks Classifiers , IEEE Transactions on Consumer Electronics, Vol. 53 Issue 2, pp. 593-600 , 2008.
4. Pankaj Agrawal, S.K.Srivastava and S.S.Limaye, MATLAB Implementation of Image Segmentation Algorithms, IEEE Pacific Rim Conference on Communication, Computer and Signal Processing, pp. 602-605., 2010
5. Asadollah Shahbahrami, Jun Tang A Colour Image Segmentation algorithm Based on Region Growing, IEEE Trans. on Consumer Electronics Euromicro, pp 362-368, 2010.
6. T. Tanaka, R. Yamada, M. Tanaka, K. Shimizu, M. Tanaka,A Study on the Image Diagnosis of Melanoma, IEEE Trans. on Image Processing, pp. 1010-1024, June 2004.
7. Y. Andreopoulos, N. D. Zervas, G. Lafruit, P. Schelkens, A local wavelet transform implementation versus an optimal row-column algorithm for the 2D multilevel decomposition, IEEE International Conf. on Image Processing, volume 3, 2001.
8. Mariam, A.Sheha,Mai, S.Mabrouk, Amr Sharawy, Automatic Detection of Melanoma Skin Cancer using Texture Analysis, International Journal of Computer Applications, Volume 42, 2012.
9. M. Vetterli, O. Riol, Wavelets and Signal processing, IEEE Signal

Processing Magazine, pp.14-38, Oct 1991.

10. Shubhankar Ray and Andrew Chan, Automatic feature extraction from wavelet coefficients using Genetic Algorithms, IEEE Trans. on Image Processing, pp. 980-1025, June 2000.