ISSN:2791-1322(Online)
ISSN:2791-1314(Print)
JNCBAE Volume1, Issue2 (April-June 2022)

A healthcare model to predict skin cancer using deep extreme machine learning

'Zara Naeem' Ghazala Zia, Zainab Bukhari

[1,2]Lahore Garrison university, Lahore

[3]University of central Punjab, Lahore

Abstract: - In the modern world, skin diseases are the leading cause of death in humans. Malignant skin growths most commonly develop on areas of the body that are exposed to sunlight, but they can appear anywhere on the body. In the early stages, most skin tumors are treatable. Early and rapid detection of skin diseases can save a patient's life. Innovation makes it possible to detect skin diseases at an early stage. A biopsy is a formal technique for detecting malignant growths on the skin [1]. After the skin cells are removed, the example is sent to different research centers for testing. The interaction is difficult and time-consuming, and we have developed a framework for spotting skin malignant growths with SVM for the early detection of skin cancers. Patients benefit more from this. Diagnoses are made using image processing strategies and support vector machines (SVMs). Various pre-handling procedures for clamor evacuation and picture improvement are performed on the coloscopy picture of skin disease. A thresholding procedure is then used to divide the picture. The GLCM method should be used to separate a few highlights in the image. The classifier uses these elements as inputs. The data is then classified using SVM. A harmful or harmless image is classified

Keywords: Machine learning, grayscale conversion, Noise removal, image enhancement

1 Introduction:

Malignant skin growths can be fatal. The skin is divided into three (3) layers. Skin disease begins in the surface layer, which consists of the first layer squamous cells, the second layer basal cells, and the deepest or third layer melanocytes. A nonmelanoma tumor is a squamous cell carcinoma or a basal cell carcinoma. Skin disorders other than melanoma usually respond to treatment and seldom spread to other tissues. The risk of developing malignant growths of the skin is higher with melanoma [3]. It rapidly invades nearby tissues and spreads to other parts of the body if it isn't detected at an early stage. An official biopsy technique is used to determine the location of malignant growths on the skin. During a biopsy, a piece of tissue or a sample of cells is removed from the body and broken down in a laboratory. There are risks associated with this procedure. The biopsy method is not only time-consuming for patients and specialists but also expensive. Skin tissue (skin cells) is removed and tested during biopsies by a research facility [1]. Infections can spread to other body parts, so the risk increases. Due to all the cases outlined above, I propose using SVM to identify So Skin malignant growths. SVM is used to classify images as a result of advanced image handling. It is possible to detect early skin diseases without applying any oil, and you can obtain a clear, sharp image of your moles without applying any oil. Identification of moles becomes quicker and easier with this method. SVM, on the other hand, has a greater sensitivity and can amplify smaller moles and skin injuries, preventing them from being removed.
The following specialists are involved in this segment:
J Abdul Jaleel [2013] proposed using Gray Level Co-Event Matrix (GLCM) for skin identification, including ANN removal and GLCM classification. The C1assification process is performed with a Back-Propagation Neural Network (BPN).

ABCD (Asymmetry Index Border Color Index Diameter) method can be used to remove highlights, according to Chaithanya Krishna [2016].
ABCD (Asymmetry Index Border Color Index Diameter) method can remove highlights according to SES. Clients can identify children's skin diseases using the web and receive helpful clinical advice in the proposed framework. I used AdaBoost, BayesNet, MLP, and NaiveBayes grouping calculations to analyze skin sickness. [8] This medicine treats three skin conditions: eczema, impetigo, and melanoma.
Various pre-processing strategies are used, such as Disease Diagnosis, Maximum Frequent Itemset Algorithm, K-implies grouping, and vast incessant examples for characterizing [6].
In this article by Amr Sharawy, Mariam A. Sheha and Mai S. Mabrouk, the authors discuss a method for melanoma detection based on computerized images. We used dim-level co-event grids (GLCM) and multilayer perceptron classifiers (MLP) to discriminate between cancerous and non-cancerous images.

2 Proposed methodology:

This method of identifying the presence of dangerous cells in an image is fundamentally defined as the method of recognizing skin diseases using SVM. SVM and GLCM are used to recognize skin diseases. Dim Level Co-Event Matrix (GLCM) is a method of extracting details from a picture that can be used for ordering. An artificial intelligence method, SVM is used to investigate order and relapse patterns.
s

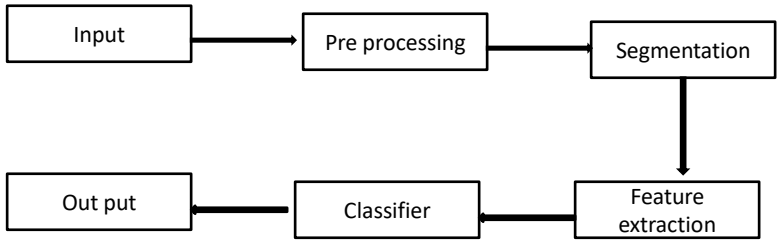

Fig 1 Block Diagram

2.1 Input image:

Dermoscopy images are part of the proposed framework, and dermoscopy images are photographs taken with dermoscopy. It's basically a magnifying glass used to photograph skin injuries (parts of the body). Handheld devices make it easy to observe skin problems.

2.2 Preprocessing:

Pre-processing aims to improve the information in the image by reducing unwanted garbled characters and highlighting some of the highlights that are important for subsequent image processing. Preprocessing includes three main features: 1) grayscale changes 2) noise reduction 3) image enhancement.

2.3 Grayscale conversion:

Grayscale images only contain information about the brightness of the image. Grayscale images compare each pixel value to a sum or amount of light. A grayscale image can separate the brightness gradient. Grayscale images only estimate light levels. 0 is the black level and 255 is the white level, so an 8-bit image has brightness variations from 0 to 255. The grayscale image shown in Fig. (3) is the result of changing the shading into grayscale. It is much easier and faster to process grayscale images than shaded images. Grayscale images are treated the same as shaded images. Using the following equation, we convert the proposed frame shading or RGB image to a grayscale image using the weighted overall technique.

$$\text{Grayscale intensity} = 0.299\,R + 0.587\,G + 0.114\,B \quad (1)$$

Noise Removal

The purpose of noise reduction is to detect and remove unwanted noise from computerized images. It is difficult to determine which highlights in an image are real and which are the result of excitement. Imaginary pixel variations add excitement.

With our proposed framework, we eliminate unwanted clamor shown in fig. (4) by using the middle channel. By using the middle channel, edges remain invariant. Sliding windows of odd length [4] are used to implement the middle channel.

In each example, the esteems are arranged by extent, with the middle esteem corresponding to the middle of the test inside the window, a channel yield.

2.4 Enhancement in the images

Image improvement aims to enhance the perception of an element of interest in an image. The quality outcome shown in figure (5) can be improved through contrast improvement.

2.5 Segmentation

The process of segmenting entails removing locales of interest from a photograph. Pixels represent local areas of interest. We use the greatest entropy thresholding for division [5].

Our first step is to compute the dark degree for the unique image, compute the histogram for the dim scale image, and then by using the most extreme entropy, separate the frontal area from the foundation. We obtained this highly contrasting image after the most extreme entropy (fig. 6).

2.6 Feature extraction

In removing data present in a picture, highlight extraction plays a key role. For surface image analysis, we use GLCM. GLCM is used to detect spatial dependency between pixels in an image. With the GLCM framework, most normal elements are captured, for example, contrast, and mean, energy, homogeneity [2].

Contrast

$\sum_i \sum_j (i-j)^2 C(i,j)$(2)

Energy

$\sum_i \sum_j C^2(i,j)$ (3)

Homogeneity

$\sum_i \sum_j \frac{C(i,j)}{1+|i-j|}$(4)

Mean (μ)

$\frac{\sum_i^m \sum_j^n C(i,j)}{M*N}$(5)

This feature allows for the suppression of the first image informational index by identifying specific qualities or highlights which helps group images according to their characteristics [5].

2.7 Classifier

Carcinogenic images are separated from other skin diseases using the classifier. The classifier used in this case is a Support Vector Machine. A system that takes a set of images and predicts which of the two classes of dangerous and non-carcinogenic images each picture belongs to. SVM is used to make hyper planes that isolate classes with extreme gaps between them [2].
We provide the framework result of GLCM in figure (7) [11], which is a contribution to the SVM classifier that includes preparing information, testing information, and collecting data to determine whether a given input picture is destructive or not.
I gathered images of skin diseases from Kaggle. The images were prepared by different pre-handling methods, including dim-scale change, middle-channel most extreme entropy and a GLCM strategy, and then each element was fed into a SVM to group the destructive and noncancerous images, which resulted in a cancerous image as shown in figure 7.

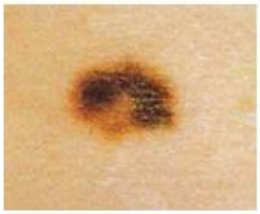

Fig: 2 Input images

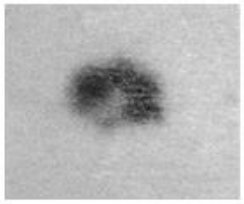

Fig: 3Grayscal image

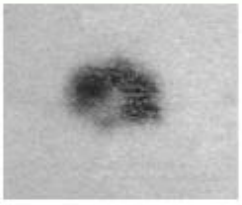

Fig: 4 Image without Noise

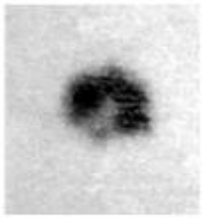

Fig:5 Enhanced image

Fig: 6 segmented image

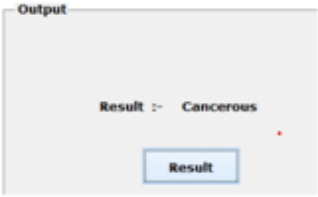

Fig: 7 Output image

Testing performed on 20 sample images. Accuracy is calculated by using following formula.

$$\text{Accuracy} = \frac{TP + TN}{TP + FP + FN + TN} \quad (6)$$

Parameters	SVM classifier
TP	16
TN	03
FP	0
FN	1
Accuracy	95%

Table 1: Performance of SVM

3 Conclusion

To determine whether a picture is harmful or not, a dark level co-occurrence grid and backing vector machine are useful in the proposed method of skin malignant growth detection. This method has been proven to be reliable in 95% of cases. Compared to a biopsy, it is more straightforward and less invasive. Therefore, patients can benefit in a variety of ways from the procedure.

4 References

[1] J Abdul Jaleel, Sibi Salim, Aswin.R.B,dz Computer Aided Detection TT Skin Cancerdz, International Conference on Circuits, Power and Computing Technologies, 2013.

[2] C.Nageswara Rao, S.Sreehari Sastry and K.B.MahalakshmiDzCo-Occurrence Matrix and Its Statistical Features an Approach for Identification Of Phase Transitions Of Mesogensdz, International Journal of Innovative Research in Engineering and Technology, Vol. 2, Issue 9, September 2013.

[3] Santosh Achakanalli& G. Sadashivappa ,dz Statistical Analysis Of Skin Cancer Image –A Case Study Dz , International Journal of Electronics and Communication Engineering (IJECE), Vol. 3, Issue 3, May 2014.

[4] DzDigital image processingdz by jayaraman. Page 244,254-247,270-273. (gray level, median filter).

[5] Algorithm For Image Processing And Computer Vision .Page 142-145.(Thresholding)

[6] Kawsar Ahmed, TasnubaJesmin, DzEarly Prevention and Detection of Skin Cancer Risk using Data Miningdz, International Journal of Computer Applications, Volume 62– No.4, January 2013.

[7] M.Chaithanya Krishna, S.Ranganayakulu, DzSkin Cancer Detection and Feature Extraction through Clustering Techniquedz, International Journal of Innovative Research in Computer and Communication Engineering, Vol. 4, Issue 3, March 2016.

[8] A.A.L.C. Amarathunga,dz Expert System For Diagnosis Of Skin Diseasesdz, International Journal Of Scientific & Technology Research, Volume 4, Issue 01, 2015.

[9] Mariam A.Sheha ,dzAutomatic Detection of Melanoma Skin Cancerdz, International Journal of Computer Applications, ´TT´.

[10] Anshu bharadwaj, DzSupport Vector Machinedz, Indian Agriculture Statistics Research Institute.

[11] Maurya R, Surya K.S,"GLCM and Multi Class Support Vector Machine based Automated Skin Cancer Classification, "IEEE journal, vol 12, 2014.