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Review Paper on Skin Disease Detection Using Machine Learning and Image Processing

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ABSTRACT

Skin illness is the most common sickness on the planet. When diagnosing skin disorders, dermatologists must have a high level of competence and accuracy, so a computer- aided skin disease diagnosis model is presented as a more objective and reliable solution. Many research have been carried out to aid in the diagnosis of skin diseases such skin cancer and tumours. However, due to factors such as low contrast between lesions and skin, visual similarity between the Disease and non- Disease parts, and so on, correct disease recognition is highly difficult. This study aims to detect skin disease from a skin image and analyse it by applying a filter to remove noise and unwanted items, changing the image to grey to aid processing, and extracting useful information. This can be used to indicate emergency preparedness and provide proof of any type of skin disease.

Index Terms—Deep learning, CNN, facial skin disease, medical image processing

I. INTRODUCTION

A. Domain Introduction

Machine Learning:In reality, we are encircled by people who can take in everything from their encounters with their learning ability, and we have PCs or machines which work on our directions. In any case, can a machine likewise gain from encounters or past information like a human does? So here comes the job of Machine Learning.Machine Learning is said as a subset of man-made reasoning that is essentially worried about the advancement of calculations which permit a PC to gain from the information and past encounters all alone. With the assistance of test authentic information, which is known as preparing information, AI calculations construct a numerical model that helps in settling on forecasts or choices without being expressly customized. AI brings software engineering and measurements together for making prescient models. AI builds or uses the calculations that gain from recorded information. The more we will give the data, the higher will be the exhibition. “A machine can learn in the event that it can improve its exhibition by acquiring information.”

A Machine Learning framework gains from verifiable information, assembles the expectation models, and at whatever point it gets new information, predicts the yield for it. The precision of anticipated yield relies on the measure of information, as the colossal

measure of information assists with building a superior model which predicts the yield all the more precisely.

Assume we have an intricate issue, where we need to play out certain forecasts, so as opposed to composing a code for it, we simply need to take care of the information to nonexclusive calculations, and with the assistance of these calculations, machine assembles the rationale according to the information and foresee the yield. AI has changed our perspective about the issue. The beneath block outline clarifies the working of Machine Learning calculation:

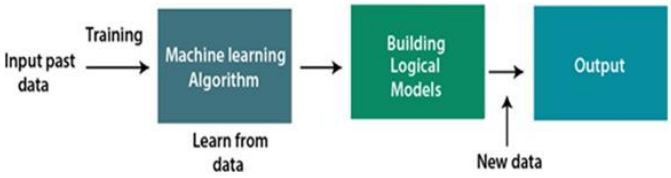

Fig. 1. Machine Learning

B. Features of Machine Learning:

- Machine learning uses data to detect various patterns in a given dataset.
- It can learn from past data and improve automatically.
- It is a data-driven technology.
- Machine learning is much similar to data mining as it also deals with the huge amount of the data.

C. Need for Machine Learning:

The need for machine learning is increasing day by day. The reason behind the need for machine learning is that it is capable of doing tasks that are too complex for a person to implement directly. As a human, we have some limitations as we cannot access the huge amount of data manually, so for this, we need some computer systems and here comes the machine learning to make things easy for us.We can train machine learning algorithms by providing them the huge amount of data and let them explore the data, construct the models, and predict the required output automatically. The performance of the machine learning algorithm depends on the amount of data, and it can be determined by the cost function. With the help of machine learning, we can save both time and money. The importance of machine learning can be easily understood by its uses cases, Currently, machine learning is used in self-driving cars, cyber fraud detection, face recognition, and friend suggestion by Facebook, etc. Various top companies such as Netflix and Amazon have build machine learning models that are using a vast amount of data to analyze the user interest and recommend product accordingly.

D. Project Idea

- Skin disorders were the fourth greatest source of nonfatal disease burden in 2010, according to a report, and three of the world's most frequent diseases were skin diseases. Skin illnesses have wreaked havoc on the economies of both high- and low-income countries. Skin disorders can have a negative impact on all parts of life, including inter- personal connections, work, social functioning, physical activity, and mental health, depending on the individual.

E. Motivation of the Project

- Skin diseases usually manifest themselves on the patient's skin as lesions, scales, plaques, pigmentation, and other symptoms. Long-term pain and discomfort are the result of these symptoms. Such damage not only harms one's physical health but also contributes to major mental health issues, particularly when it occurs on the face. Patients with primary skin illnesses (such as psoriasis, alopecia areata, and vitiligo) have a higher risk of mental problems like anxiety and depression, according to studies. Further- more, several skin disease therapies have the potential to cause mental disorder (for example, isotretinoin, an acne medicine, can cause suicidal depression).

F. Problem Statement

To build and implement skin disease detection using ma- chine learning framework.

G. Goals and objectives

Goal and Objectives:

- To detect facial skin diseases.

- To check face skin health in their daily life.
- Try to improve accuracy using deep learning.

II. REVIEW OF LITERATURE

1) Cynthia Hayat,Barens Abian, "The Modeling of Artifi- cial Neural Network of Early Diagnosis for Malnutri- tion with Backpropagation Method", 2018, this research consisted of 2 phases, which were training phase in which it generated ANN weight by using feed-forward of activation function, and testing phase in which the result of the previous stage was tested to obtain output.
2) Bambang Lareno, Liliana Swastina, Husnul Maad Ju- naidi, "IT Application to Mapping The Potential of Malnutrition Problems", 2018, this paper focus to find a model of IT application that can be used for mapping the potential of malnutrition problems and the rate of utilization of posyandu. The result, the cross-platform information model developed is a web-based core sys- tem, with a mobile application-based support system.
3) Anutosh Maitra, Rambhau Eknath Rote, Nataraj Kun- tagod, "Managing Child Malnutrition via Digital Enable- ment: Insights from a Field Trial", 2017, in this paper that malnutrition management requires an integrated digital approach – that not only looks at making data available, but also establishing relationships between various program indicators, overlaying that with socio- economic conditions of the region and family demo- graphics.
4) Sri Winiarti, Sri Kusumadewi, Izzati Muhimmah, Her- man Yuliansyah, "Determining The Nutrition of Patient Based on Food Packaging Product Using Fuzzy C Means Algorithm", 2017, the result of the decision will give 3 clusters on nutritional status is good nutrition, malnu- trition and better nutrition. Mobile apps are used as a reminder of the nutritional value or ingredients contained in the packaging of food products while consuming food. The result of system testing for application of FCM algorithm in this mobile application obtained validation of 80
5) Archana Ajith, Vrinda Goel, "Digital Dermatology Skin Disease Detection Model using Image Processing", 2017, This paper proposes 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 noninvasive to patient's skin. The patient provides an image of the infected area of the skin as an input to the prototype.
6) Kyamelia Roy, Sheli Sinha Chaudhuri, "Skin Disease detection based on different Segmentation Techniques", 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 mi- croorganisms. 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.
7) Sambit BAKHSHI, "Deep convolutional neural network for face skin diseases identification", 2019, In this paper, author propose an automated facial skin disease method using a pre-trained deep convolutional neural network (CNN). In the beginning, the images are regenerated using some pre-processing image techniques in order to augment the size of our database, collected from differ- ent sources and resized to fit the network. These images are then used for training and validation purposes.
8) Tanzina Afroz Rimi, "Derm-NN: Skin Diseases Detec- tion Using Convolutional Neural Network", 2020, This paper is a sandwich

between picture handling strategies and machine learning. Where picture preparation has produced the picture which is being utilized by CNN to arrange the classes. The preparation information com- prises five classes of the skin gives that have been talked about above. We have 73% precision by actualizing our framework on the dermnet dataset of 500 pictures of various diseases. This will end up being an incredible achievement if the further enhancements are finished utilizing a bigger measure of the dataset.

9) Shih-Hsiung Lee, Chu-Sing Yang, "An Image Prepro- cessing Method for Fingernail Segmentation in Mi- croscopy Image", 2019, this paper proposes an image preprocessing method, trying to segment different parts of nail: lunula and nail plate. In the data of poor image quality, the lunula may not be presented clearly. In order to maintain the nail image quality, this paper uses microscope to capture nail image. Besides lunula and nail plate, the nail details, such as free edge, cross striation and longitudinal striation, can be seen clearly in the image captured by microscope.
10) Laura Safira, Budhi Irawan, Casi Setianingsih, K-Nearest Neighbour Classification and Feature Extraction GLCM for Identification of Terry's Nail, 2019, The dataset in this study is taken from Google and also some of the paper that discusses the nail abnormalities. Nail pictures obtained are different from any source. Therefore, the image should be cut just one finger. Because when detecting terry's nail, the disorder usually occurs in all the nails. So we can use one finger. The photos of a nail that has been doing the extraction characteristics using GLCM then will be done using KNN classification. In this case the class will be divided into two classes, healthy and Terry's.
11) Hongfeng Li a, Yini Pan b , Jie Zhao c , Li Zhang d, "Skin disease diagnosis with deep learning: A review", 2021, In this paper, author present a review on deep learning methods and their applications in skin disease diagnosis. We first present a brief introduction to skin diseases and image acquisition methods in dermatology, and list several publicly available skin datasets. Then, we introduce the conception of deep learning, and review popular deep learning architectures and popular frame- works facilitating the implementation of deep learning algorithms.

III. PROPOSED METHODOLOGY

1. Input Image:

Here we will upload the Input Image.

2. Image Pre-processing:

In this step we will applying the image pre-processing methods like gray scale conversion, image noise removal.

3. Image Feature Extraction:

In this step we will applying the image object and edge detection methods to extract the image features from image.

4. Image Classification:

In this step we will applying the image classification methods.

5. Result:

In this step will show the final result

A. Architecture

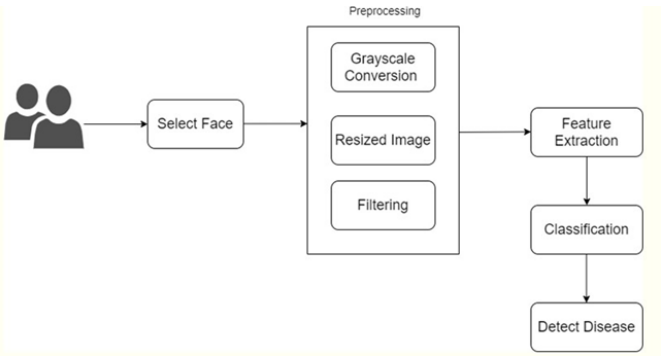

Fig. 2. Proposed System Architecture

B. Algorithms

Convolution Neural Network

Convolution Layer

Convolution is the first layer to extract features from an input image (image). Convolution preserves the relationship between pixels by learning image features using small squares of input data. Convolution of an image with different filters can perform operations such as edge detection, blur and sharpen by applying filters i.e. identity filter, edge detection, sharpen, box blur and Gaussian blur filter.

Pooling Layer

Pooling layers would reduce the number of parameters when the images are too large. Spatial pooling also called subsampling or down sampling which reduces the dimensionality of each map but retains important information.

Fully Connected Layer

In this layer Feature map matrix will be converted as vector (x1, x2, x3, . . .). With the fully connected layers, we combined these features together to create a model.

Softmax Classifier

Finally, we have an activation function such as softmax or sigmoid to classify the outputs.

IV. RESULTS AND ANALYSIS

The Experiments are done by personal computer with configuration: Intel (R) Core (TM) i3-2120 CPU @ 3.30GHz, 4GB memory, Windows 7, MySQL 5.1 backend database and JDK 1.8. The application uses web application tool for design code in Eclipse and execute on Tomcat server.

Positive (P) : Observation is positive. Negative (N) : Observation is not positive.

True Positive (TP) : Observation is positive, and is predicted to be positive.

False Negative (FN) : Observation is positive, but is predicted negative.

True Negative (TN) : Observation is negative, and is predicted to be negative.

False Positive (FP) : Observation is negative, but is predicted positive.

Accuracy = TP + TN / (TP + FP + TN + FN)

Precision = TP / (TP + FP) Recall = TP / (TP + FN)

F1-Measure = 2 * Precision * Recall / (Precision + Recall).

A. OUTPUT

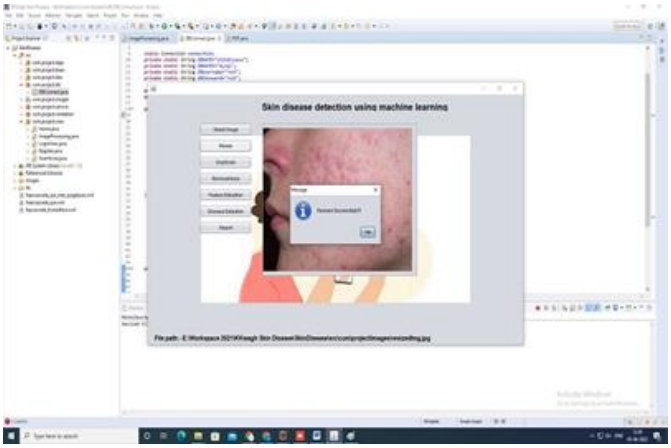

Fig. 3. Image Preprocessing

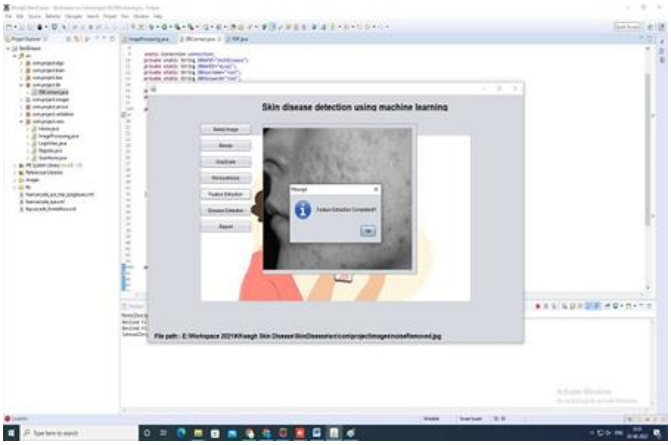

Fig. 4. Feature Extraction

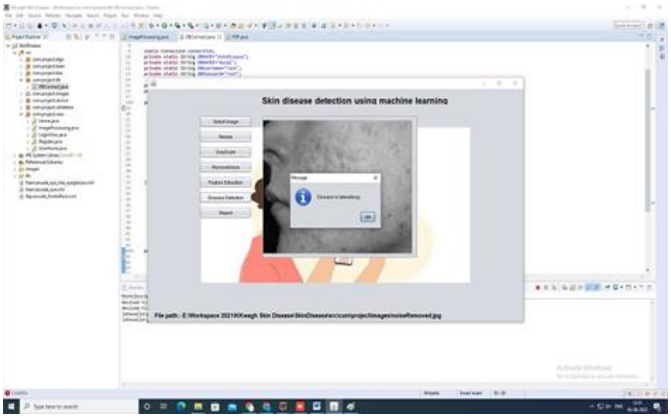

Fig. 5. Final Output

V. CONCLUSION

This paper used two conventional CNN topologies to study clinical image identification of six prevalent facial skin disorders and developed a data collection that comprised the results. Mostly images of facial skin disorders. The results reveal that CNNs can tell the difference between healthy and sick skin on people's faces. According to our findings, separate models for identifying illnesses in different parts of the body should be used. In addition, our investigation discovered the following: that a more reasonable network structure could aid in improving the performance of the model The current year's results In some cases, network structure has been found to be sufficient. In terms of overall performance, though, there is still space for growth. As a result, if we want folks to use this method, we must make it simple for them to do so. on a daily basis to examine the state of their face and skin, specialised It is essential to make improvements.

VI. REFERENCES

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