Skin Cancer Cell Detection Using Deep Learning Techniques

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**Abstract –** *Skin syndrome is a quotidian in people’s life since of a significant increase in pollution and an unclean way of living. The repercussions of this manage to various skin diseases. Conventionally skin diseases are diagnosed visually by humans. As human’s adjudication can be inexact, we tend to lean on computer-aided diagnostic system, hence in this paper, we have put forward a skin disease prediction system that is built on top of deep neural networks. The dataset is inspired by Harvard’s HAM(Human against machine). Furthermore, data augmentation has been done to enhance the quality of the dataset. A sequential model has been created by using Keras .Numpy The model advanced can achieve an accuracy of 81%, further improvement can be attained by enhancing the model facilitated by good infrastructure.*

## *Key Words*: Skin Syndrome, Deep Learning, Convolutional neural network, Melanoma

1. **INTRODUCTION**

Diseases are perceived as medical condition that is associated with a specific set of symptoms. The disease can be classified based on how much area of the body they affect

i.e. Localized diseases impact peculiar parts of the body, disseminated diseases spread to different parts of the body and systemic diseases affect the whole body. Skin diseases are disorders that affect the human skin. It has a severe impact on people’s health. This has become ubiquitous and so the need for effective remedies has become necessary. Detection of skin disease is very crucial as it can cause severe loss to people. In today's world, there is a need for an automatic diagnostic system that would help in diagnosing the disease at a faster rate and thereby reduce the manual efforts and time required to recognize the disease. Our proposed system is based on a convolution deep neurons network which is a machine learning algorithm that helps in detecting skin disease by taking an image of the affected area as an input to the system. The system then processes and classifies the images under specific categories. It is capable of deciding 7 types skin diseases particularly.

## Deep Learning Methods

Deep learning is a machine learning technique that teaches the computer to behave like people do and to learn from experience. Deep learning teaches a model to do text-based and image-based categorization of pictures according to their respective classes. The data, which might take the form of text or images, is categorized using models that have been structured

## Convolutional Neural Network

Convolutional neural networks are a subclass of neural networks that are used to recognize images, classify images, detect objects, etc. Convolution neural network consists of different layers such as convolution, ReLU, pooling, and fully connected layer. Convolution layer extracts the features from an input image. It is an operation that takes two inputs, that is image matrix and a filter. ReLU stands for the Rectified Linear Unit, the output of this layer is ƒ(x) = max(0,x) where x stands for each value of the matrix. The pooling layer is used to reduce the number of parameters of the image, spatial pooling is of three types namely max pooling, average pooling, and some pooling. A fully connected layer flattens the matrix into a vector. In this way, a model is created that classifies images based on their features.

## Proposed Methodology

Our proposed model incorporates two technologies, they are machine learning algorithms that is convolutional neural network and GUI.

## Dataset

This dataset consists of 10000 images of malignant and benign kind diseases, which were formed from The Ham that is Human against machine dataset We grouped images according to the ISIC classification, and all subsets were divided into the same number of images, except for malignancies and moles, whose images are slightly more prominent.

The data set contains the following diseases:

* + - basal cell carcinoma
    - melanoma
    - squamous cell carcinoma
    - benign
    - vascular lesion
    - benign keratosis

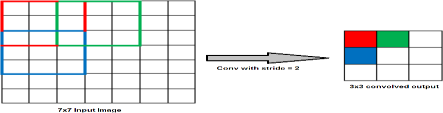
## Data Segmentation

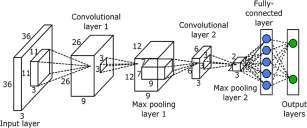
The CNN model performs best with large datasets, therefore by increasing the amount of data currently available, extraordinary performance may be attained. With the help of data augmentation, the dataset's size may be extended, which promotes a rise in model accuracy. Among the

The rotation action turns the picture by the provided amount, in this case, 45 degrees. Shearing is a technique for changing an input image's orientation. It is set at 0.3 for the shear range. Zooming can be done either inside or outward. It is set at 0.2 for the zoom range. The orientation of the picture is flipped via flipping. The two types are horizontal flip and vertical flip. Both values have been set to "True." We can fight variations in lighting by adjusting the brightness level. The brightness level is chosen between 0.7 and 1.3.

## Convolution Neural Network Working

**Strides**

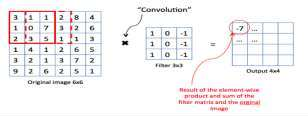
**Fig -3**: Strides



**Fig -1**: Convolutional neural network

A convolutional neural network is the deep learning algorithm that simulates the visual cortex of the human brain. The idea of the convolution neural network is that filters the image before training the deep neural network. It typically uses four layers i.e convolution, pooling, ReLU, and fully connected layer.

## Convolution layer of Deep learning

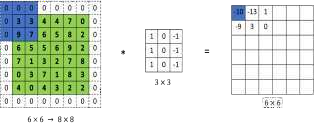


**Fig -2**: Convolution layer

The main job of the Convolution layer is to take the features out of the input image. More than one convolution layer may be present in the network. The first convolution layer picks up edges, colour, sharpness, gradient direction, and other low-level features. High-level properties of the image are taken from the dataset via additional layers. It works as a mathematical technique that requires an image matrix and a filter as inputs. The image matrix and filter matrix are multiplied to produce a feature map.

Strides are the number of pixels that shifts n into the n matrix over the input matrix. When the stride is set as 1 then the filters are moved by 1 pixel at a time.

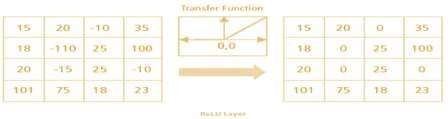
## Padding Working



**Fig -4**: Padding

When the mesh do not fit the image matrix then either the image is padded with zeros so that it fits, that is called zero paddings or the portion of the image where the filter does not fit is dropped, it is named as valid padding.

## Rectified Linear Unit(ReLU)



**Fig -5**: Rectified Linear Unit function

In a rectified linear unit, if the input value is positive, the input is directly delivered; if not, the input is zero.. Since ReLU is easier to train and performs better than other activation functions, it has replaced other activation functions.

## Pooling

**Fig -6**: Pooling

Image upload area where the patient can upload a photo of the pretentious area, that image is given to the built model as an input and the result of the CNN model will be displayed to the patient, which will be the sensed disease.

## CONCLUSION

In this paper, a model is created using a machine learning algorithm, convolutional neural network, that helps in predicting the skin disease. Data augmentation is done to improvise the accuracy of the model. The suggest model is a successive model with top accuracy of 81%. It is found that by using deep learning algorithm, we can achieve higher

The function of this pooling layer is to reduce the size of the representation to reduce the number of limitations and computations. The most used method is max pooling*.*

In max pooling, for each of the area considered by the filter, the max of that area is taken interested in reflection and the output matrix is created where each element is the max of the area in the Input matrix.

## The fully connected input layer of network

The output of the pooling layer is flattened into a single vector of values that represents a chance that a particular feature belongs to a label.

As we are using Keras numpy, there are majorly two types of models available in Keras the are the sequential model and the model class used with functional API. Here, we have used the sequential model.

In order to construct and build a model, we will need to be familiar with terms like optimizers and loss. Loss: To optimise the parameter values of a model, a loss function is utilised. The potential loss mechanism in the

A typical error matrix would include error, squaredhinge, hinge, categorical\_hinge, logcosh, huber\_loss categorical\_crossentropy, spare\_categorical\_crossentropy, binary\_crossentropy, kullback\_leibler\_divergence, poisson, cosine\_proximity, is\_categorical.\_

Optimizers the augmented dataset to predict the disease as a result. This result is made available to the user An optimizer helps a model minimize its loss function by updating the weight parameter. This model uses the Adam optimizer. There are several other optimizers besides 'Adam', including SGD, RMSprop, Adagrad, Adadelta, Adamax, and Nadam. As a result, the convolution neural network is trained on the augmented dataset to predict the disease. We are provided with this result

## Graphical User Interface design

We have created a website with a graphical user interface that allows users to identify disorders.

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## Literature Review

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