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Dermatological Disorder Detection Using Machine Learning

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Abstract:- Skin diseases are considered one of the biggest scientific troubles in 21st century because of its especially complex and luxurious prognosis with problems and subjectivity of human interpretation. In cases of deadly illnesses like Melanoma prognosis in early tiers play a critical part in determining the possibility of getting cured. The software of automated strategies will assist in early diagnosis specifically with photographs with variety of analysis. Hence, in this system we present a completely automated machine of skin sickness recognition via lesion images, a device intervention in evaluation to traditional clinical personnel based detection. This system is designed into 3 levels compromising of statistics series and augmentation, designing version and subsequently prediction of disease. This proposed system uses more than one AI algorithms like Convolutional Neural Network and naive Bayes classifier and amalgamated it with image processing tools to shape a higher shape, leading to better accuracy.

Keywords:- *Convolutional Neural Network, Naive Bayes classifier, Dermatological Disorders, Machine Learning.*

I. INTRODUCTION

THE proposed system is for the detection of human pores and skin sicknesses primarily based on image processing. Detection of disorder consists of strategies which include acquisition of skin samples, pre-processing of samples, segmentation of images, and extraction of functions. The proposed system makes use of Convolutional neural network and Naive Bayes classifier to discover the tactics used to pick out human skin diseases. This system additionally addressed several strategies of segmentation and extraction of capabilities used with extra accuracy in the identity of human pores and skin ailment. The current research for the diagnosis of human skin disease is entirely based on machine learning and neural network through which human skin disease identification and detection is conducted. For better accuracy and high reliability, the need for human skin dataset reaches in size. On the basis of machine learning and image processing, system developing human skin disease detection and prediction technology. The system will work on the limited size of the image dataset of the human skin downloaded from isic Archive. The system use Convolutional neural network to achieve high detection accuracy. Also use Naive Bayes classifier for performance evaluation. The proposed technique is used to classify and identify the various skin diseases that infect human skin. A recognition system based on machine learning should prove to be very beneficial in improving the accuracy in current work. The image processing methods are the approach given in this for extraction of the skin feature. Convolutional neural networks are to be used for automated detection of diseases in skin. The proposed method can be impactful and effective for skin disease detection, and it appears to be an important approach. This system acquires various images of skin for extraction of features. The analysis phase, pre-processing unit is used to remove noise, to convert gray scale using Gaussian filter, to convert binary images. Convolutional Neural Network (CNN) will be used in our system for disease prediction where we have the input unit of skin images training data set. Next have a hidden layer that acts on this training dataset to evaluate the results train model of the output unit. This whole CNN works by taking into account the elements, namely the matrix feature of images, for designing a train model for recognition of skin disease. When dealing with real-time skin disease detection, will face limitations that will not produce results with higher accuracy. In the future, to solve this constraint, must work with real-time skin disease data collection.

II. REVIEW OF LITERATURE

Hassan Yasser et. al [1] stated that human pores and skin coloration has been studied as biometric indicator, most of preceding researches studies centered in the use of skin color to locate the face, human and human movement. Goal of this article is to assess a version in human skin shade as completely unique code for identity reason. Fifty picture of the nostril were captured the usage of a cell digital camera with a decision of three mega pixel. Area of the nose location has been the region of interest to symbolize a place of less direct publicity to the solar light as the relaxation of a face. The color pics had been transformed from RGB to HSI layout in an effort to isolate the impact of the mild. Intensity in the course of shots. The snap shots had been analyzed using mathematical and statistical methods (Mean, Median, wellknown deviation, kurtosis, skewness, and gray level co-prevalence matrices (GLCM).

Satishkumar L Varma et. al [2] states that human skin detection coloration is crucial in numerous programs. There are various pores and skin primarily based packages in several areas namely gesture evaluation, face reputation, character tracking, and nudity detection, pornography filtering, website filtering, content based picture retrieval. Skin detection includes looking of pores and skin colored

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pixels. There is numerous skin areas found in image or video. It identifies the coloration pixel as a color of human pores and skin. It is one of the pre-processing steps to locate human parts in pics. It has programs in numerous regions use pores and skin for photo processing. Skin detector transforms pixel into appropriate shade space. Skin is used as classifier to differentiate pixel as skin or non-pores and skin pixel. Skin classifier uses threshold. Different color spaces are used for class over given database.

Shanmugavadivu Pichai et. al [3] affords A new combinatory and Multi-Colour theme System for the digital pictures is bestowed during this paper. This pre-processing algorithmic rule finds application in external body part detection in addition as in recognition. The Multi-Colour theme System (MCSS) for Human Skin Detection in digital pictures aims at object localization, supported principle of neighborhood constituent process. This method thanks to its process accuracy and performance is well-tried to possess a footing over the competitive strategies. It conjointly assures pay-off on reduced process quality, compared to facial textures/ geometrics-based skin detection strategies. an intensive comparative analysis is disbursed to judge the result and influence of various multi-color bands for the human skin classification.

Pratik Dubal et al. [4] gives Skin most cancers is the maximum commonplace form of most cancers, which influences the existence of millions of people each yr. About three million humans are recognized with the disease each year in the United States by myself. The fee of survival decreases steeply as the t he disorder progresses. However, detection of pores and skin cancer in the early ranges is a difficult and steeply-priced technique. In this examine, we suggest a method that detects and identies pores and skin lesions as benign or malignant primarily based upon pics taken from fashionable cameras. The photographs are segmented, functions extracted by making use of the ABCD rule and a Neural Network is trained to classify the lesions to a high diploma of accuracy.

P. B. Manoorkar et. al [5] states the basic approach of detecting these pores and skin illnesses is thru visual inspection followed by way of biopsy and pathological examination. If the medical doctor finds the arrival of lesion dubious then commonly visible inspection approach is used for diagnosis however all malignant lesions are not identified via visible inspection. Now, there are not any usually established equipment that physician can use to at once find the pores and skin ailment within the health facility. Most shape of visible inspection could help to prevent misdiagnosis of BCC and other varieties of pores and skin diseases.

III. SYSTEM ARCHITECTURE / SYSTEM OVERVIEW

This system is going to overcome existing problem of skin disease diagnosis and quality loss of human skins due to multiple diseases. The machine learning approach is used to accurate detection of human skin diseases. In current work done system is going to work on image processing techniques with the advantages of Convolutional neural network feature of accuracy in image classification and recognition. System uses human skin dataset for training purpose to create train model which will further used to classify human skin diseases accurately. Overall working of system is shown in fig.1.

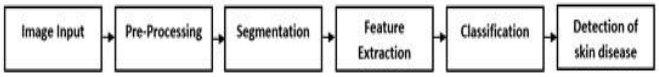

Fig 1- Architecture of system

The overall system design consists of following modules:

1. Human skin image acquisition
2. Image processing
3. Feature extraction
4. Feature mapping and model generation

This system implement the web based software application in python for skin disease prediction using image processing .Software performs the operations such as:

1) Human skin image acquisition

Open-CV (Open Source Computer Vision) is a library of programming functions used for dynamic image processing with computer vision. In our implementation system uses open compute vision for taking human skin images for further processing. After getting human skin images processing applied on it for removing noise from it.

2) Image processing

Then human skin image will send to image processing phase. In image processing image gets transformed in gray format by removing noisy data in it using Gaussian filter. After gray conversion phase image thresholding by setting RGB colour values to zero and preserving only black and white values. Gray to binary conversion is done by using OTSU's method. After getting black formatted image hand shape get extracted from image. The exact shape of hand will get by forming edge using canny edge detection method. After processing phase extract disease infected area from input image.

3) Feature extraction

After getting proper shape of human skin disease infected area features get extracted from it by using method named as pixels weight calculations. The image pixels get transfered in matrix by using weight gradient functions only on drawn area of diseases. Feature extraction done on all human skin image dataset for training model creation and drafting. The model creation done by using deep learning (CNN) algorithm.

4) Feature mapping and model generation

Human skin dataset is going through image processing and subsequent layers of feature extraction. After getting image features these statistical features get mapped on machine files which is trained model. The runtime testing image gets mapped with pre trained model and respective outcomes will be generated. After generation of outcome those results is nothing but our desire human skin disease detection and prediction results.

IV. SYSTEM ANALYSIS

1) Convolutional Neural Network (CNN):-

In this system, CNN algorithm is used which takes human skin disease as dataset for creating machine model. After getting skin images it will processed using image processing method for feature evaluation. System can extract the different features from that images regardless of their size and shapes in it consist by using series of mathematical methods to determining the skin diseases. Each layer in CNN has capability to find weights of images by using matrix evaluations which converts input to output with valuable methods. Layers of CNN used to determine skin disease from dataset images and give prediction by preserving higher accuracy and less time.

Steps are as follows:-

a) Input skin disease dataset (ISIC's)
b) Image processing by using ML libraries
c) Feature Extraction from images in the form of bottlenecks generated during train model.
d) Model mapping by using machine learning framework.
e) Skin disease recognition by providing skin disease and healthy skin images.
f) Performance evaluation by using test dataset images of human skin disease.

2) Naive Bayes algorithm:-

This Naive Bayes algorithm is divided down into 5 parts:

a) Separate by Skin Disease Classes.
b) Summarize Skin disease Dataset.
c) Summarize Data By Class called detected dis-ease category.
d) Gaussian Probability Density Function.
e) Class Probabilities for each type of disease. All above steps will give the basement that we need to implement Naive Bayes classifier in our implementation and apply it to our own predictive framework for skin disease detection.

V. RESULTS

This system accurately detects and classifies human skin diseases using convolutional neural network and machine learning approaches. It is very important for the successful detection of skin diseases and this can be done using image processing. Using Feature extraction and classification techniques to extract the features of infected skin and the classification of human skin diseases. In our system we can upload the image of infected area as shown in fig 3 , so it will identify what type of disease person having in his/her infected body part. After identifying the disease it will provide to the user with its symptomsas shown in fig 4 . In this way the system gives the user-friendly environment to the users.

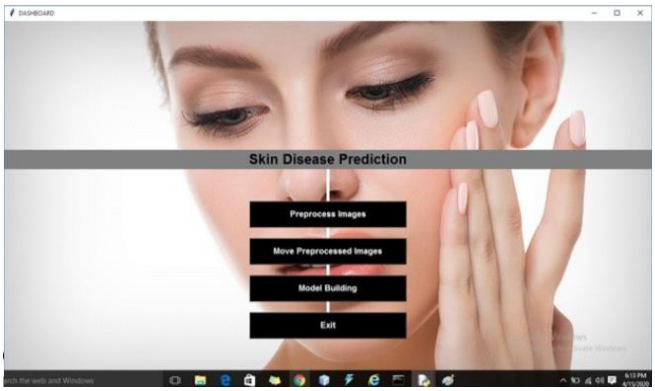

Fig 2:- Homepage of system

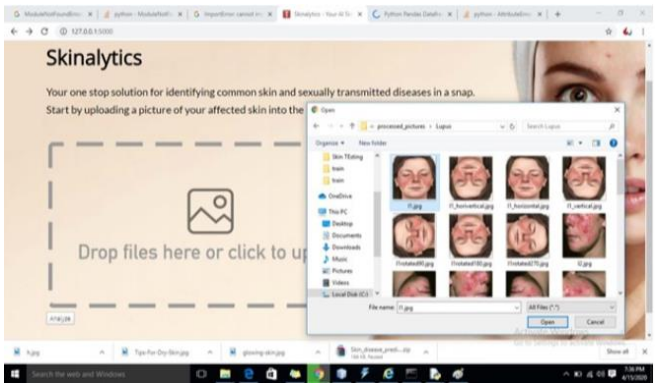

Fig 3:- Uploading Input Image

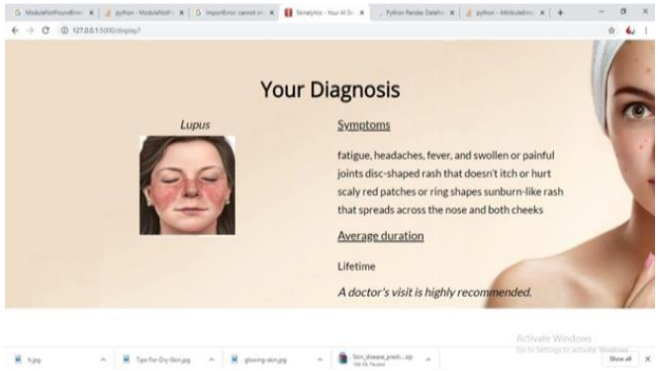

Fig 4:- Disease Detected.

VI. CONCLUSION

Thus implemented system is a web based software application in python for skin disease prediction using image processing. System uses operations such as:

1) Human skin image acquisition
2) Image processing
3) Feature Extraction
4) Feature mapping and model generation.

FUTURE WORK

The future research will be extended for further improvement in skin disease recognition accuracy and work for real time human skin disease recognition.

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REFERENCES

[1]. Hassan Yasser, "Human Skin Color Code Recognition: A Case Study 2013 INTERNATIONAL CONFERENCE ON COMPUTING, ELEC-TRICAL AND ELECTRONIC ENGINEERING (ICCEEE). c 2013 IEEE.

[2]. Satishkumar L Varma, "Human Skin Detection Using Histogram Process-ing and Gaussian Mixture Model Based on Color Spaces, 9781-5386-1959-9/17 c 2017 IEEE.

[3]. Shanmugavadivu Pichai, "Human Skin Detection in Digital Images using Multi Colour Scheme System" , (ICIIP) 978-1-50906734-3/17 c 2017 IEEE.

[4]. Pratik Dubal, "Skin Cancer Detection and Classication" , 978-153860475-5/17/ c 2017 IEEE.

[5]. P. B. Manoorkar, Analysis and Classification of Human Skin Diseases , 978-1-5090-2080-5/16 c 2016 IEEE.

[6]. Sabah Bashir, Navdeep Sharma "Remote Area Human skin Disease Detection Using Image Processing", IOSR Journal of Electronics and Communication Engineering , ISSN : 2278-2834 Volume 2, Issue 6 2012, PP 31-34.

[7]. Smita Naikwadi, Niket Amoda" ADVANCES IN IMAGE PROCESSING FOR DETECTION OF HUMAN SKIN DISEASES" , International Journal of Application or Innovation in Engineering and Management , Volume 2, Issue 11, November 2013.

[8]. Sanjay B. Patil et al. " DISEASE SEVERITY MEASUREMENT USING IMAGE PROCESSING", International Journal of Engineering and Technology Vol.3 (5), 2011, 297-301.

[9]. Anand.H.Kulkarni, Ashwin Patil R. K." Applying image processing technique to detect human skin diseases", International Journal of Modern Engineering Research, Vol.2, Issue.5, Sep-Oct. 2012 pp-36613664.

[10]. Jainesh Rathod, Vishal Waghmode, Aniruddh Sodha, Dr. Prasenjit Bhavathankar, "Diagnosis of skin diseases using Convolutional Neural Networks", IEEE, November 2018.

[11]. Yanhui Guo, Amira S. Ashour, Lei Si, Deep P Mandalaywala, "Multiple Convolutional Neural Network for Skin Dermoscopic Image Classification", Institute of Electrical and Electronic Engineers(IEEE), 2018.

[12]. Archana Ajith, Vrinda Goel, Priyanka Vazirani, Dr. M. Mani Roja, "Digital Dermatology Skin Disease Detection Model using Image Processing", Institute of Electrical and Electronic Engineers(IEEE), 2017.