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Skin Cancer Disease Prediction System

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ABSTRACT: Skin diseases are hazardous and often contagious, especially melanoma, eczema, and impetigo. These skin diseases can be cured if detected early. The fundamental problem with it is, only an expert dermatologist is able to detect and classify such disease. Sometimes, the doctors also fail to correctly classify the disease and hence provide inappropriate medications to the patient. Our project proposes a skin disease detection method based on Image Processing and Deep Learning Techniques. Our system is Personal Computer based so can be used even in remote areas. The patient needs to provide the image of the infected area and it is given as an input to the application. Image Processing and Deep Learning techniques process it and deliver the accurate output. The output is used to get the idea about disease and information about that disease. In this project, we present a CNN model to predict the skin disease.

KEYWORDS: Skin Disease Detection, Convolutional Neural Networks, Image Processing, Disease Classification.

I.INTRODUCTION

Skin diseases have a significant impact on the psychological health of the patient. It may result within the loss of confidence and may even turn the patient into depression. Skin diseases can thus be fatal. it's a significant issue and can't be neglected but should be controlled. So it's necessary to spot the skin diseases at an early stage and stop it from spreading. Human skin is unpredictable and almost a difficult terrain thanks to its complexity of jaggedness, lesion structures, moles, tone, the presence of dense hairs and other mitigating confusing features. We are relatively ignorant about the symptoms of the bulk of those diseases although knowledge is rapidly increasing, however, that creates it a challenge for dermatologist to diagnose them.[1][5]

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 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 tumor 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. Our project aims to detect skin disease from the skin image and to analyze 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. This help to give evidence for any type of skin disease and illustrate emergency orientation. Analysis result of this study can support doctor to help in initial diagnoses and to know the type of disease.[5]

II.METHODOLOGY

The proposed system is built using the following key components:

1. Data Gathering. The proposed system has been assessed on dermatoscopic images which is collected from publicly available dataset based on SkinCancer-MNIST (Modified National Institute of Standards and Technology Database)-HAM10000. The number of options is endless. To save time and effort one can use publicly available data.
2. Data Preprocessing Enhancement. "Trash In- Good Out" is the basic motto in this step [6]. Validating your dataset with some basic profiling procedure will help speeding up the process, by slip-ups and grimy information [4]. AI algorithms don't give great outcomes when working with such information.
3. Data Cleaning. Dirty data can cause confusion and results in unreliable and poor output. Hence first step in Data Pre-processing is Data Cleaning. Cleaning of data is done by filling in missing values, smoothing noisy data by identifying and/or removing outliers, and removing inconsistencies.



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4. Data Transformation. Data Transformation involves converting data from one format into another. It involves transforming actual values from one representation to the target representation.
5. Exploratory Data Analysis (EDA) . In this we explore different features of the dataset, their distributions and actual counts. Encoding.
6. The dataset is labelled into 7 different categories: 1. MelanocyticNevi 2. Melanoma 3. Benign keratosis-like lesions 4. Basal cell carcinoma 5. ActinicKeratosis 6. Vascular lesions 7. Dermatofibroma
7. Training. For this we have to divide the data into training set and testing set. This division can be in any ratio. Also, the batch size and number of epochs has to be decided beforehand.
8. Model Building. We have used Convolutional Neural Network (CNN). A Convolutional Neural Network (CNN or ConvNet) is a category of deep neural networks, where the machine learns on its own and divide the data provided into the levels of prediction and in a very short period of time gives the accurate results [2]. A Convolutional Neural Network (CNN) is an algorithm in deep learning which consist of a combination of convolutional and pooling layers in sequence and then followed by fully connected layers at the end as like multilayer neural network [2]. CNN stands out among all alternative algorithms in classifying images. Crucial characteristics are Sparse Connectivity, Shared Weights and Pooling Feature so as to extract the best features. Also, the use of Graphical Processing Units (GPUs) have shrivelled the training time of deep learning methods. Giant databases of lasbelled data and pre-trained networks are now publicly available

III.MODELING AND ANALYSIS

1. Software Requirement :

- a) Android Studio : Android Studio is the official Integrated Development Environment (IDE) for developing Android applications. It provides a comprehensive suite of tools for building, testing, and debugging Android apps, making it a powerful environment for creating mobile applications that can run on Android devices.
- b) Keras : Keras is an open-source, high-level neural networks API written in Python. It is designed to make building deep learning models fast and easy. Keras runs on top of low-level machine learning libraries such as TensorFlow, Theano, and CNTK (although Keras is now primarily associated with TensorFlow).
- c) TensorFlow: TensorFlow is an open-source machine learning framework developed by Google for building and training machine learning models. TensorFlow provides both high-level APIs (like Keras) and low-level APIs for more flexibility, allowing users to define complex models, perform automatic differentiation, and optimize neural networks.
- d) Visual Studio : Visual Studio Code (VS Code) is a free, open-source code editor developed by Microsoft. It is lightweight, fast, and highly customizable, making it one of the most popular code editors for developers. While it's not an Integrated Development Environment (IDE) in the traditional sense, VS Code is often used as an IDE because of its flexibility and wide range of extensions and features e) Eclipse Ide: Eclipse IDE is a powerful, open-source integrated development environment (IDE) primarily known for Java development, but it also supports a wide range of languages such as Python, C/C++, PHP, and more through plugins. It's widely used for large-scale software development, and its extensibility makes it ideal for machine learning and AI projects.
- e) Eclipse Ide: Eclipse IDE is a powerful, open-source integrated development environment (IDE) primarily known for Java development, but it also supports a wide range of languages such as Python, C/C++, PHP, and more through plugins. It's widely used for large-scale software development, and its extensibility makes it ideal for machine learning and AI projects.
- f) Spring Boot : Spring Boot is a popular framework used to build Java-based applications, particularly for web development. It is part of the larger Spring Framework, but unlike traditional Spring applications, Spring Boot simplifies the process of setting up and configuring your application. Spring Boot allows you to create stand-alone, production-grade applications with minimal setup and configuration



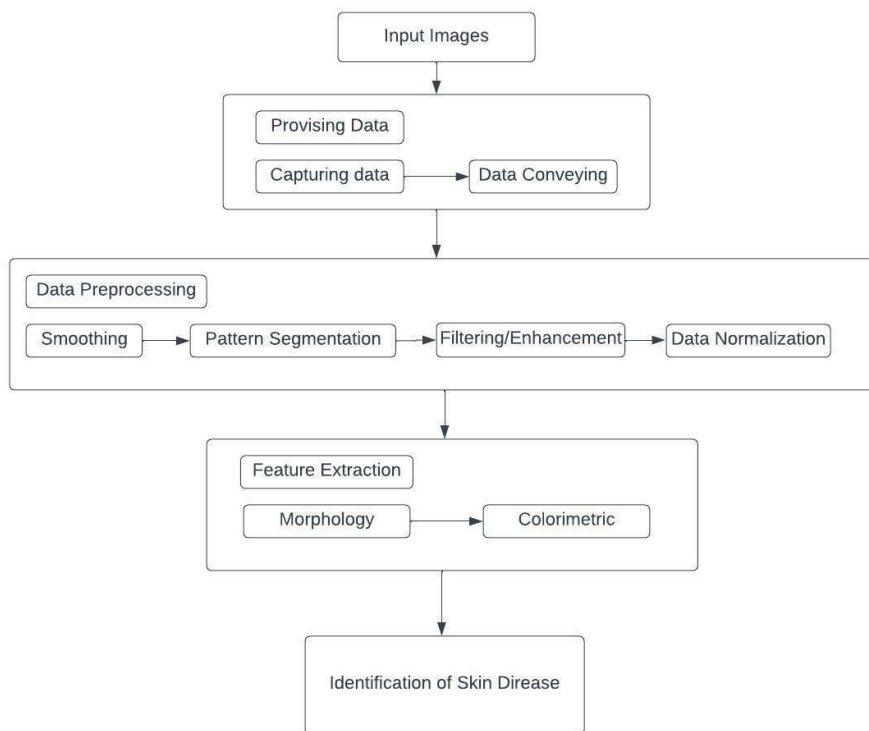
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IV. LITERATURE SURVEY.

1. Kritika Sujay Rao , Pooja Suresh Yelkar , Omkar Narayan Pise ,Dr. Swapna Borde proposed a Skin Disease Detection model using Machine Learning This paper highlights the skin disease prediction model using Convolutional neural network. The limitations are the dataset used is small and has less classes of diseases.
2. Sourav Kumar Patnaik, Mansher Singh Sidhu, Yaagyanika Gehlot, Bhairvi Sharma and P Muthu proposed a Automated Skin Disease Identification using Deep Learning Algorithm The research paper provides a a skin disease identification system using Deep learning model. Inception v3 CNN model is used in the model.
3. Shaden Abdulaziz AlDera ,Mohamed Tahar Ben Othman proposed A Model for Classification and Diagnosis of Skin Disease using Machine Learning and Image Processing Techniques This paper proposed a model for classification and diagnosis of skin diseases using machine learning algorithms. Random forest , KNN , SVM algorithm are used in this model.CNN should be used for classification of image data because of its accuracy.
4. Prof .Shrikant Sanas , Prabhakar Pawale, Gaurav Ghadage, Monish Sahani proposed a SKIN DISEASE PREDICTION model This paper highlights the study of skin disease prediction model using ResNet CNN model . With Dement dataset which has 19 thousands of dermatological images.
5. B. Bhagyasree, N. Harika, B. Sruthi, proposed a model for prediction of skin diseases using machine learning This research paper highlights a machine learning model for skin disease prediction using supervised and unsupervised machine learning algorithms.

System Architecture



System Architecture

Fig 1. System Architecture Diagram.



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V.CONCLUSION AND FUTURE WORK

Identification of disease can help in reducing the problem of skin disease spread and will provide a better way to identify the skin problem. This will provide a low-cost way to do medical treatment without any delays. This will also help in early identification and early treatment of disease before they spread because most of the skin disease can get spread easily with touch. In our application we have used a model of Convolutional neural network . This will help in detection of skin disease in rural parts of India where there is already a huge lack of basic medical facilities.

Future Work

The platform can be implemented for more skin disease analysis and prediction using CNN models. It can also can be implemented for an android application.

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- [6] Intelligent System for Skin Disease Prediction using Machine Learning Ahmed A. Elngar ¹ , Rishabh Kumar ² , Amber Hayat ³ , Prathamesh Churi ⁴ ¹ Faculty of Computer and Artificial Intelligence, Ben-Suef University, Beni Suef City, 62511, Egypt, (elngar7@yahoo.co.uk)



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