**Institute of Technology University of Moratuwa**

# AI Powered Dermatology Diagnostic Tool

**Version 1.0**


*Student Details:*

| | |
|---|---|
| P.G.C.G. Subasena | 20/IT/0499 |
| A.N.A. Gunawardhana | 20/IT/0468 |
| W.P. WithanaArachchi | 20/IT/0516 |
| T.B.N.N. Weerakoon | 20/IT/0545 |
| H.M.K.C. Herath | 20/IT/0541 |

*Supervised by:*

Ms. Sithara Madhubashini

Division of Information Technology

Institute of Technology University of Moratuwa


June 2023

**Table of Contents**

# 1 Introduction

## 1.1 Purpose

The Software Requirements Specification (SRS) provides a detailed description of the requirements for the AI powered dermatology diagnostic tool. SRS document is needed to create startups and launch this software product. This SRS allows for a complete understanding of what is to be expected from a newly introduced system that is to be constructed. A clear understanding of the system and its' functionality will allow for the correct software to be developed for the end-users and this can be used for the development of future stages of the project. [1]

The SRS creates a framework for development teams and helps them clearly define what they need to develop the product. in addition, completed SRS lays the foundation for other teams such as quality assurance, operations, and maintenance. A detailed SRS coordinates between these different teams as well and helps to ensure all software requirements are fulfilled. Without a plan, the teams are bound to go in circles; errors will occur, deadlines will be missed, cost overruns will occur, and the projects will derail, even threatening the company's existence. Because writing in SRS clearly defines what needs to be done and provides no room for ambiguity, it reduces project deviations, as well as time and expense overruns.

## 1.2 Product Scope

### 1.2.1 Aim and Objectives

As IT students, our aim is to develop software that aids in the detection and diagnosis of various skin diseases using image processing technology. This software will not only facilitate researchers but also accelerate the detection process, improve accuracy, and simplify their work. By harnessing the power of advanced algorithms, our system will enable healthcare professionals to accurately identify different types of skin diseases, thereby reducing misdiagnosis and improving patient outcomes.

- Requirement gathering by conducting interviews with general doctors and medical students.
- To conduct a literature review and identify existing systems and their features.
- To define the system features and system boundaries.
- To design the system process with the help of UML diagrams.
- To conduct a feasibility study about the technologies such as programming languages.
- To find proper data set.
- To preprocess data.
- To train the model using preprocessed data with the most appropriate machine learning model to improve the accuracy.
- To validate and improve the prediction.
- To test the model using test data.
- To develop a mobile application.
- To integrate the system.

## 1.2.2 Project Boundary

The system should focus specifically on diagnosing skin diseases and conditions. The goal of the skin diseases dermatology diagnosis tool is to offer consumers an educational and user-friendly platform for studying and recognizing different skin ailments. The tool seeks to provide ideas and possibilities for skin disease diagnoses by concentrating on visual analysis of skin photos and symptom descriptions. To underline that the tool should not take the place of expert medical advice or invasive treatments, it is crucial to emphasize the instrument's limitations. The tool's limitations are related to its breadth of non-invasive analysis, informational goals, limited accuracy, supported skin disorders, user interface, and safeguarding privacy and data security.

# 2 Overall Description

## 2.1 Product Perspective

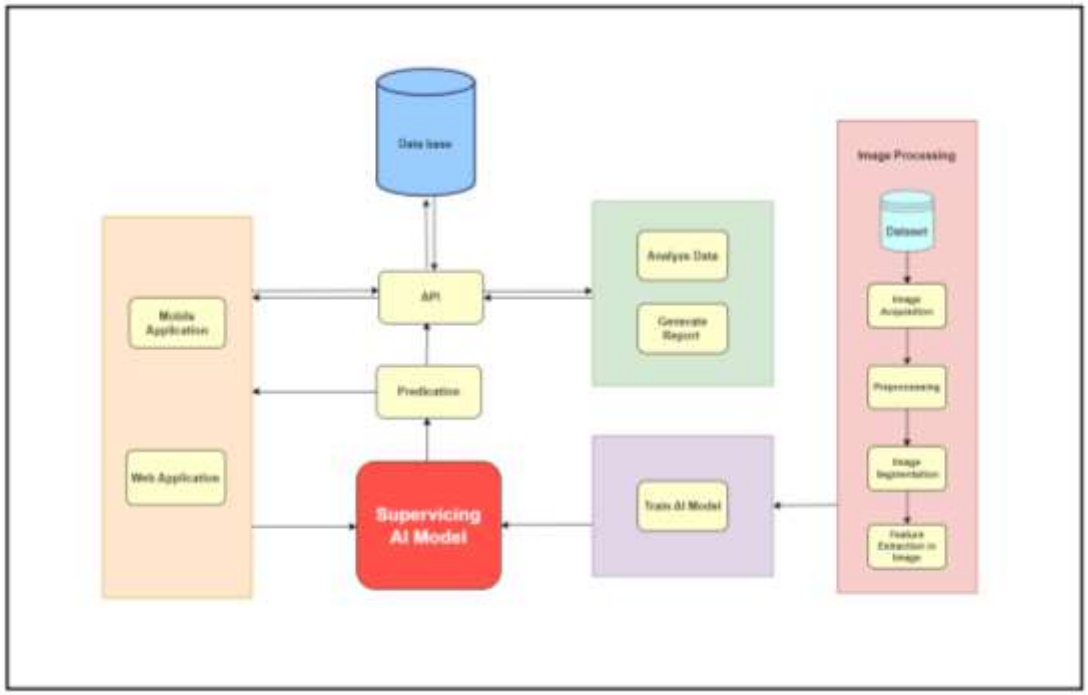



*Figure 1: High level architecture*

In the first step, we have selected a particular training skin disease images data for image preprocessing. The steps of the preprocessing are Noise Removal, image segmentation, and image Normalization. In the third step, Model is trained by an algorithm using that skin disease images.

In the next step, test data is selected for testing to the trained model. Also, that skin images are sent through the feature extraction and arrive in the trained model. That way, we will be got a prediction. Furthermore, that obtained prediction is sent to the User Interface (UI). While by sending so, that prediction is updated in the database via the API (Application Programming Interface). Then we can be accessed through our mobile phones with the database. [2]

## 2.2 User Classes and Characteristics

**General Doctor**

In the beginning, the doctor should be logged into the system, and he has to input a skin disease Image and patient information into the system. And also get the result supplied by the system. He has a responsibility to help the patient via mobile application or web application.

**Medical student**

In the beginning, the medical students should be logged into the mobile application or web application, and after they can get the prediction. It means they can identify the skin disease. The medical students can get help from the dermatologist and general doctors via the mobile app or web application. For that, they can use option available in the system. There is a chat option. In addition, they have an opportunity to create a new profile or update an existing profile.

**Admin**

The system allows the administrator to monitor and remove inappropriate datasets and code. He can update and edit existing information in the system, for he can access the database. And also, can backup data of the system. Admin will be able to log in to both web application and mobile applications.

## 2.3 Operating Environment

Use Anaconda environment to run Spyder. The i7-7500U is an excellent option and an Nvidia RTX 3070 is suggested (5888 CUDA cores, 8GB GDDR6 memory) if budget is a concern, Models are recommended such as GTX 1080 or GTX 1070 So, these GPUs can be used and GDDR6 or GDDR5 is good for memory, 1TB or 2TB SSD Hard drive it is better if having 500GB NVMe M2 SSD is a good option to the hardware platform. Microsoft Windows 10 operating system is used, Tensorflow, Google Colab environment. Moreover, Linux or Ubuntu this operating system can be used. [3] [4]

## 2.4 Design and Implementation Constraints

**Time requirements**

Artificial Neural Networks (ANNs) and machine learning require extensive research and time-consuming implementation. As a result, we must adjust the schedule to do the assignment in the allotted time.

**Implementation constraints**

The system can only detect two skin diseases, in accordance with the project's scope. However, there are many kinds of skin diseases (including psoriasis, eczema, monkeypox, tinea infection, and Leprosy). But the system will not be able to identify all these diseases. And also, we can’t predict the diseases of some patients because the appearance of the infected area differs from that of a regular patient [5].

**Language Requirements**

The cording components are implemented using Python, Machine Learning, and Artificial Neural Networks. When creating a user interface, we use Flutter and React.

**Security Considerations**

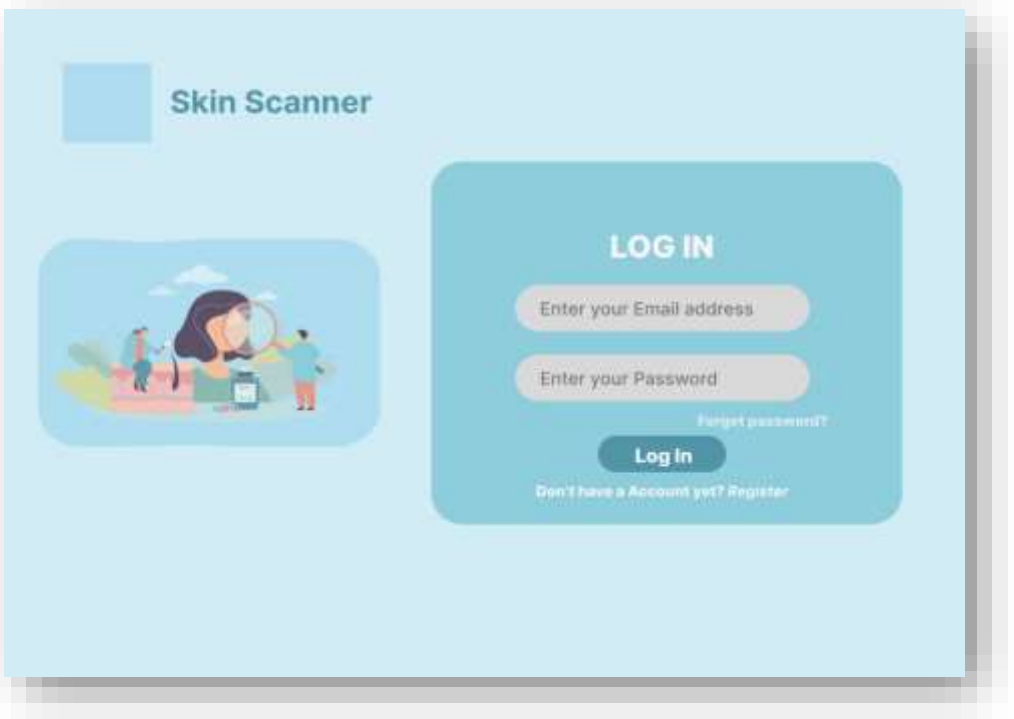
Our model is meant to be used in healthcare facilities, in line with the project's goal. Furthermore, we created this model such that it could function independently at the beginning, without relying on any network connections. Therefore, network security mechanisms are not necessary at the beginning. Our only focus is on putting access procedures into practice, which we have done by creating a user interface with sign-up and login forms for authentication. This strategy aids in preventing unauthorized system access. Additionally, user registers and information about skin diseases are stored on an external hard drive.

## 2.5 Assumptions and Dependencies

Our software will run on a suitable computers and mobile phones, and skin images in the JPEG and PNG formats will be made available. Additionally, we expect that general doctors and medical students will both have dependable internet access. The doctors will have to use a smart phone or desktop. But remember that our product is primarily intended for Android devices. The Software Requirements Specifications (SRS) may need to be changed if the client is using an IOS devise since some adjustments may be necessary to meet the unique requirements.

# 3 External Interface Requirements

## 3.1 User Interfaces

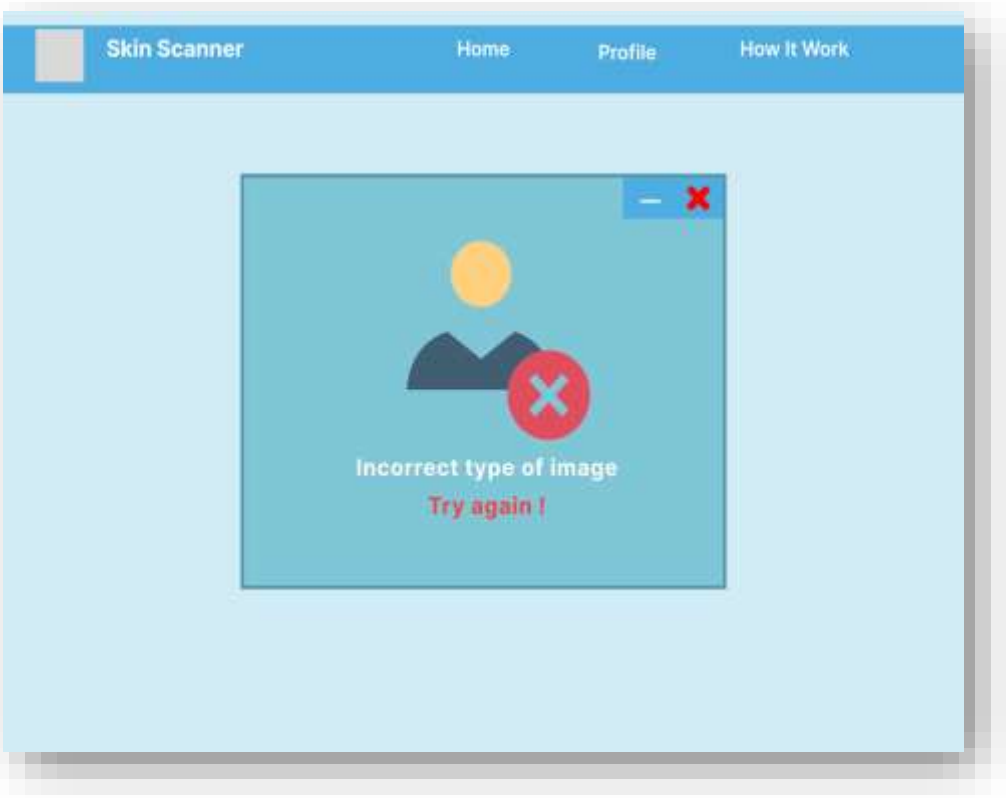



- After double-clicking the software icon, the doctor or admin can see this interface.
- User can enter Email address and Password to log in to the system.
- A person only who had already created a profile can use this option.
- When a doctor or medical student logs in to the system by clicking on the LOG IN button, he can see the following interface.

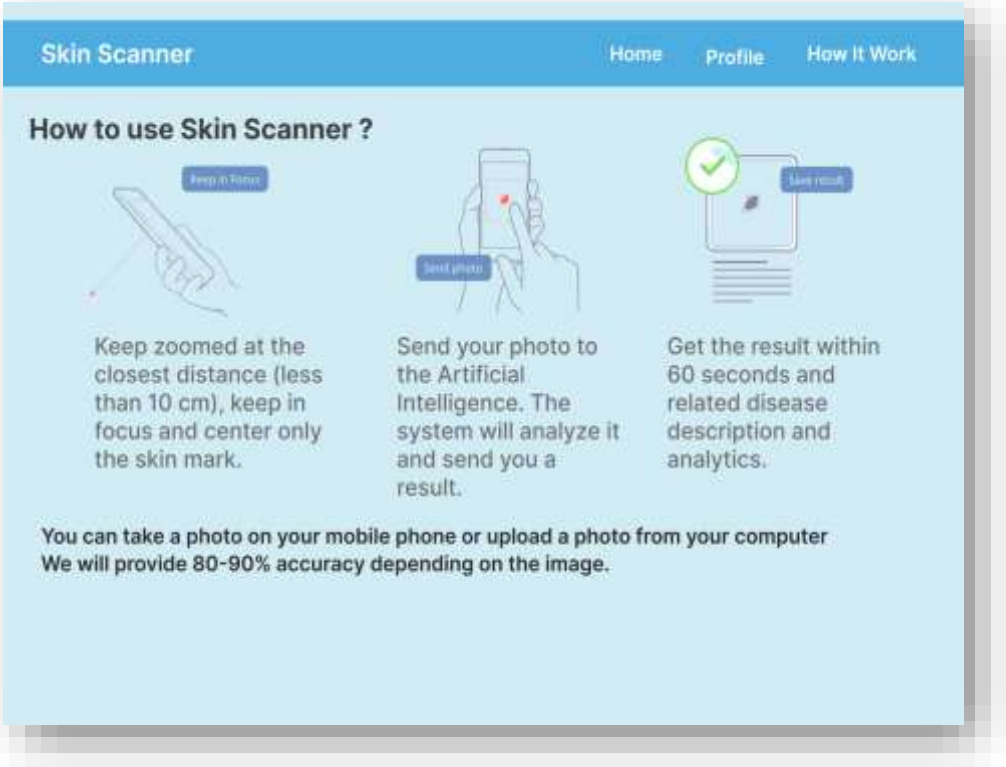

- Using this interface, users can enter the following details and register with the system:

1. Enter your full name.
2. Your Role.
3. Enter your Reg. No.
4. Enter your E-mail Address.
5. Enter your Password.
6. Confirm your Password.

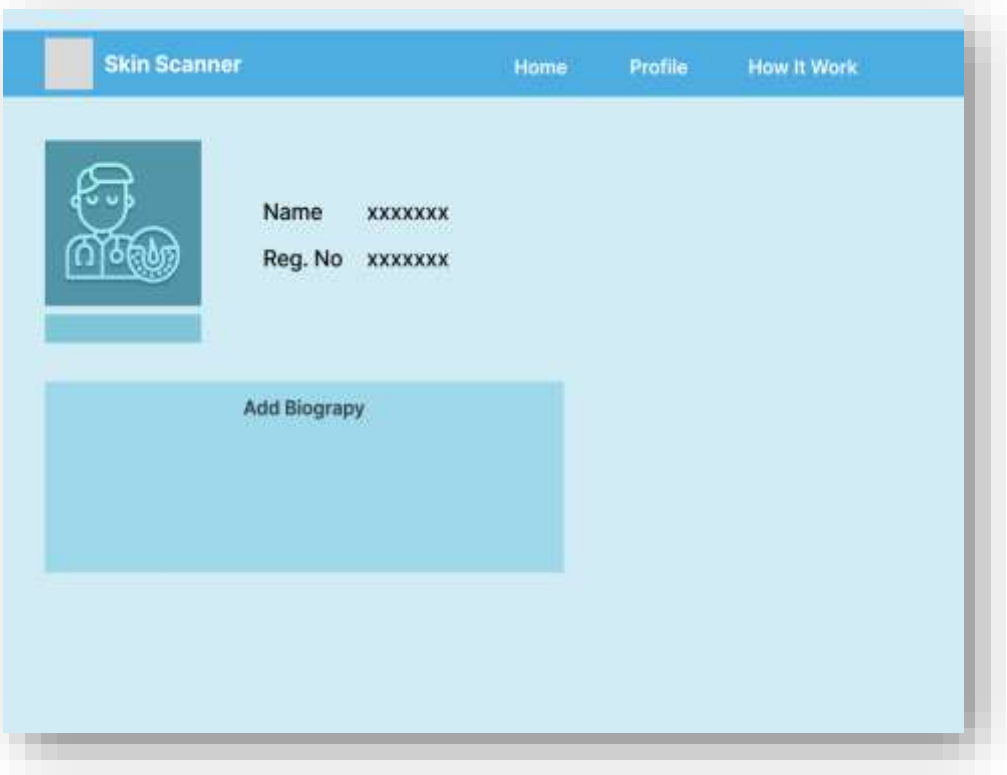

- Here, users can upload a patient’s skin image or scan the patient's skin. And also users can see the data analysis that the system provides.
- Using the "Upload clear photo of skin" option, the user can upload an image of a skin disease area.
- Using the "Scan patient skin" option, the user can scan patient skin using a mobile camera.
- Using the "Data Analysis" option, the user can see the analytical data that the system provides.




- If a user inputs an incorrect type of image, system generate this window to show error message.

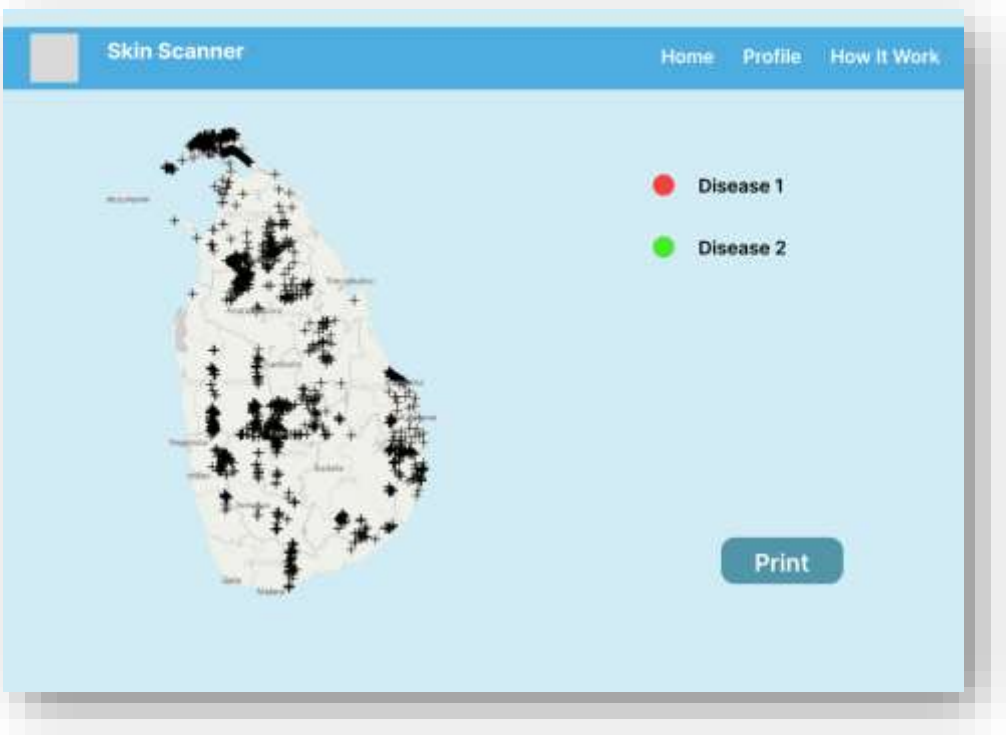



- Using this interface, users can get a clear idea of how to work with this software.

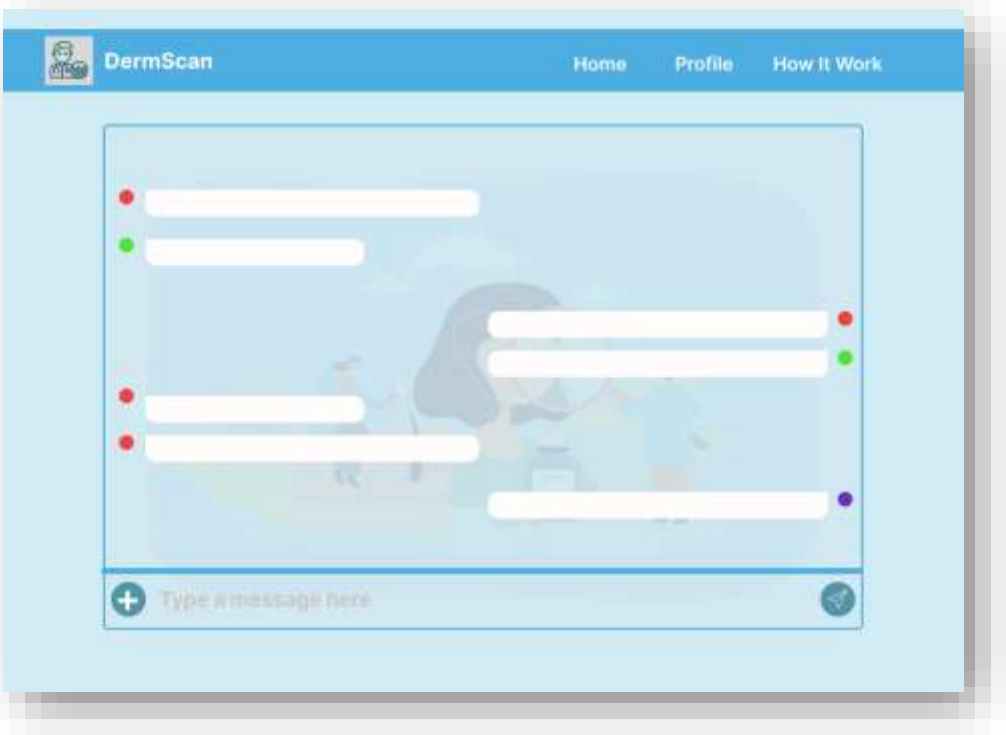



- Using this interface, the user can maintain his or her user profile.


- After the user inputs a clear photo of the skin-affected area, this interface provides the name of the disease, the accuracy of the result, and a full description of the disease.




- This interface shows the generated report about the areas that how skin diseases spread around the country.
- System shows the result in two colours.
- And using print button , user can get a hard copy of the report.




- This is the Discussion forum interface.
- Using this option in our system, doctors and medical students share their idea about the generated disease.

## 3.2 Software Interfaces

Users can communicate with the system through the user interface (UI). It may have options like sign-up pages, the ability to add images, and an easy-to-use dashboard for controlling and seeing the results.

Image Processing interface is responsible for uploading and analyzing user-provided skin images as well as other image processing operations. It should provide features for feature extraction, categorization, and image pre-processing using AI techniques.

Database interface links the system to a database that stores and retrieves information about users, medical histories, and diagnostic results. It provides effective data management and guarantees secure data storage.

Reporting interface based on the diagnostic results, it enables users to access and create reports. It should offer recommendations and additional steps as well as clear and thorough information regarding the diagnosed skin conditions.

## 3.3 Communications Interfaces

A strong internet connection is needed for this. Here SFTP is used to transfer files with the Secure Shell (SSH) connection. SFTP is an encrypted network protocol that can enable remote login to operate over a network that lacks security. SFTP offers encryption of commands and data. The database has to be bought from AWS to store system data.

# 4 System Designs

Our system design entails the general layout and coordination of the parts that make up the instrument.

Our system components interact and communicate with one another according to the system architecture. It describes the high-level structure of the system.

The goal of the user interface design is to make the system user interface simple and easy for users to use. It has the design, aesthetics, and features needed for users to enter information, and photos, as well as view test results.

The system's architecture takes data collection and archiving into account. Designing a database schema to hold user inputs, information, and photos may be necessary. To further safeguard patient privacy and data security, measures for secure data transfer and storage should be put in place. [6]

The design includes components for gathering and processing submitted photos. Computer vision algorithms can be used for image processing to examine and extract features from the uploaded photos. [7].

The knowledge base's organization and structure are included in the system design. It provides details on various skin conditions and their signs, prevalence rates, and other medical information. The knowledge base may be populated with information gleaned through clinical investigations, expert opinions, or information found in medical literature. [8]

How the diagnosis results are displayed to users is determined by the system design. This entails creating a thorough report that outlines suspected skin conditions, their likelihoods, and any pertinent supplementary data. To make the diagnosis report more usable, the design may contain formatting, visualization. [9]

# 4.1 Use case Diagram

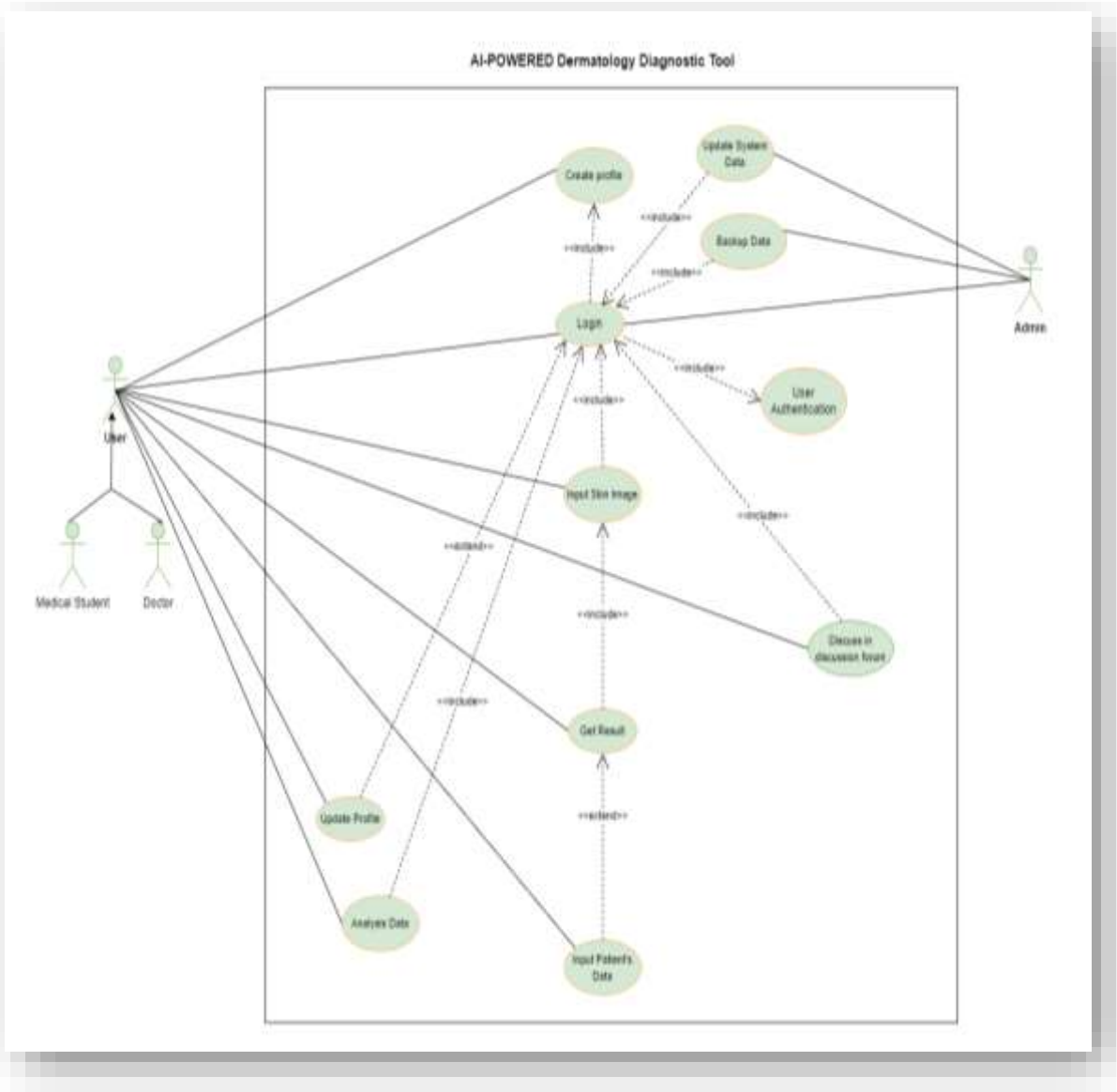



*Figure 3: Use case Diagram*

## 4.1.1 Use case Description

<table>
<tr><td>Use Case</td><td colspan="2">Login</td></tr>
<tr><td>Priority</td><td colspan="2">High</td></tr>
<tr><td>Primary System Actor</td><td colspan="2">General Doctor</td></tr>
<tr><td>Other participant Actors</td><td colspan="2">Admin</td></tr>
<tr><td>Description</td><td colspan="2">This use case allows the doctor to login into the system to access the relevant functions according to the user’s role. To login into the system, a user has to enter a username and password.</td></tr>
<tr><td>Pre-conditions</td><td colspan="2">The system should be run.<br>User should have username and password</td></tr>
<tr><td>Trigger</td><td colspan="2">To protect the system from unauthorized access.</td></tr>
<tr><td rowspan="2">Flow of Events</td><td>Actor Action</td><td>System Response</td></tr>
<tr><td>1. Enter a username.<br>2. Enter password.<br>3. Press the login button.</td><td>4. Verifies username and password.<br>5. Display relevant homepage.</td></tr>
<tr><td>Post-conditions</td><td colspan="2">The system displays the relevant homepage.</td></tr>
<tr><td>Exceptional Flows</td><td colspan="2">4a Invalid username or password<br>1. The system displays an “Invalid username or password” message.<br>2. Go to the login page.</td></tr>
<tr><td>Assumptions</td><td colspan="2">The system has been connected to the network.</td></tr>
</table>

| | | |
|---|---|---|
| **Use Case** | Input skin image | |
| **Priority** | High | |
| **Primary System Actor** | General Doctor | |
| **Other participant Actors** | None | |
| **Description** | This use case allows users to input PNG or JPEG images into the system. This skin image is of a person suspected of having skin disease. | |
| **Pre-conditions** | The doctor has logged into the system and should have a JPEG or PNG skin disease image. | |
| **Trigger** | To identify abnormal patterns on the skin disease image. | |
| **Flow of Events** | Actor Action | System Response |
| | 1. Click on ADD image<br>2. Select skin disease image.<br>3. Press submit button. | 4. Display relevant homepage. |
| **Post-conditions** | The system displays the relevant homepage. | |
| **Alternative Flows** | 3a-1 User select cancel.<br>3a-2 Go to the previous home page | |
| **Assumptions** | The system has been connected to the network. | |

| | | |
|---|---|---|
| **Use Case** | Input Patient's Data | |
| **Priority** | Medium | |
| **Primary System Actor** | Doctor | |
| **Other participant Actors** | None | |
| **Description** | This use case allows users to patient's data into the system. The patient's data is made by the user. This is used to send the final result (the patient can have what kind of skin disease) to the relevant user's app. | |
| **Pre-conditions** | The doctor has input PNG or JPEG skin images into the system. | |
| **Trigger** | To send the final result to the patient. | |
| **Flow of Events** | Actor Action | System Response |
| | 1. Enter patient data.<br>2. Press the start button. | 3. Display the result. |
| **Post-conditions** | The system displays the relevant homepage. | |
| **Alternative Flows** | | |
| **Assumptions** | The system has been connected to the network. | |

| | | |
|---|---|---|
| **Use Case** | Get result | |
| **Priority** | High | |
| **Primary System Actor** | Doctor | |
| **Other participant Actors** | None | |
| **Description** | This use case allows the user to get a result. It means whether the patient can have what kind of skin disease. This is the main goal of the system. | |
| **Pre-conditions** | Successfully upload the clear photo or successfully scan the skin area. | |
| **Trigger** | To identify whether the person can have what kind of skin disease. | |
| **Flow of Events** | Actor Action | System Response |
| | 1. Press the Result button. | 2. Display the result. |
| **Post-conditions** | The system displays the relevant homepage. | |
| **Alternative Flows** | | |
| **Assumptions** | The system has been connected to the network. | |

| | | |
|---|---|---|
| **Use Case** | Discussion forum. | |
| **Priority** | High | |
| **Primary System Actor** | General doctor and Medical student | |
| **Other participant Actors** | none | |
| **Description** | This use case allows the doctors to login into the system and discuss about the generated result via a chat. To login into the system, the user has to enter username and password. | |
| **Pre-conditions** | The system should be run.<br>The user should have a username and password. | |
| **Trigger** | To protect the system from unauthorized access. | |
| **Flow of Events** | Actor Action | System Response |
| | 1. Enter a username.<br>2. Enter password.<br>3. Press the login button.<br>4. Press the chat button | 1. Verifies username and password.<br>2. Display relevant homepage.<br>3. Display discussion forum. |
| **Post-conditions** | The system displays the relevant discussion forum. | |
| **Exceptional Flows** | 4a Invalid username or password<br>1. The system displays an “Invalid username or password” message.<br>2. Go to the login page. | |
| **Assumptions** | The system has been connected to the network. | |

| | | |
|---|---|---|
| **Use Case** | Create profile | |
| **Priority** | Medium | |
| **Primary System Actor** | General Doctor and Medical Student | |
| **Other participant Actors** | None | |
| **Description** | This use case allows the general doctor and medical student to create a new profile. The user has to add personal information. | |
| **Pre-conditions** | The patient has logged into the mobile app | |
| **Trigger** | Make it easy for the system to give feedback. | |
| **Flow of Events** | Actor Action | System Response |
| | 1. Click on Create profile.<br>3. Fill form.<br>4. Click on submit button. | 2. Display the form<br>5. Display relevant homepage. |
| **Post-conditions** | The user has to the navigate to the registration form. | |
| **Alternative Flows** | 3a-1 User select cancel.<br>3a-2 Go to the previous home page. | |
| **Assumptions** | The system has been connected to the network. | |

<table>
<tr><td>Use Case</td><td colspan="2">Update profile</td></tr>
<tr><td>Priority</td><td colspan="2">Medium</td></tr>
<tr><td>Primary System Actor</td><td colspan="2">General Doctor and Medical Student</td></tr>
<tr><td>Other participant Actors</td><td colspan="2">None</td></tr>
<tr><td>Description</td><td colspan="2">This use case allows the user to edit the existing profile.<br>The user has to change profile information.</td></tr>
<tr><td>Pre-conditions</td><td colspan="2">The user has logged into the web app.</td></tr>
<tr><td>Trigger</td><td colspan="2">Make it easy for the system to give feedback.</td></tr>
<tr><td rowspan="2">Flow of Events</td><td>Actor Action</td><td>System Response</td></tr>
<tr><td>1. Click on Update profile.<br>3. Edit form.<br>4. Click on submit button.</td><td>2. Display the form<br>5. Display relevant homepage.</td></tr>
<tr><td>Post-conditions</td><td colspan="2">The system. displays the relevant homepage</td></tr>
<tr><td>Alternative Flows</td><td colspan="2">3a-1 User select cancel.<br>3a-2 Go to the previous home page.</td></tr>
<tr><td>Assumptions</td><td colspan="2">The system has been connected to the network.</td></tr>
</table>

| | | |
|---|---|---|
| **Use Case** | Login | |
| **Priority** | High | |
| **Primary System Actor** | Admin | |
| **Other participant Actors** | None | |
| **Description** | This use case allows the admin to login into the system to access the relevant functions. To login into the system, the admin has to enter the username and password. | |
| **Pre-conditions** | The system should be run.<br>The user should have a username and password. | |
| **Trigger** | To protect the system from unauthorized access. | |
| **Flow of Events** | Actor Action | System Response |
| | 1. Enter a username.<br>2. Enter password.<br>3. Press the login button. | 4. Verifies username and password.<br>5. Display relevant homepage. |
| **Post-conditions** | The system displays the relevant homepage. | |
| **Exceptional Flows** | 4a Invalid username or password<br>5. The system displays an "Invalid username or password" message.<br>6. Go to the login page. | |
| **Assumptions** | The system has been connected to the network. | |

| | | |
|---|---|---|
| **Use Case** | Update system data | |
| **Priority** | Medium | |
| **Primary System Actor** | Admin | |
| **Other participant Actors** | None | |
| **Description** | This use case allows the admin to update the information in the system. As an example, the admin can delete skin images and access the database etc. | |
| **Pre-conditions** | The admin has logged into the system. | |
| **Trigger** | | |
| **Flow of Events** | Actor Action | System Response |
| | 1. Click on the update system<br>3. Can update<br>4. Press submit button | 2. Display relevant page<br>5. Display previous page |
| **Post-conditions** | The system displays the relevant homepage. | |
| **Alternative Flows** | 4a-1 User select cancel.<br>4a-2 Go to the previous home page. | |
| **Assumptions** | The system has been connected to the network. | |

<table>
<tr><td>Use Case</td><td colspan="2">Backup Data</td></tr>
<tr><td>Priority</td><td colspan="2">Medium</td></tr>
<tr><td>Primary System Actor</td><td colspan="2">Admin</td></tr>
<tr><td>Other participant Actors</td><td colspan="2">None</td></tr>
<tr><td>Description</td><td colspan="2">This use case allows the admin to get back up the data of the system.</td></tr>
<tr><td>Pre-conditions</td><td colspan="2">The admin has logged into the system.</td></tr>
<tr><td>Trigger</td><td colspan="2">To protect the data.</td></tr>
<tr><td rowspan="2">Flow of Events</td><td>Actor Action</td><td>System Response</td></tr>
<tr><td>1. Click on backup<br>3. Can backup<br>4. Press submit button</td><td>2. Display relevant page<br>5. Display previous page</td></tr>
<tr><td>Post-conditions</td><td colspan="2">The system displays the relevant homepage.</td></tr>
<tr><td>Alternative Flows</td><td colspan="2">4a-1 User select cancel.<br>4a-2 Go to the previous home page.</td></tr>
<tr><td>Assumptions</td><td colspan="2">The system has been connected to the network.</td></tr>
</table>

# 5 System Features

## 5.1 System Feature 1

Get an accurate result about what kind of skin disease that the patient has at the initial stage.

### 5.1.1 Description and Priority

After entering the skin image, the system will be given accurate results for the particular person. This feature has high priority.

### 5.1.2 Stimulus/Response Sequences

After the user inputs data, the system will be processed that data using Machine Learning and Artificial Neural Networks. The system will then output which type of skin disease that specific person may have.

### 5.1.3 Functional Requirements

REQ-1: Shall be able to input skin disease image.

REQ-2: Shall be able to get output as a particular person has what kind of skin disease.

## 5.2 System Feature 2

Available an Admin as a system authorized person

## 5.2.1 Description and Priority

We are wanted to make an Admin for security purposes and maintainability of the system. So Related person is made as a user for giving feedback about system errors and maintain the user profiles. We can be selected as a machine operator as an Admin. This feature has high priority.

## 5.2.2 Stimulus/Response Sequences

Once the model is activated, there are two authentication details are displayed in the logging form, in the middle of the user interface of the model to Admin. Admin must enter the Employ ID and Password for verify the admin authentication. Then the system will be verified and accessed the system.

Admin can view user profiles and their history. For the Admin to check up and access user information, the system provides a list of user profiles or a search interface.

A system administrator keeps track of the information and performance of the system. The system gives the administrator access to a dashboard or interface where they can monitor diagnostic data, performance indicators, and usage analytics. Admin keeps an eye on data and system performance.

## 5.2.3 Functional Requirements

REQ-1: Shall be able to activate model and maintain the system.

REQ-2: Shall be able to backup data for security purposes.

REQ-3: Shall be able to update the system.

## 5.3 System Feature 3

Availability to maintain a connection with other doctors and medical students.

## 5.3.1 Description and Priority

According to the system feature, doctors and medical students can be contacted by other doctors and medical students through the system. We have used a discussion forum for this task to help with the main system. Senior Doctors and dermatologists can share their knowledge about skin diseases with junior doctors and medical students through this system feature.

## 5.3.2 Stimulus/Response Sequences

Once the user has accessed the system, the user must input the user's Name and password.

Then he can add the patient’s skin disease image and enter information about the disease through the discussion forum. Then the system will display that information in the discussion forum. Then doctors and medical students can discuss that information via the discussion forum.

## 5.3.3 Functional Requirements

REQ-1: Shall be able to input skin disease images.

REQ-:2: Shall be able to input information.

REQ-3: Shall be able to contact doctors and medical students.

## 5.4 System Feature 4

Availability to make predictions and generate reports about the spread of skin diseases in Sri Lanka.

### 5.4.1 Description and Priority

The capability enables the Skin Disease Detection System predict the spread of skin illnesses in Sri Lanka and produce reports about it. In order to provide insights into the distribution of various skin disorders throughout various regions in Sri Lanka, the system analyzes the data received via user uploads and diagnoses, together with pertinent demographic and geographic information. In order to make educated decisions about prevention, resource allocation, and focused interventions, healthcare authorities and medical professionals can use the generated reports to better understand the patterns and trends of skin disorders. This feature has high priority. [10]

### 5.4.2 Stimulus/Response Sequences

A forecast report for the spread of skin disorders in Sri Lanka is requested by the healthcare authorities. Based on the data gathered and AI analysis, the system provides a prediction report that offers details on the anticipated expansion of skin disorders throughout the various regions of Sri Lanka.

The Sri Lankan healthcare authorities requests a report on the prevalence of skin diseases by region. The system generates a report that provides a regional breakdown of the prevalence of skin diseases, highlighting regions with more cases and providing statistical data for each region.

### 5.4.3 Functional Requirements

REQ-1: Shall be able to generate a report about spread of skin disorders.

REQ-2: Shall be able to generate a report that provides a regional breakdown of the prevalence of skin diseases.

# 6 Other Nonfunctional Requirements

## 6.1 Performance Requirements

The allowed response times for system functionality are defined by performance criteria. Although the system was designed to have the lowest possible system performance requirements, the installation computer's hardware and software performance will have a significant impact on the system's performance. The loading time for user interface screens must not exceed two seconds when taking the timing relationships of the system into account. It facilitates quick access to system features. For system efficiency, the log-in information must be confirmed within 10 seconds. The search feature is more precise when it responds to queries in less than five seconds.

## 6.2 Safety Requirements

Maintaining backups ensures the system's database security. The system can be restored in any case of an emergency. If the power goes out while using this, the test cannot be done properly so the computer must have a good battery capacity. Also, this can be due to computer hardware errors. Proper maintenance of the hardware can avoid this situation. Data can also be erased by viruses entering the computer. Therefore, you can avoid this situation by installing a virus guard on the computer. This software does not require any special experience to operate and can be easily operated by any person.

## 6.3 Security Requirements

There are several user levels in this system, Access to the various subsystems will be protected by a user log-in screen that requires a user name and password. doctor, patient, and admin can be log into the system. But only the admin can enter the database. The patient's information is retrieved by the software before electrocardiography testing. That data is stored on its hard disk. That data may not be available to another person without special permission. And because this is not networked, data does not flow out. Therefore, no harm is done to the privacy of the patient. Finally, the patient receives a printed copy, which contains the patient's description and the result of the electrocardiography test.

## 6.4 Software Quality Attributes

This new research, which is a new experience to the world, will be very close to the doctor's common problem. Our software can be used using simple smart phone or desktop. Therefore, it does not require any additional cost.

| | |
|---|---|
| Availability | The system shall be available in 24 hours |
| Flexibility | Ability to add new features to the system and handle them conveniently. |
| Adaptability | This device can adapt and respond very quickly. |
| Correctness | Our goal is to build the accuracy of this device to 98%. That way we can get the data we need with a very high degree of accuracy. |
| Reliability | Operating with high reliability, it responds very similarly to the conclusion of a dermatologist. |
| Maintainability | This is not a device and does not require hardware maintenance. |
| Portability | The software could be run in any operating system. |
| Testability | The system needs to test to ensure performs as intended. |
| Robustness | Strength of the system to handle system functions accurately and maintain the database without facing unexpected failures. |
| Usability | The user can be taken the benefits of the system and the user-friendliness. |

# 7 References


[1] Dr. T. Kameswara Rao1, Professor, Department of CSE,, "Skin Disease Detection Using Machine Learning," *IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES,* vol. 24, no. Skin Disease Detection, p. 12, 2012.

[2] Lior Shamir, John D. Delaney, Nikita Orlov, D. Mark Eckley, Ilya G. Goldberg*, "Pattern Recognition Software and Techniques for Biological Image Analysis," *PLoS Computational Biology,* vol. 7, no. 11, p. 10, 2010.

[3] s. Seema Kolkur 1, Dr. D.R. Kalbande 2, Dr. Vidya Kharkar 3, "Machine Learning Approaches to Multi-Class Human Skin Disease Detection," *International Journal of Computational Intelligence Research,* vol. 14, no. Skin Disease Detection, p. 12, 2018.

[4] Shuchi Bhadula, Sachin Sharma, Piyush Juyal, Chitransh Kulshrestha, "Machine Learning Algorithms based Skin Disease Detection," *Article in International Journal of Innovative Technology and Exploring Engineering · May 2020,* vol. 17, no. skin disease detection, p. 7, 2020.

[5] Damilola A. Okuboyejo, Oludayo O. Olugbara, and Solomon A. Odunaike, "Automating Skin Disease Diagnosis Using Image Classification," *roceedings of the World Congress on Engineering and Computer Science 2013 Vol II,* vol. 14, no. Automating Skin Disease Diagnosis, p. 5, 2013.

[6] J. Rodellar, S. Alférez, A. Acevedo, A. Molina, A. Merino, "Image processing and machine learning in the morphological analysis of blood cells," *International Journal of Laboratory Hematology,* vol. 40, no. 51, pp. 46-53, 2018.

[7] Batta Mahesh, "Machine Learning Algorithms - A Review," *International Journal of Science and Research (IJSR),* vol. 10, no. Machine Learning Algorithms, p. 7, 2018.

[8] B. Chitradevi1, P.Srimathi2,Asst. Professor, Dept. of Computer Science, Thanthai Hans Roever College, Perambalur, India1,Asst. Professor, Dept. of Computer Application, Thanthai Hans Roever College, Perambalur, India, "An Overview on Image Processing Techniques," *International Journal of Innovative Research in Computer,* vol. 2, no. 11, p. 7, 2014.

[9] M. MORGAN, R. McCREEDY, J. SIMPSON, R.J. HAY, "Dermatology quality of life scales –a measure of the impact of skin diseases," *British Journal of Dermatology,* vol. 136, p. 206, 1997.

[10] Nawal soliman ALKolifi ALEnezi-Department of Computer Science and Engineering, Umm AL-Qura University, Makkah, Saudi Arabia, "A Method Of Skin Disease Detection Using Image Processing And Machine Learning," *Procedia Computer Science,* vol. 163, pp. 85-92, 2019.