CLASSIFICATION AND DETECTION OF SKIN DISEASE BY USING DEEP LEARNING ALOGRITHMS

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Abstract

People are concern   more about skin diseases rather than any other diseases. Skin diseases are caused mainly due to virus, bacteria and food intake. The most common skin disease occurring in the youth is Acne. Skin diseases are the conditions that affect your skin. These diseases may cause rashes, inflammation's diseases treatment may include ointments and life style changes. Laser treatments are used to identify and treat the disease but they are expensive.so, Deep learning algorithms is used for detecting the skin disease at early stage. A data set of images has been taken for classifying the skin diseases that may include Actinic keratosis, melanoma, Nevus. Using CNN Algorithms 70% accuracy is achieved and by using Alex Net 80% Accuracy is achieved for classifying the skin disease.

Keywords: CNN, Alex Net, Deep learning, skin disease

1.   Introduction

Skin is one of the largest and fastest growing tissues in the human body. Skin diseases are the common health problems in the worldwide. The burden of skin disease is viewed as a multidimensional concept that comprehends psychological, social and financial importance of the skin disease on the patients and their families and also on society. It is the infections that occurring in people among all the ages. Skin is frequently damaged because it is very sensitive part of the body. There are 3000 and more unknown skin diseases. A cosmetically appearance

spoiler disorder can have a significant impact, and can cause considerable pain and permanent injury. Most of the chronic skin conditions, such as atopic eczema, psoriasis, vitiligo and leg ulcers, are not immediately lethal, they are recognized as a considerable trouble on health status including physical, emotional and financial outcome. On the other hand, skin cancers, like malignant melanoma, are potentially lethal and their trouble is associated with the temporality that they carry. People of almost 73% are affected with skin disorder do not seek medical advice. Chronic and several other incurable skin diseases, like psoriasis and eczema, are associated with significant sickness in the form of physical discomfort and impairment of patients life; whereas malignant diseases like malignant melanoma, carry substantial temporality. With the wide range of health status and quality-of-life measures, the effects of most skin diseases on patients' lives can be measured efficiently. Along with some of the deep learning algorithms are used for detecting skin diseases in whole body. The convolutional neural network (CNN) is a category of deep learning neural networks. CNN represents a huge advance in image recognition. They are used to analyze the visual images and image classification. A convolutional neural network (CNN) is used to extract features from images. This eliminates the need of manual feature work extraction. The features from the set of images are not trained they are learned while the network trains on a set of images. It makes extreme accuracy for the deep learning models. CNN learns the feature detection through tens or hundreds of the hidden layer Each layer increases the in all the documents in the training set involvement of the learned features. A particular amount dataset will be provided to detecting the skin diseases.

2.   Literature Review

A.   Many studies have applied deep learning algorithms in classification of skin diseases. Daily soft drink consumption significantly increases the risk of moderate-to-severe acne in adolescents, especially when the sugar intake from any type of soft drink exceeds 100 g per day [2].

B.   Rosacea is one of the common chronic facial disorders that affects the patients' health. The adjusted Chinese version RosQol was easy to complete, well received by patients, and demonstrated acceptable validity and reliability [3]. The results indicate that leptin plays a critical role in the development of autoimmune disorders and demonstrate that the transgenic leptin pigs will be act as a valuable model of SLE Certain results argue strongly to include skin disease prevention and treatment in future global health strategies as a matter of urgency [1]. The results in ''Symptoms of systemic lupus erythematosus are diagnosed in leptin transgenic pigs,'' indicate that leptin plays a critical role in the development of autoimmune disorders and demonstrate that our transgenic leptin pigs can act as a valuable model of SLE [4].

C.   Samples from nine normal skin analyzed by IHC in expression of ATP5B and K10 such as, six chronic dermatitis, five prurigo nodular is, seven keratosis seborrheic, nine verruca vulgaris, 25 psoriasis, five keratoacanthoma, and nine SCC in "Possible involvement of F1F0-ATP synthase and intracellular ATP in Keratinocyte differentiation in normal skin and skin lesions" [5]. Similarly, several skin diseases are associated with long-term disfigurement,

disability and stigma.

D.   A treatment and care activities for skin-related diseases to maximize the use of limited resources and expand the treatment coverage [6]. In order to explore the association between polymorphisms and acitretin efficacy, the specialists enrolled 46 and 105 Chinese Han psoriasis vulgaris patients for discovery and validation phases [7].

E.   This study indicates ''Frizzled-related proteins 4 (SFRP4) rs1802073G allele predicts the exalted serum lipid levels during acitretin treatment in psoriatic patients from Hunan, to investigate the relation between the Frizzled- related proteins 4 (SFRP4) rs1802073 polymorphism and what are the changes of serum lipids in Chinese psoriatic patients during the treatment with acitretin [8].

F.   The illustration in the usefulness of ImageNet through three simple applications in object recognition, image classification and automatic object clustering is done in "ImageNet: A large-scale hierarchical image database" [9]. For example, the task of classifying skin tumors using the Inception-v3 network has reached the classification level of professional dermatologists. For certain nine classes of tumors, a computer achieved an accuracy rate of 55.4%,and two dermatologists achieved accuracies of 53.3% and 55.0% [10]. With the same network structure, [11] it has been achieved an accuracy of 87.25, 2.24% on the dermoscopic images for four most common skin diseases, such as SK, BCC,   psoriasis and melanocytic nevus.

G.   These studies show that current deep learning algorithms have the potential to be applied to skin related diseases. At the same time, deep learning application to face- related diseases is also promising. Reference[13] designed a deep learning algorithm called Deep Gestalt and it trained the model on more than 17,000 facial images of genetic syndromes, and this model identified more than 200genetic syndromes using skin images with very high precision.

H.   Reference [14] used CNNs for classification of acne into different severity grades ranging from clear to severe, and their results show that the accuracy obtained by their method outperformed expert physicians. Initially, investigation of the proportion of skin images in the most commonly used public datasets for skin disease, which include AtlasDerm [15], DermlS [16], the ISIC Archive[17], Derm101 [18] and Dermnet [19]. Most of these datasets [15]–[18] did not provide information about body parts. In [19], which provides body parts information, there were only 195 facial images.

3.   Finding

Conceptual Model.

Neural networks and deep learning are currently providing the best solutions for many problems in image recognition, speech recognition, and natural language processing. A neural network is a type of machine learning algorithm allows the computer to learn by incorporating new data. CNNs is very useful in image recognition in order to analyze visual imagery and are frequently used in classifying the images. It takes the given three classes of skin disease images as input and it gives the output of a probability that the input belongs to a particular class.

CNN is now the go-to model on every image related problem. The main advantage of CNN compared to its predecessors is that it automatically detects the important features without any human superintendence. For example, given many pictures of cats and dogs it learns distinctive features for each class by itself. CNN is also computationally efficient. A CNN has Convolutional layers, ReLU layers, Pooling layers and fully connected layer. Here it takes input as the skin disease dataset. Convolutional layers apply a convolution operation to the input. It uses different filters to create a feature map and passes the information to the next layer. It uses convolution and pooling operations and performs parameter sharing. This enables CNN models to run on any device, making them universally attractive. The main building block of CNN is the convolutional layer. Convolution of an image with different filters can perform operations such as edge detection, blur and sharpen by applying different filters. ReLU function is used to increase the non-linearity that is, it is an element wise operation and replaces all negative pixel values in the feature map by zero. Since, the real-world data would want our ConvNet to learn non-negative linear values. There are other nonlinear functions such as tanh and sigmoid that can also be used instead of using ReLU layer. ReLU is used since performance wise ReLU is better than the other two layers. Pooling layer is used for combining the outputs of clusters of neurons into a single neuron in the next layer. Spatial pooling which reduces the dimensionality of each map but retains important information. It is of three different types such as Max Pooling, Average Pooling and Sum Pooling. Max pooling takes the largest element from the feature map. Average pooling takes the average for the feature. Sum of all elements in the feature map is called as sum pooling. With the fully connected layers, combining the features together to create a model. Flattening layer flattens the pooled images into one long vector and inputs the vector into a fully connected artificial neural network.
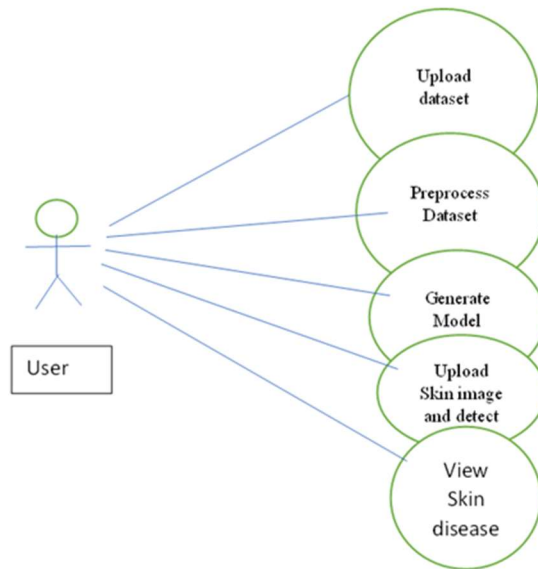
Fig 1: User case Diagrams

Skin is the largest and fastest growing organ of the body. In this contemporary world, skin diseases are mostly found in humans. A skin disease is a particular kind of illness caused by bacteria or an infection. These diseases like psoriasis have various dangerous effects on the skin and keep on spreading over time.

It becomes important to identify these diseases at their initial stage to control it from spreading. Since there are large number of different skin diseases, manually identifying them can be a difficult task. Derma disease detection and classification can help in early identification of disease, prevent it from becoming chronic. we are collected 5 images it contains img1-actinic keratosis, img2-dermatofibroma, img3-melanoma, img4-seborrheic keratosis, img5-squamous cell carcinoma.

The following Derma Diseases are identified by our virtual doctor:
1.   Actinic Keratosis
2.   Dermatofibroma
3.   Melanoma
4.   Seborrheic Keratosis
5.   Squamous Cell Carcinoma

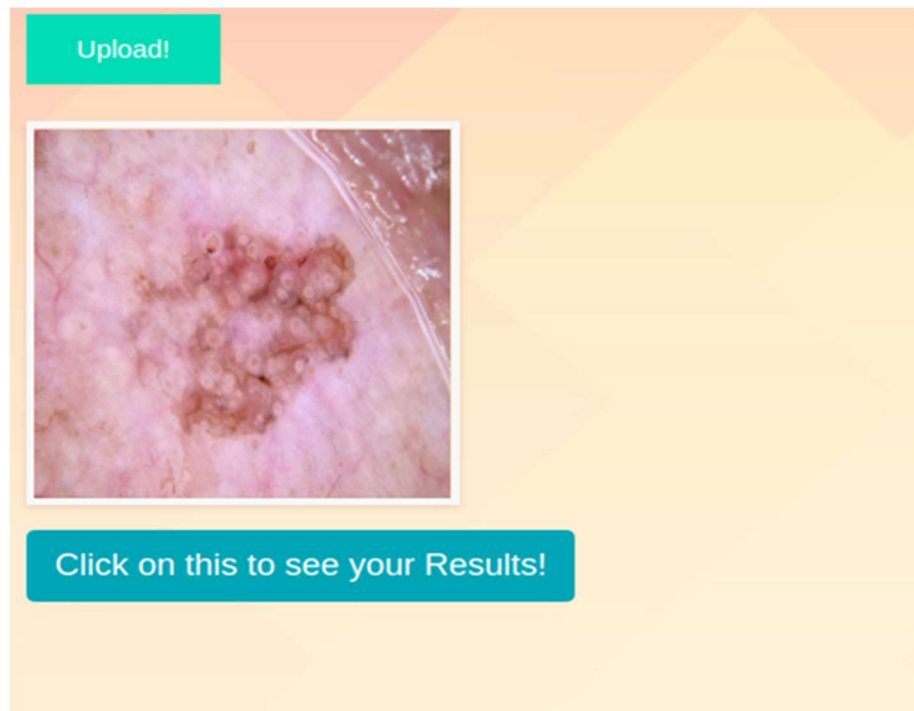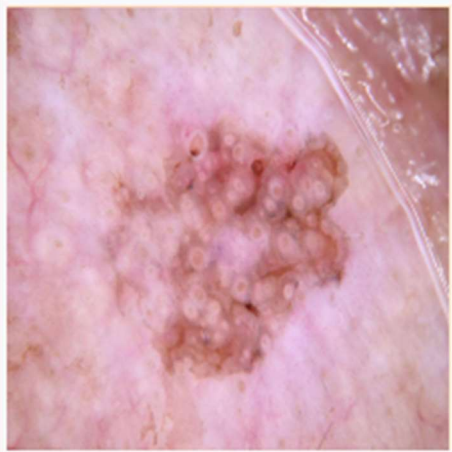Upload an image using upload button. And then Click for results.

Fig 2: Web page to upload

Fig 3: Skin Disease and Its Treatment

4. Conclusion

Early detection of melanoma skin cancer accelerates the time of dermatologists and improves diagnosis performance. This paper is mainly focused on the current and traditional technologies of melanoma skin cancer detection in an early stage. From the study of literature, it is concluded that various methods are employed for detecting melanoma skin cancer are image pre-processing, post-processing, image segmentation, Feature extraction, andclassificationalgorithms.

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