

Skin Cancer Diseases Detection using Deep Learning

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Abstract—Skin cancer is one of the most dangerous diseases of all cancers. The skin cancer should be detected at an early stage, otherwise it will spread all over the body. Skin lesion Recognition is introduced to detect the accurate automatic system to prevent the human Death rate. This method of skin cancer treatment makes use of deep learning and image processing. In this study, the different forms of skin cancer have been identified, that are classified into nine types. Deep Learning approach such as Convolutional Neural Network (CNN) algorithm for processing the given data. Here it is used because it gives high accuracy in image processing and also training time is reduced. The dataset contains all 9 types of skin cancer. In this model, it diagnoses a skin cancer and also classifies into different classes through convolutional neural network which gives an accuracy of 98% and above which is higher than other approaches.

Index Terms— Cancer Detection, CNN, Machine Learning, Deep Learning.

I. INTRODUCTION

Automatic skin lesion classification using dermoscopic images is highly necessary in order to improve diagnostic accuracy and to minimize melanoma deaths. A crucial first step in designing a support system for skin cancer diagnosis is automatic localization of skin cancer by using dermoscopic images. Segmenting the lesion image is highly difficult because the defects in the images may be confusing based on the regularity of the lesion region. In pixel- wise image segmentation, a deep convolutional learning-based technique that plays major attention.

The proposed method uses the fine-tuning strategy. This proposed technique that learns the skin lesions and the contextual information. Hence as a result, it can segment the skin lesions and fuzzy boundaries accurately.

A. Advantages of CNN

CNNs have several advantages over traditional machine learning algorithm. They can detect patterns in data that is not possible in traditional algorithms. They can also recognize patterns in data that humans cannot.

II. LITERATURE SURVEY

To diagnose the skin cancer use the different stages of melanoma cancer, two approaches are used. The first system classifies melanoma into stages 1 and 2. In the second system, melanoma is divided into stages 1, 2, and 3. Convolutional Neural Network (CNN) method is used to identify skin cancer [1]. This study found that very deep CNNs perform better in segmentation and classification tasks than their considerably shallower counterparts by producing features with higher discrimination capabilities [2].

Comparing dermoscopy to naked imaging test, dermoscopy increases the accuracy of melanoma diagnosis. However, dermoscopy requires significant training and cannot be advised for unskilled users [3]. The system can make comparisons between observations in dermoscopic images and natural world, simulating the method medical physicians themselves use to categorize patterns in skin lesions [4].

K-means clustering and thresholding are combined as the segmentation techniques. Sobel operator for edge detection and median filter for inpainting are utilized to complete the preprocessing stage [5]. This call to action suggests a number of objectives and methods to improve awareness of the risks of UV radiation exposure, enhance access to UV radiation protection, and strengthen research, surveillance, and monitoring relevant to skin cancer prevention [6].

Declare that, for non-pigmented lesions, the use of dermatoscopy as a supplement to inspection with the naked eye should be taken into consideration, especially if a malignant tumor is possibly in the differential diagnosis [7]. In order to enhance accuracy, an active counter model and a user-determined initial district were utilized in this work. RGB components and features were combined to recover picture features [8].

To enhance the image and identify the region of interest, a number of preprocessing and segmentation techniques were used. The HSV was used to identify a number of characteristics [9]. It is demonstrated that the method may effectively capture aspects of skin cancer by applying parallel convolution blocks to create the feature or characteristic of skin cancer [10].

III. PROPOSED METHODOLOGY

The labeled images such as “benign” and “malignant” were used in this method. Then images were added to the dataset using the analysis mark extracted from the image’s information. The two classes of dataset that includes the dangerous dermoscopic images, and the essential dermoscopic images. The photos needed for the experimental portion were selected at random from ISIC dermoscopic archive. Three layers are present in the system. The datasets are trained in first layer of preprocessing. Data are collected in the input layer that are used for delivering and adding some weight with it and enter into hidden layer. Then the hidden layer which include neurons that separate the features to find out the pattern from the given data. Finally, our proposed approach isto improve the accuracy and reduce the training time.

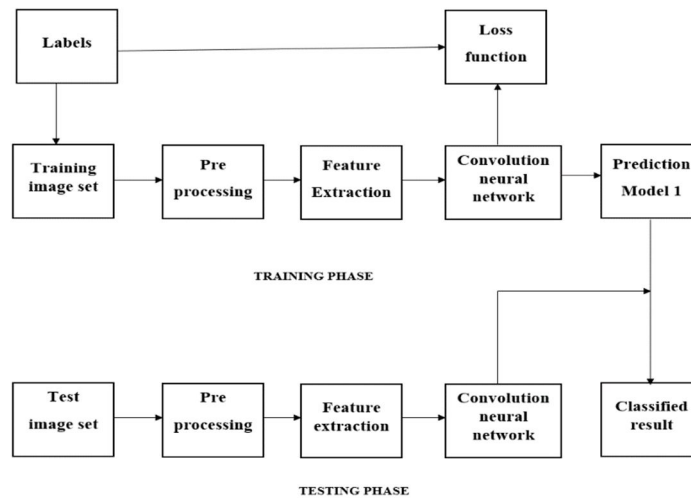


Figure 1. Architecture of Block Diagram

A. Preprocessing

Skin images that have various shapes and sizes. They also come from a wide variety of sources. We should execute various techniques, such as pre-processing, on any image data after accounting for all of these factors. Most "natural images" are encoded in the RGB format, which is the most popular. Therefore, creating images with the same size is the initial step in data pre-processing. So, all of the images in the dataset were automatically resized to the same level for training purposes.

B. Feature Extraction

By using the feature extraction method, processing resources is used more efficiently. It also helps us to minimize the amount of unnecessary data for a given analysis. Further, the computer’s work in building variable

combinations and data reduction which increases the learning and generalize the stages of machine learning process.

C. Classification

This process of classification involves extracting relevant features from the images of skin lesions. Here, we classify eight type of skin cancer disease and one non-cancerous disease. The eight types of skin cancer diseases are Melanoma, Nevus, Actinic Keratosis, Basal cell carcinoma, Dermatofibroma, Seborrheic keratosis, Squamous cell carcinoma and Vascular lesion.

D. Validation and Evaluation

Validation and Evaluation involves validating the performance of the proposed system by using a separate dataset and then evaluating its accuracy, sensitivity, specificity, and other performance metrics.

Dataset

The main advantage of using CNN is no need to change the input images to 1D. The “Spatial” features of the skin image data are thus preserved as a result. The Kaggle dataset which is used to process the images and also it contains nine classes of different skin cancer images. One is non-cancerous cell images and other eight classes which includes cancerous cell images such as Melanoma, Nevus, Actinic Keratosis, Basal cell carcinoma, Dermatofibroma, Seborrheic keratosis, Squamous cell carcinoma and Vascular lesion.

The dataset consists of many numbers of skin cancer images. Example image dataset is shown in the Fig. 2.

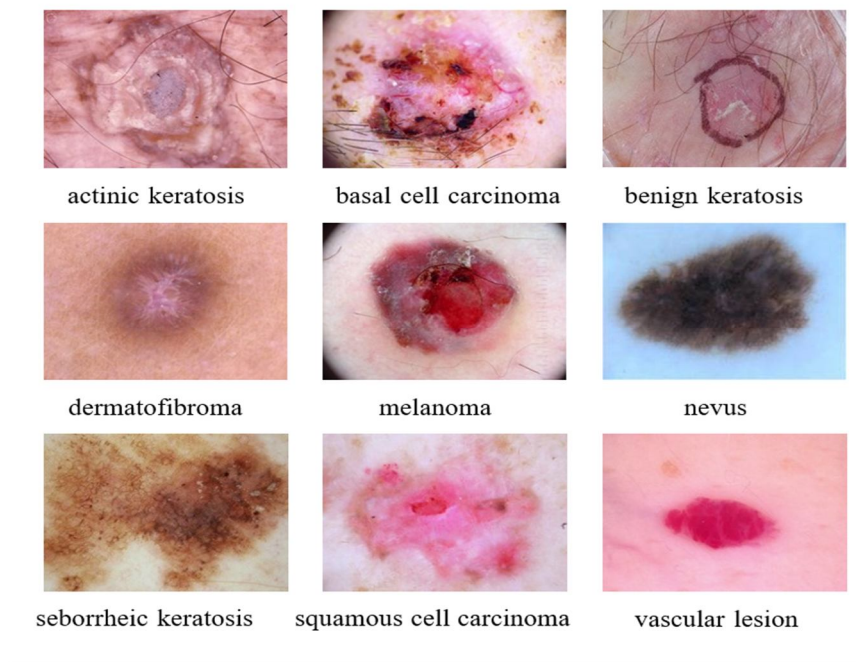


Figure 2. Image dataset (Sample images of various classes of cancer)

CNN

A Convolutional Neural Network (CNN) is to extract information from it. They are composed of layers of neurons, each of which is connected to set of inputs, typically images or text. Images, sounds, and videos, among other things, that can be used to extract data for CNN. Local receptive field comes first, then biases and shared weight, and finally activation and pooling are used. Here we used 8 layers in architecture of the model that consists of 4 hidden layers and 4 convolutional layers which trained the images in the dataset.

Initially, Neural networks CNN trained using a large amount of data. In image pre-processing, process the images and the Processed images are extracted using feature extraction based on the set of stored data, followed by the data classification and output, which are displayed as the results.

- The Neural Network should have trained Data. The CNN should only interact with the given inputs.
- CNN is applied for the recognition of images and videos, classification of images, medical image Processing and natural language processing.



Figure 3.1. Accuracy

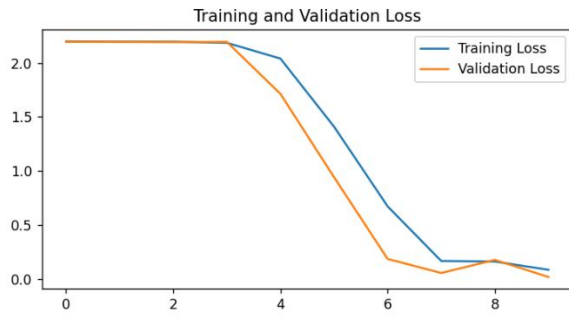


Figure 3.2. Loss

IV. CONCLUSION

In this study, Deep learning algorithms can be used to detect the skin cancer which had produced promising results in terms of improving the accuracy and efficiency of diagnosis process. By analyzing images of skin lesions and extracting relevant features, Deep learning algorithms can help classify skin lesions as either malignant or benign. CNN can achieve high levels of accuracy in classifying skin lesions. This model was effective in obtaining accuracy levels of 98%, respectively during training and validation.

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