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Survey on Skin Disease Detection

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ABSTRACT: Melanoma, nevus, and carcinoma are all dangerous and often contagious skin illnesses. These skin diseases can be treated if caught early enough. The basic issue is that only a trained dermatologist can recognise and classify such an illness. Doctors may also fail to appropriately identify the ailment, resulting in the patient receiving ineffective treatments. Using Image Processing and Deep Learning Techniques, we offer a method for detecting skin diseases. The image of the affected area must be provided by the patient and entered into the application as an input. It is processed and delivered using image processing and deep learning algorithms. Skin disease symptoms vary significantly, depending on what condition you have. Skin changes are not always due to skin diseases. For example, you may get a blister from wearing ill-fitting shoes. However, when skin changes show up with no known cause, they may be linked to an underlying condition.

KEYWORDS: Deep learning, dermatologist, image processing, skin diseases

I. INTRODUCTION

The utmost organ of the body is human skin. Its weight vary around six to nine pounds and surface region is around two square yards. Internal piece of body is isolated by skin from the external climate. It gives insurance against parasitic disease, microorganisms, sensitivity, infections and controls temperature of body. Circumstances that disappoint, change surface of the skin, or harm the skin can create side effects like expanding, consuming, redness and tingling. Sensitivities, aggravations, hereditary construction, and specific infections and resistant framework related issues can create dermatitis, hives, and other skin issues. A considerable lot of the skin sicknesses, like skin break out, alopecia, ringworm, dermatitis likewise influences your look. Skin can likewise create many kinds of diseases. Picture handling is utilized to distinguish these sicknesses by utilizing different strategies like division, sifting, include extraction and so forth. To get a superior picture or to get significant data from a picture, it is important to change over a picture into advanced structure and afterward fill roles onto that picture. It is a piece of sign handling. Generally, Picture Handling models accept input tests as 2-D signs and after that they apply fixed signal handling strategies to them. It is broadly utilized innovation now days and it has different applications in the space of business. It is another examination region inside designing and PC science as well. The scope of skin illnesses is extremely wide. By and large, the greater part of the average folks doesn't have the foggiest idea about the sort and phase of a skin illness. A portion of the skin infections show side effects a while later, making the illness create furthermore, become further. This is because of the absence of clinical information in the general population. Now and again, a dermatologist (skin expert specialist) may likewise find it hard to analyse the skin infection and may require costly research centre tests to accurately distinguish the sort and phase of the skin infection. The progression of lasers and photonics based clinical innovation has made it conceivable to analyse the skin sicknesses significantly more rapidly and precisely. Yet, the cost of such conclusion is as yet restricted and extravagant.

II. PROBLEM STATEMENT

Nowadays people are suffering from skin diseases, more than 125 million people suffering from skin diseases. Also, skin disease rate is rapidly increasing over last few decades specially Melanoma is most diversifying skin disease. Nevus rate is high specially at rural areas. If skin diseases are not treated at prior stage, then it may lead to problems in the body including spreading of the infection from one to the other. Some people will find it difficult to identify the disease in their body. The people in rural area, they lack in facilities near to their hometown. They need to travel for a longer distance to consult the doctor. So, skin diseases like Carcinoma, Melanoma and Nevus which is hard to detect in early stages can be detected using this application.

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III. EXPECTED OUTCOME

System should be able to perform the following actions:

- System must be able to differentiate three types of skin diseases melanoma, nevus and carcinoma.
- System should able to show the accuracy of the predicted disease.
- User must be able to use the application without the internet connection.
- The user must add his affected skin area as a dataset to classify the disease.
- System should have well defined User Interfaces.

IV. IMPLEMENTATION

System has the following modules:

- Image Selection: The images skin is selected from the system. The input image will be the resized to 300x300 pixels.
- Image Pre-Processing: Image pre-processing is used to enhance the quality of the image necessary for the purpose of further processing and analysis. It includes conversion of colour space and image enhancement.
- Image Segmentation: Image segmentation is the process which is used to simplify the delineation of an image into a meaningful form, so as to highlight the object of interest from the background.
- Classification: System will use the CNN algorithm to classify the images. CNN is used to compare the image piece by piece. The pieces that it looks for, in order to compare with the other images are called features. By finding the rough feature matches in approximately the same position in two images, CNN gets better by identifying the similarity when compared to the whole-image matching schemes.

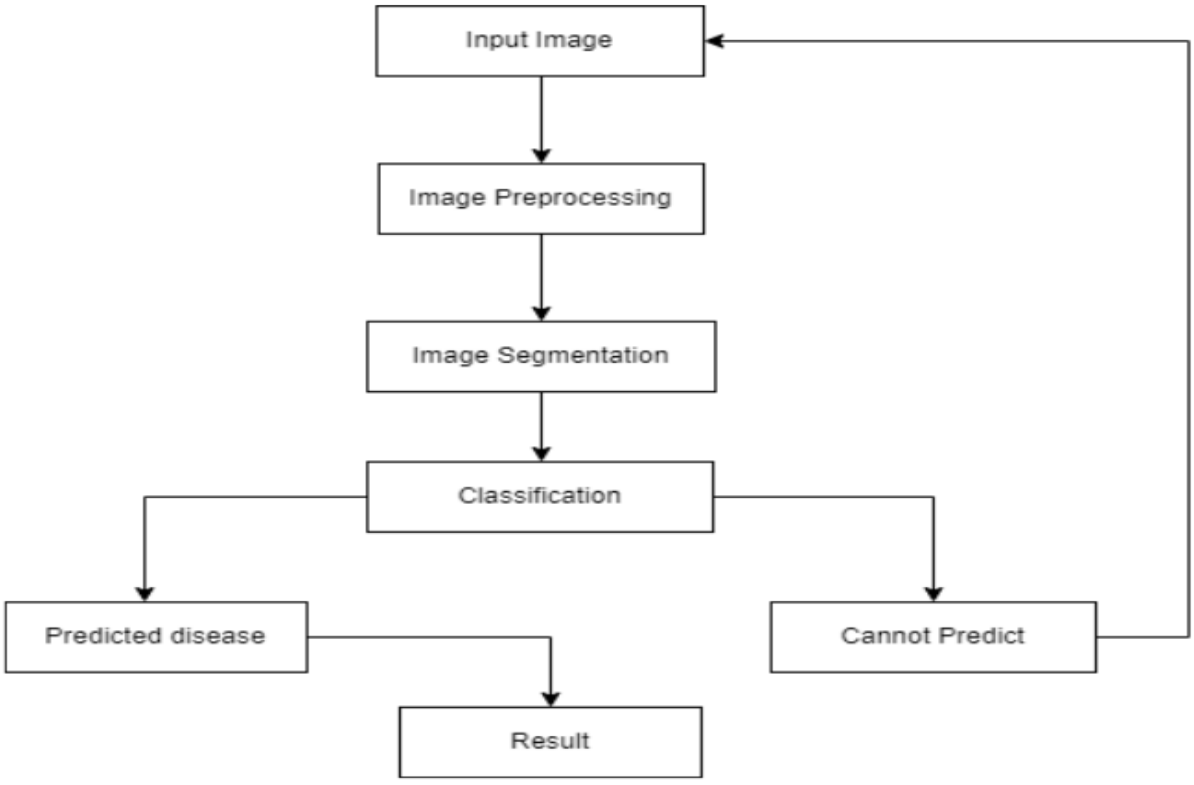

Figure 1: System Design

V. LITERATURE SURVEY

Image Analysis Model for Skin Disease Detection Alaa Haddad; Shihab A. Hameed IEEE2018. Skin disease is the most common disease in the world. The diagnosis of the skin disease requires a high level of expertise and accuracy for

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dermatologist, so computer aided skin disease diagnosis model is proposed to provide more objective and reliable solution. Many researches were done to help detect skin diseases like skin cancer and tumour skin. But the accurate recognition of the disease is extremely challenging due to the following reasons: low contrast between lesions and skin, visual similarity between Disease and non-Disease area, etc. This paper aims to detect skin disease from the skin image and to analyse this image by applying filter to remove noise or unwanted things, convert the image to grey to help in the processing and get the useful information.[1]

Skin Cancer Detection using Convolutional Neural Network: Dipu Chandra Malo; Md. Mustafizur Rahman; Jahin Mahbub; Published in: 2022 IEEE 12th Annual Computing and Communication Workshop and Conference (CCWC). The advancement of artificial intelligence is reshaping various sectors of our lives including disease identification. Today, dermatologists depend greatly on digitalized output of patients' results to be absolutely confirm about skin cancer. In recent times, many researches based on machine learning pave the way to classify the stages of skin cancer in clinicopathological practice. In this paper, we have tried to evaluate the chance of deep learning algorithm namely Convolutional Neural Network (CNN) to detect skin cancer classifying benign and malignant mole. We have discussed recent studies that use different models of deep learning on practical datasets to develop the classification process. The dataset we use for this research is ISIC containing a total of 2460 coloured images. We use 1800 images as training set and the rest 660 for testing set. A detailed workflow to build and run the system is presented too. We have used Keras and TensorFlow to structure our model. Our proposed VGG-16 model shows a promising development upon some modification to the parameters and classification functions. The model achieves an accuracy of 87.6%. As a result, the study shows a significant outcome of using CNN model in detecting skin cancer.[2]

Automatic Classification of Clinical Skin Disease Images with Additional High-Level Position Information Jingyi Lin; Zijian Guo; Dong Li; Xiaorui Hu; Yun Zhang IEEE 2019. Since skin disease is one of the most common human diseases, intelligent systems for classification of skin diseases have become a new line of research in deep learning, which is of great significance for both doctors and patients. Some skin-disease datasets have already been the advancement of artificial intelligence is reshaping various sectors of our lives including disease identification. Today, dermatologists depend greatly on digitalized output of patients' results to be absolutely confirm about skin cancer. In recent times, many researches based on machine learning pave the way to classify the stages of skin cancer in clinicopathological practice. In this paper, we have tried to evaluate the chance of deep learning algorithm namely Convolutional Neural Network (CNN) to detect skin cancer classifying benign and malignant mole. We have discussed recent studies that use different models of deep learning on practical datasets to develop the classification process. The dataset we use for this research is ISIC containing a total of 2460 coloured images. We use 1800 images as training set and the rest 660 for testing set. A detailed workflow to build and run the system is presented too. We have used Keras and TensorFlow to structure our model. Our proposed VGG-16 model shows a promising development upon some modification to the parameters and classification functions. The model achieves an accuracy of 87.6%. As a result, the study shows a significant outcome of using CNN model in detecting skin cancer published, such as the SD-198 dataset, which contains 6584 clinical skin-disease images of 198 categories in this paper, we propose an SD-198-P dataset, which includes additional high-level position information in the SD-198 dataset to guide the generation of better deep visual features.[3]

Skin Disease detection based on different Segmentation Techniques Kyamelia Roy; Sheli Sinha Chaudhuri; Sanjana Ghosh; Swarna Kamal Dutta; Proggya Chakrabor IEEE 2019. The outer integument of the human body is skin. The skin pigmentation of human beings varies from person to person and human skin type can be dry, oily, or combination. Such a variety in the human skin provides a diversified habitat for bacteria and other microorganisms. Melanocytes in the human skin, produces melanin which can absorb harmful ultraviolet radiation from sunlight which can damage the skin and result in skin cancer.[4]

Skin Cancer Classification Using Image Processing and Machine Learning; Arslan Javaid; Muhammad Sadiq; Faraz Akram; IEEE 2021. One of the most rapidly spreading cancers among various other types of cancers known to humans is skin cancer. Melanoma is the worst and the most dangerous type of skin cancer that appears usually on the skin surface and then extends deeper into the layers of skin. However, if diagnosed at an early stage; the survival rate of Melanoma patients is 96% with simple and economical treatments. The conventional method of diagnosing Melanoma involves expert dermatologists, equipment, and Biopsies. To avoid the expensive diagnosis, and to assist dermatologists, the field of machine learning has proven to provide state of the art solutions for skin cancer detection at an earlier stage with high accuracy.[5]

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Digital dermatology: Skin disease detection model using image processing; Archana Ajith; Vrinda Goel; Priyanka Vazirani; M. Mani Roja IEEE 2017. A skin disease detection method based on image processing techniques. This method is mobile based and hence very accessible even in remote areas and it is completely non-invasive to patient's skin. The patient provides an image of the infected area of the skin as an input to the prototype. Image processing techniques are performed on this image and the detected disease is displayed at the output. The proposed system is highly beneficial in rural areas where access to dermatologists is limited.[6]

Studies on Different CNN Algorithms for Face Skin Disease Classification Based on Clinical Images; Zhe Wu; Shuang Zhao; Yonghong Peng; Xiaoyu He; IEEE 2019. Skin problems not only injure physical health but also induce psychological problems, especially for patients whose faces have been damaged or even disfigured. Using smart devices, most of the people are able to obtain convenient clinical images of their face skin condition. On the other hand, the convolutional neural networks (CNNs) have achieved near or even better performance than human beings in the imaging field. Therefore, this paper studied different CNN algorithms for face skin disease classification based on the clinical images. Comparing the performances, the models that used transfer learning achieved a higher average precision and recall for almost all structures. In the test dataset, which included 388 facial images, the best model achieved 92.9%, 89.2%, and 84.3% recalls for the LE, BCC, and SK, respectively, and the mean recall and precision reached 77.0% and 70.8%.[7]

Diagnosis of skin diseases using Convolutional Neural Networks; Jainesh Rathod; Vishal Waghmode; Aniruddh Sodha; Praseniit Bhavathankar; IEEE 2018. Dermatology is one of the most unpredictable and difficult terrains to diagnose due its complexity. In the field of dermatology, many a times extensive tests are to be carried out so as to decide upon the skin condition the patient may be facing. The time may vary from practitioner to practitioner. This is also based on the experience of that person too. So, there is a need of a system which can diagnose the skin diseases without any of these constraints. We propose an automated image-based system for recognition of skin diseases using machine learning classification. This system will utilize computational technique to analyze, process, and relegate the image data predicated on various features of the images. Skin images are filtered to remove unwanted noise and also process it for enhancement of the image. Feature extraction using complex techniques such as Convolutional Neural Network (CNN), classify the image based on the algorithm of SoftMax classifier and obtain the diagnosis report as an output.[8]

Segmenting Skin Images for Cancer Detection; Riham Abdel Kader; Wassim El Hajj Chehade; Ali Al-Zaart; IEEE 2018. The analysis of medical images for skin cancer detection is rising. A fundamental step in image analysis is segmentation. One of the segmentation techniques is thresholding, which is based on finding the optimal threshold value that partitions the image into multiple classes. Otsu's method, a known thresholding technique searches iteratively for the optimal threshold. It assumes that an image has a Gaussian distribution, which does not always apply to the data in skin cancer images. Skin cancer images usually have a lognormal distribution. We, therefore, propose a Lognormal variant of the Otsu's sequential method to find the optimal threshold. The sequential search tries all 255 possible values of the threshold, which is time consuming. We therefore propose an iterative Lognormal method, which we found by computing the derivative of Otsu's optimization formula using a Lognormal distribution.[9]

Skin Cancer Detection using Machine Learning Techniques; M. Vidya; Maya V. Karki; IEEE 2020. As increasing instant of skin cancer every year with regards of malignant melanoma, the dangerous type of skin cancer. And the detection of skin cancer is difficult from the skin lesion due to artifacts, low contrast, and similar visualization like mole, scar etc. Hence Automatic detection of skin lesion is performed using techniques for lesion detection for accuracy, efficiency and performance criteria. The proposed algorithm applies feature extraction using ABCD rule, GLCM and HOG feature extraction for early detection of skin lesion. In the proposed work, Pre-processing is to improve the skin lesion quality and clarity to reduce artifacts, skin colour, hair, etc., Segmentation was performed using Geodesic Active Contour (GAC) which segments the lesion part separately which was further useful for feature extraction. ABCD scoring method was used for extracting features of symmetry, border, colour and diameter. HOG and GLCM was used for extracting textural features. The extracted features are directly passed to classifiers to classify skin lesion between benign and melanoma using different machine learning techniques such as SVM, KNN and Naïve Bayes classifier.[10]

The melanoma skin cancer detection and classification using support vector machine; Hiam Alquran; Isam Abu Qasmieh; Ali Mohammad Alqudah; Sajidah Alhammouri; Esraa Alawneh; Ammar Abughazaleh; IEEE 2017. Melanoma skin cancer detection at an early stage is crucial for an efficient treatment. Recently, it is well known that,

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the most dangerous form of skin cancer among the other types of skin cancer is melanoma because it's much more likely to spread to other parts of the body if not diagnosed and treated early. The non- invasive medical computer vision or medical image processing plays increasingly significant role in clinical diagnosis of different diseases. Such techniques provide an automatic image analysis tool for an accurate and fast evaluation of the lesion. The steps involved in this study are collecting dermoscopy image database, pre-processing, segmentation using thresholding, statistical feature extraction using Gray Level Co-occurrence Matrix (GLCM), Asymmetry, Border, Color, Diameter, (ABCD) etc. [11]

A Comparative Analysis of Skin Cancer Detection based on SVM, ANN and Naive Bayes Classifier; Bethanney J. Janney; S. Emalda Roslin; Mary Jo Shelcy; IEEE 2018. Skin cancer cases have grown worldwide, and it is by far the most common of all cancers. It is caused by the extended exposure to harmful radiations from the sun. Skin cancer can be broadly classified into two categories as melanocytic and non-melanocytic (benign). Most basic way to detect the threat of skin is by visual investigation performed by a specialist dermatologist employing a set of specific clinical tools. This paper describes novel image processing approaches for skin cancer detection using dermoscopy images. The motive of this work is to investigate and prefer an algorithm for skin cancer determination that can group the lesions as malignant or benign melanoma in terms of accuracy, sensitivity and specificity. Initially, the image samples showing melanoma are obtained by using dermoscope and segmented. It is then given for feature extraction and the results are classified using Support Vector Machine (SVM), Artificial Neural Network (ANN) and Naive Bayes Classifiers.[12]

VI. CONCLUSION

Detection of skin diseases is a very important steps to reduce death rates, disease transition and development of the skin disease. Clinical procedures to detect skin diseases are very expensive and time consuming. In this, a Convolutional Neural Networks based approach have been proposed for melanoma classification. Image processing techniques helps to build automated screening system for dermatology. A system is developed that can help patients and doctors to be able to detect or identify skin cancer classes whether it is benign or malignant. From the experimental and evaluation section, by taking some random images any doctor can identify the accurate results but in traditional approach too much time are taken to detect the cases correctly. In this research the method of detection was designed by using CNN. Using this we develop an application which detects three different types of skin diseases.

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