Skin Disease prediction

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ABSTRACT

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. 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

Technical keywords: *deep learning; neural network, mobile platform; Convolutional Neural Network (CNN); MobileNet*

1. INTRODUCTION

One of the medical areas which needs mobile health technology is skin analysis to identify diseases. Around 24% of the population in England and Wales (12.9 million people) visited their general practitioner with a skin problem in 2006, with the most common reasons being skin infection and eczema (WHO). One of the most preventable types of cancer is the skin cancer and the best ways to keep the skin healthy and cancer free is checking and examining skin once a month for suspicious moles or spots .This exam is a visual and clinical skin exam, it costs more than Rs.5000 and it needs hospital scan which is difficult for disabled people. In our paper, we propose a low cost Smartphone based intelligent scheme that allows people for regular skin examinations. We use a Smartphone camera and an intelligent learning algorithm to scan skin images.

1.1 MOTIVATION OF THE PROJECT

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. This paper 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. That is compatible with skin and to avoid side effects

1.2 LITERATURE SURVEY

Several researchers have proposed image processing-based techniques to detect the type of skin diseases. Here we briefly review some of the techniques as reported in the literature. In, a system is proposed for the dissection of skin diseases using color images without the need for doctor intervention. The system consists of two stages, the first the detection of the infected skin by uses color image processing techniques, k-means clustering and color gradient techniques to identify the diseased skin and the second the classification of the disease type using artificial neural networks. The system was tested on six types of skin diseases with average accuracy of first stage 95.99% and the second stage 94.016%. In the method of extraction of image features is the first step in detection of skin diseases. In this method, the greater number of features extracted from the image, better the accuracy of system. The author of applied the method to nine types of skin diseases with accuracy up to 90%. Melanoma is type of skin cancer that can cause death, if not diagnose and treat in the early stages. The author of focused on the study of various segmentation techniques that could be applied to detect melanoma using image processing. Segmentation process is described that falls on the infected spot boundaries to extract more features. The work of proposed the development of a Melanoma diagnosis tool for dark skin using specialized algorithm databases including images from a variety of Melanoma resources. Similarly, discussed classification of skin diseases such as Melanoma, Basal cell carcinoma (BCC), Nevus and Seborrheic keratosis (SK) by using the technique support vector machine (SVM). It yields the best accuracy from a range of other techniques. On the other hand, the spread of chronic skin diseases in different regions may lead to severe consequences. Therefore, proposed a computer system that

automatically detects eczema and determines its severity. The system consists of three stages, the first effective segmentation by detecting the skin, the second extract a set of features, namely color, texture, borders and third determine the severity of eczema using Support Vector Machine (SVM). In, a new approach is proposed to detect skin diseases, which combines computer vision with machine learning. The role of computer vision is to extract the features from the image while the machine learning is used to detect skin diseases. The system was tested on six types of skin diseases with accurately 95%.

2 .PROBLEM DEFINITION AND SCOPE

A. Problem Statement:

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

B. Goal and Objectives*:*

Our objective of the project is to detect the type of skin disease easily with accuracy and recommend the best. First stage of the image the skin disease is subject to various kinds of pre-processing techniques followed by feature extraction. Then the second stage involves it uses the Machine learning algorithms to identify diseases based on the analyzing and observance of the skin. The proposed system is highly beneficial in rural areas where access to dermatologists is limited. For this proposed system, we use Pycharm based python script for experimental results.

C. Statement of scope

Skin is the largest organ in human body, which is important to cover human bone, and to protect human from any harm, fight the bacteria and other kind of diseases, and may have numerous potential abnormalities. Several factors may affect the skin directly or indirectly and cause diseases which can be treated with specific medicine and others require doctor's consultation. This paper will help people to know what are the required procedures for treatment of skin disease by analyzing the image and extract useful information that help to show the infected skin area and classification of image based on the kind of skin disease

D. Software context

Python will be used for development which is free of cost for development. Pycharm community version is free for development. We use DJango MVC Framework for development

E. Methodologies of problem solving and efficiency is- sues

Waterfall approach was first SDLC Model to be used widely in Software Engineering to ensure success of the project. In "The Waterfall" approach, the whole process of software development is divided into separate phases. In this Waterfall model, typically, the outcome of one phase acts as the input for the next phase sequentially.
The following illustration is a representation of the different phases of the Waterfall Model.

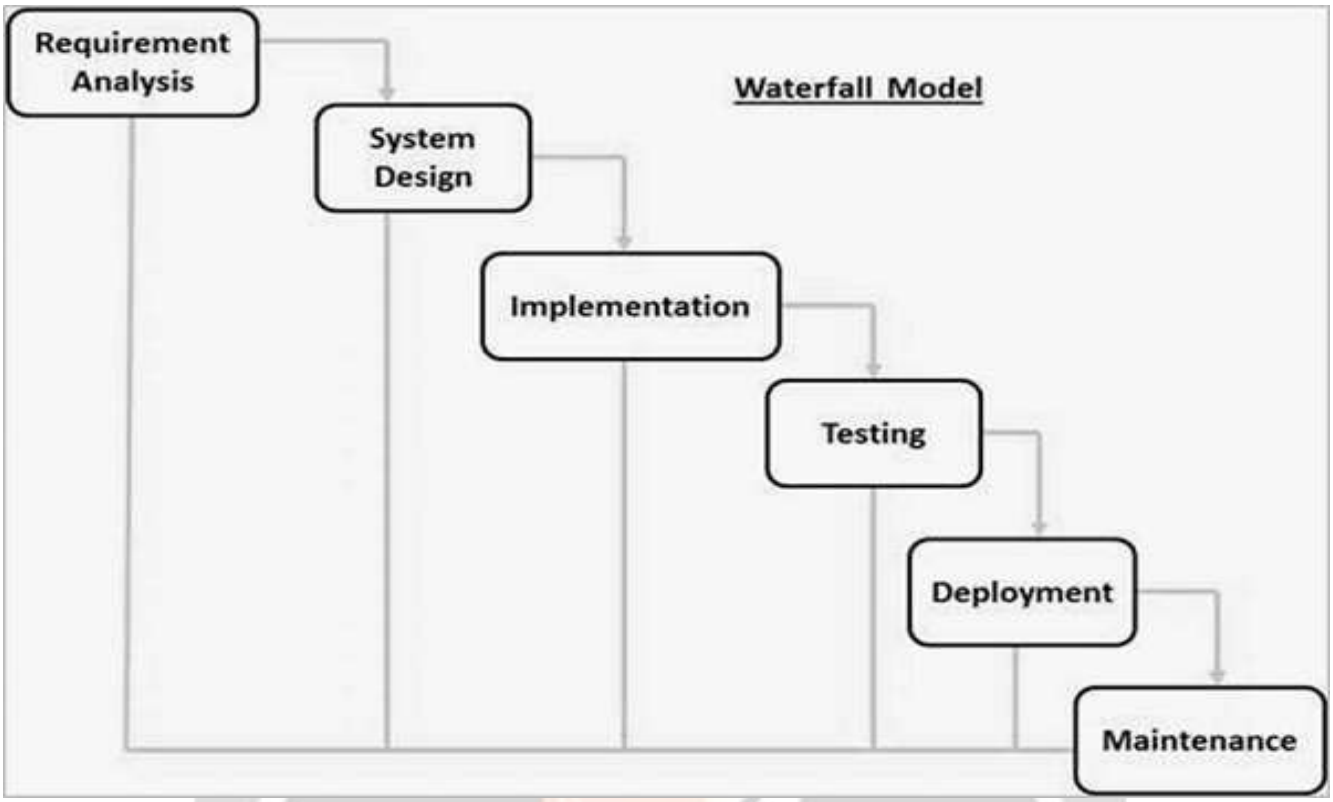

Fig. 1. Waterfall Model.

The sequential phases in Waterfall model are –

- Requirement Gathering and analysis − All possible requirements of the system to be developed are captured in this phase and documented in a requirement specification document.
- System Design −The requirement specifications from first phase are studied in this phase and the system design is prepared. This system design helps in specifying hardware and system requirements and helps in defining the overall system architecture.
- Implementation −With inputs from the system design, the system is first developed in small programs called units, which are integrated in the next phase. Each unit is developed and tested for its functionality, which is referred to as Unit Testing.
- Integration and Testing − All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures.
- Employment of system − Once the functional and non-functional testing is done; the product is deployed in the customer environment or released into the market.
- Maintenance − There are some issues which come up in the client environment. To fix those issues, patches are released. Also to enhance the product some better versions are released. Maintenance is done to deliver these changes in the customer environment

2.1 SOFTWARE REQUIREMENT SPECIFICATION

A. Outcome

Disease is detected and shown on Application screen

B. Applications

Other openCV concepts can be used and different detection can be done. Animal Detection, Plant Detection.

Sr. No.	Parameter	Minimum Requirement	Justification
1	CPU Speed	i5	Remark Required

2	RAM	8 GB	Remark Required
3	HDD	1 TB	Remark Required

Table.1 Hardware resources required

Software resources required
- Platform :Operating System:
- Windows
- IDE:Pycharm
- Programming Language
- Python
- Java

3. ARCHITECTURAL DESIGN

A. Purpose and Scope of Document

The purpose of SRS and what it covers is to be stated Overview of responsibilities of Developer. What all activities carried out by developer?

B. Usage scenario

This section provides various usage scenarios for the system to be developed.
- User profiles

The profiles of all user categories are described here. (Actors and their Description)
- Use-cases

All use-cases for the software are presented. Description of all main Use cases using use case template is to be provided.

Table 2: Use Cases

Sr. No.	Use Case	Description	Actors	Assumptions
1	Use Case 1	Description	Actors	Assumption

- Use Case View
- Use Case Diagram. Example is given below

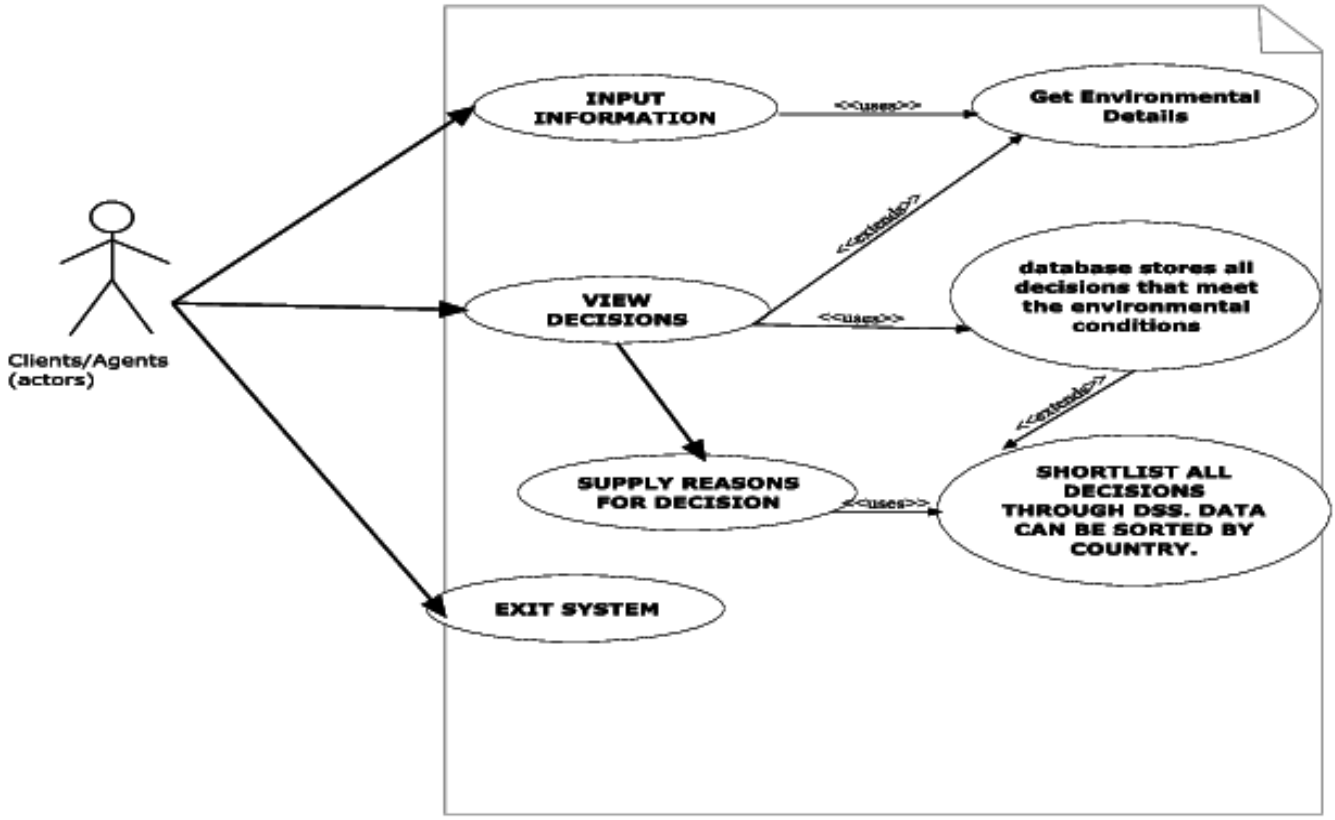

Fig.3.1 .Use case diagram

C. Data model and description

- Data Description

Data objects that will be managed/manipulated by the software are described in this section. The database entities or files or data structures required to be described. For data objects details can be given as below

- Data objects and Relationships

Data objects and their major attributes and relationships among data objects are de- scribed using an ERD- like form.

D. Functional model and description

A description of each major software function, along with data flow (structured analysis) or class hierarchy (Analysis Class diagram with class description for object oriented system) is presented.

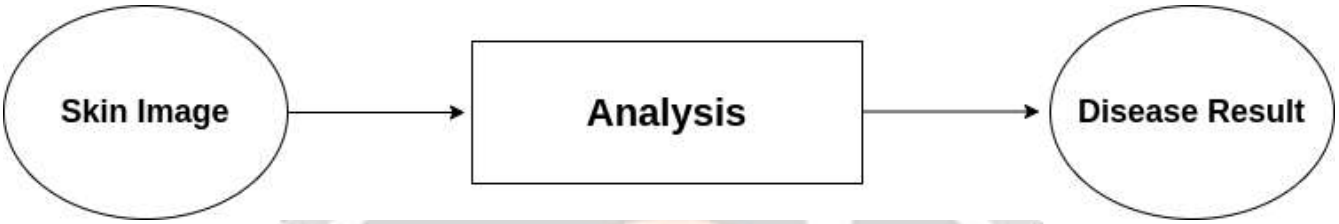

Fig.3.2 Level 0 Data FlowDiagram

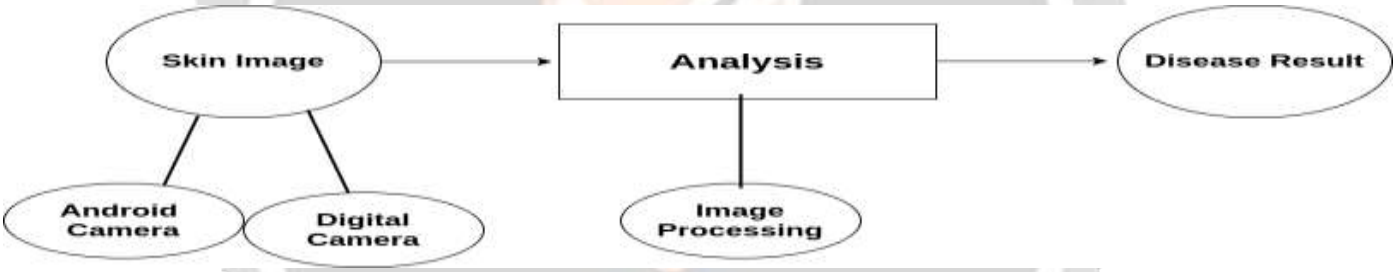

Fig. 3.3 Level 1 Data FlowDiagram

- Description of functions

A description of each software function is presented. A processing narrative for function n is presented. (Steps)/Activity Diagrams. For Example Refer

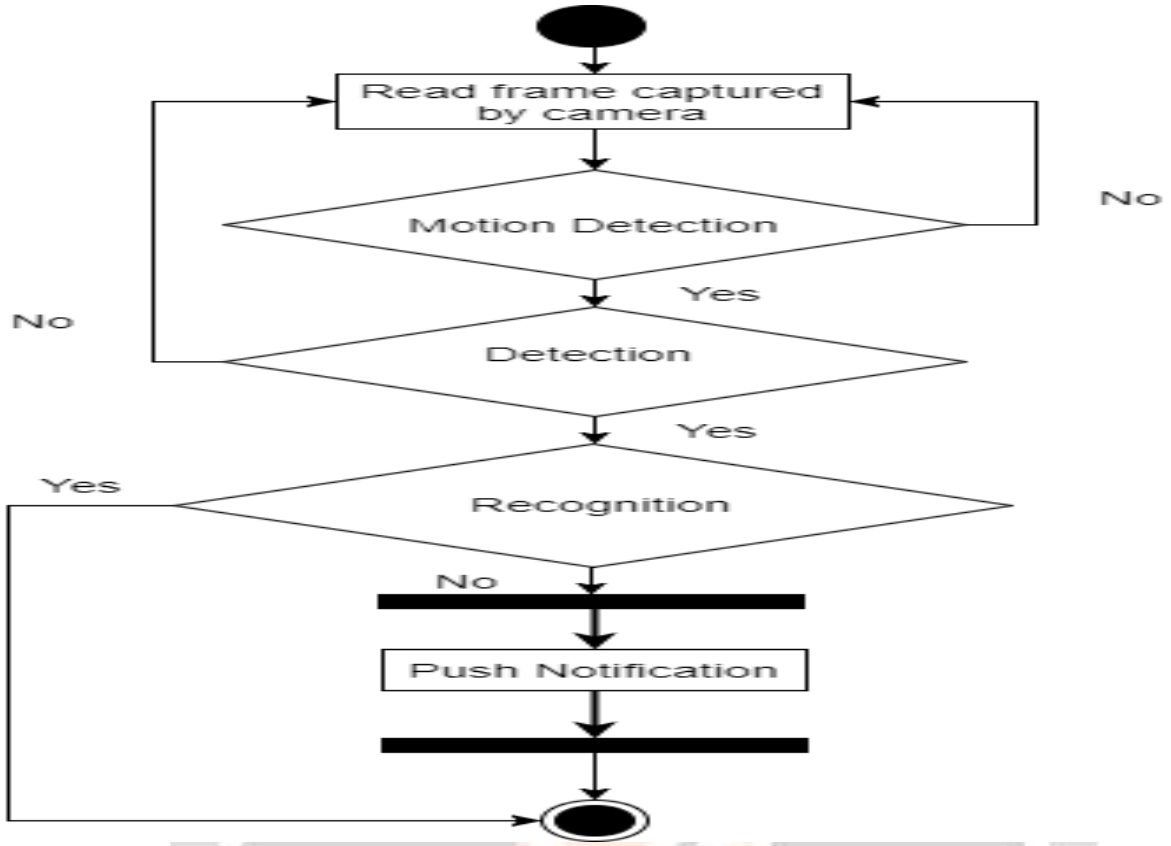

Fig.3.4. Activity diagram

Activity Diagram:
The Activity diagram represents the steps taken.

- Non Functional Requirements:
- Interface Requirements
- Performance Requirements
- Software quality attributes such as availability [related to Reliability], modi- fiability [includes portability, reusability, scalability] performance, security, testability and usability [includes self-adaptability and user adaptability]

4. Results

Step 1: This is the interface of our appication

Fig 4. MainUI

Step 2: After we click on Camera there comes two option on screen

a)Take pic

b)Upload

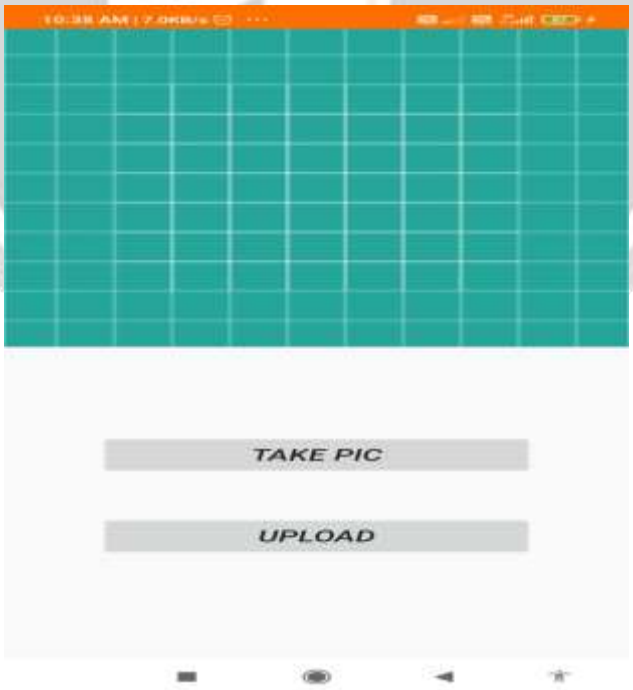

Fig 4.1 CameraUI

Step 3 :- we pass our images data set to teachable machine which trains our model according to our requirement into different classes and provides us with dependency which we use in our code

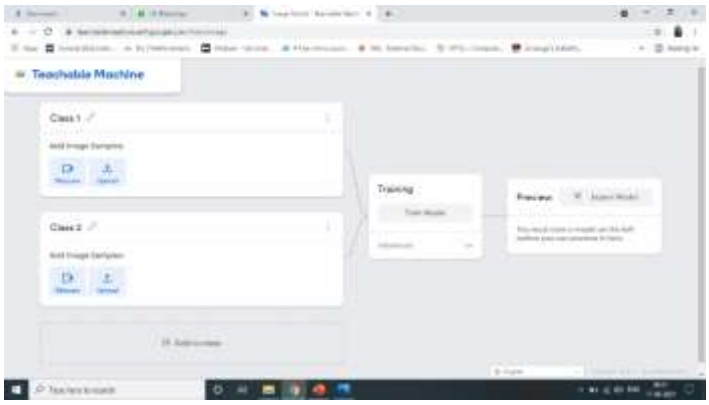

Fig4.2 Teachable machine

Step 4: - Result generated is shown in our app

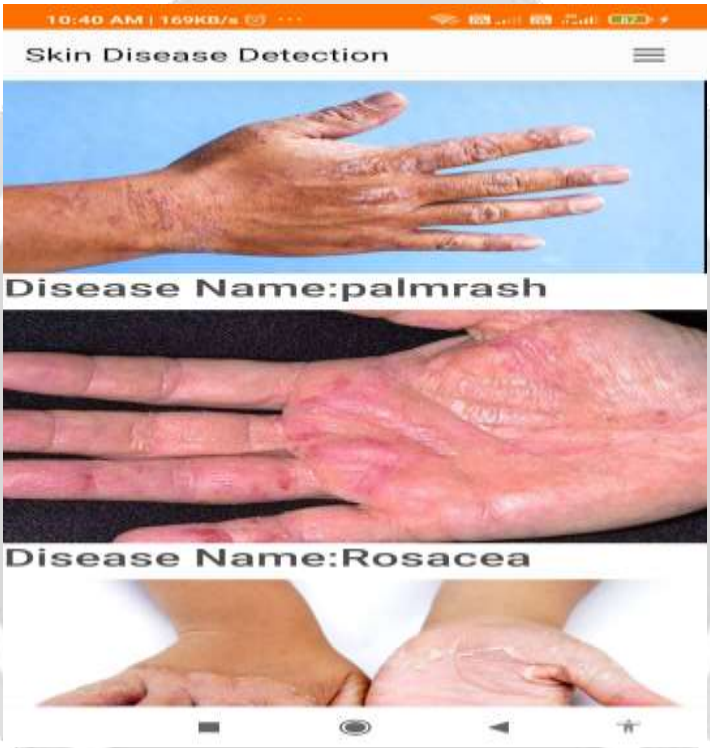

Fig4.3 Output

A. Machine learning Machine

Learning is that branch of computer studies that gives the potentiality to the computer to grasp without being characteristically programmed. Machine learning is employed in a wide range of computing functions where building and designing specific algorithms with better performances is difficult or impractical. Machine Learning is also firmly attached to computational statistics which makes prediction through computers easier and feasible.

- Convolutional neural network (CNN/ConvNet) is a class of deep neural networks, most commonly applied to analyze visual imagery. Now when we think of a neural network we think about matrix multiplications but that is not the case with ConvNet. It uses a special technique called Convolution. Now in mathematics convolution is a mathematical operation on two functions that produces a third function that expresses how the shape of one is modified by the other
- TensorFlow is an open-source end-to-end platform for creating Machine Learning applications. It is a symbolic math library that uses dataflow and differentiable programming to perform various tasks focused on training and inference of deep neural networks.
- Keras is a minimalist Python library for deep learning that can run on top of Theano or TensorFlow.It was developed to make implementing deep learning models as fast and easy as possible for research and development.It runs on Python 2.7 or 3.5 and can seamlessly execute on GPUs and CPUs given the underlying frameworks. It is released under the permissive MIT license.

B. Deep Learning Deep

learning is a part of the broader family of machine learning wherein the learningcan be supervised, unsupervised or semi supervised. Deep learning unlike machine learning uses a large dataset for the learning process and the number of classifiers used gets reduced.The training time for the deep learning algorithm increases because of the usage of the very large dataset. Deep learning algorithm chooses its own features unlike the machine leaning making the prediction process easier for the end user as it does not use much of pre-processing

C. Component design

Class diagrams, Interaction Diagrams, Algorithms. Description of each component description required.

- Class Diagram

The graphical representation of the class - trainer as shown above:

5. CONCLUSION

In this work a model for prediction of skin diseases is done using deep learning algorithms. It is found that by using the ensembling features and deep learning we can achieve a higher accuracy rate and also we can go for the prediction of many more diseases than with any other previous models done before. As the previous models done in this field of application were able to report a maximum of six skin diseases with a maximum accuracy level of 75%. By implementing deep learning algorithm we are able to predict as many as 20 diseases with a higher accuracy level of 88%. This proves that deep learning algorithms have a huge potential in the real world skin disease diagnosis. If even a better system with high end system hardware and software with a very large dataset is used the accuracy can be increased considerably and the model can be used for clinical experimentation as it does have any invasive measures. Future work can be extended to make this model a standard procedure for preliminary skin disease diagnosis method as it will reduce the treatment and diagnosis time

6. ACKNOWLEDGMENT

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