

A
Project Report

On

Protectoe

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Requirements for the award of the Degree of

MASTERS OF SCIENCE (INFORMATION TECHNOLOGY)

By

SHALINI SURYAPRAKASH GOUND

Masters of Science Part II
(Information Technology)

Under The Esteemed Guidance
Of
PROF. AKSHAY RIDLAN



DEPARTMENT OF INFORMATION TECHNOLOGY

(Affiliated to University of Mumbai)

GURU NANAK COLLEGE OF ARTS, SCIENCE AND COMMERCE
G.T.B NAGAR, MUMBAI: 400037

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(Affiliated to University of Mumbai)

MUMBAI-MAHARASHTRA-400037

DEPARTMENT OF INFORMATION TECHNOLOGY



CERTIFICATE

This is to certify that the project entitled, "**Protectoe**", is bonafide work of **MS. Shalini Suryaprakash Gound** bearing Seat. No: **3269662** submitted in partial fulfilment of the requirements for the award of degree of Master OF SCIENCE in INFORMATION TECHNOLOGY from University of Mumbai.

Internal Guide

Coordinator

External Examiner

Date:

College Seal

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PROTECTOE

ABSTRACT

There are various type of fungus in nails, some are very serious and some are normal. Serious one will last for so long, as a consequence we need to remove the entire nail of a finger as well as the cost to treat this kind of fungus is high. In the healthcare domain, early stage disease diagnosis is very important aspect which plays an important role during the identification of the cause of a disease.

There are different parts of human body is analyzed to predict disease at the early stage of disease diagnosis by observing symptoms with respect to color or pattern or other features. With the help of this software we can detect what type of disease is present on nail and take action accordingly at early stage.

The proposed software guides user to take decision in nail disease identification. The input to the proposed software application is person nail symptom. The system will process the data and use the model to identify the infection. Here, first training set data is prepared using the different symptoms of nail disease. With this application the user can make decisions easily and can prevent there nail from getting lost.

1. INTRODUCTION

1.1 INTRODUCTION

Protectoe help user to get the nail disease information from anywhere, without visiting the doctor instantly. This application will save user time and money to some extent also, user can cure the nail as early as possible.

This application is also capable of predicting type of nail infection and its risk level so that user can take action accordingly. User need to provide the symptom to know the type of nail infection and if they want to check the level of risk to know how much risk is there if they delay for any medication to save nail.

If the risk level is low they can follow some treatment to stop nail infection from getting spread all over the nail. If the risk level is high, user need to visit doctor immediately and get the surgery done if required as per doctor suggestion.

1.2 OBJECTIVES & SCOPE

The following are the objectives of Protectoe:

- To predict the type of nail infection from anywhere.
- To identify the risk level of nail disease.
- To give information on types of nail disease.
- To identify the type of treatment to go-through for identified nail disease.
- To know which doctor user can visit for there treatment.
- Protectoe can help us to achieve all our goals to predict nail infection and treatment that can cure the nail disease, so that user can regain their healthy and beautiful nail.

1.3 PURPOSE AND SCOPE

1.3.1 PURPOSE

The purpose of this application is to save human nail. Nails protect the sensitive tips of fingers and toes. We don't need our nails to survive, but they do support the tips of our fingers and toes, protect them from injury, and help us pick up small objects. Without them, we'd have a hard time scratching an itch or untying a knot.

Around 10% of the adult population suffers from nail fungus infection. Human not much took care of nail but when it catch nail infection and if not much taken care, it can spread to all over the nail and at last it need surgery to treat the infection. People don't visit doctor for such a small issue and hence can lead to loss of entire nail.

To avoid such issue and lose of our beautiful nail they can use this software to protect nail at early stage.

1.3.2 SCOPE

- To make simple User interface which can help users to identify the type of nail infection from anywhere
- To reduce the risk of losing finger or toe nail.
- To make the nail disease identification easier
- To check the type of doctor to visit.
- To get a good understanding of nail infection.
- This application also provide the health tips for good health.

2. SYSTEM ANALYSIS

2.1 IDENTIFICATION OF NEED

The hard surface of your nails helps to protect the tips of your fingers and toes. And your fingernails make it easier to scratch an itch or remove a dog hair from your sweater. Nails themselves are made of keratin. Toenail fungus is a common infection of the toenails. Also known as onychomycosis, it can cause the toenail to discolor and thicken. As it is contagious, it often starts in one toenail and spreads to several others. As a result, people may consider home remedies to treat toenail fungus.

However, home remedies are often not effective. While they may help suppress mild cases, they are unlikely to prevent infections. Instead, people may consider trying certain remedies alongside prescription antifungal treatments. This kind of issue stay for long time.

2.2 Preliminary Investigation

Hardware resources would require for using Protectoe as follow:

- Computer Embedded with Minimum 8gb of RAM on top of the hardware any operating system supporting latest version of python, Browser, Jupiter notebook for Testing the functionality. If user wants to compare huge datasets than may require of Larger RAM for fast computation.

2.3 FEASIBILITY STUDY

2.3.1 EXISTING SYSTEM

There are different ways of disease diagnosis such as through various tests (blood test etc..) and symptom's available on various parts of body guides toward disease diagnosis patient should wait for the report to analyse the problem. People need to visit doctor for consultation then they need to go for a treatment to some other doctor for surgery/treatment for identified infection.

2.3.2 PROPOSED SYSTEM

The main objective of this system design to provide an application for use in healthcare domain this is advantages in terms of cost and time. The proposed system will take nail symptom as an input and will perform some processing on input details then finally it will predict probable type of nail infection, this system can be used by people who wants to know the type of infection without visiting doctor at first place.

Protectoe will guide people whether to take medication or must visit particular doctor for surgery or any other treatment.

2.3.3 Technical Feasibility Study

Various Cloud Platform are available that supports python and different python libraries like pandas, NumPy, flask, sklearn etc. To accomplish the tasks, local system is selected but we can use Google Colab cloud platform.

2.3.4 Economical Feasibility Study

Cloud platform (Google Colab) available to use its free and give good resource to run the application. If local system has 8 Gb RAM than Local system is best suited.

2.3.5 Legal Feasibility Study

All the documents are available for Python and for its libraries that are used in Protectoe. These libraries get frequent updates and release.

2.3.6 Operational Feasibility Study

Protectoe able to provide you better solution to identify the type of nail infection and its risk. It works on any operating system that have Python Installed.

2.4 Project Planning

SR	TASK NAME	Duration	Start Time	End Time
System Analysis	Identification of need	10	10-Oct	20-Oct
	Preliminary Investigation	14	21-Oct	04-Nov
	Feasibility study	15	01-Nov	16-Nov
	Software Requirement Specification	14	28-Oct	11-Nov
Review of Literature	Paper Study	20	10-Nov	30-Nov
Design & Coding	Different source and sink Research & Implementation	59	10-Jan	10-Mar
Testing	Unit Testing	14	11-Mar	25-Mar
Deployment	Application GUI	30	20-Mar	19-Apr

Table 1. Project Planning

2.5 Project Scheduling

Gantt Chart

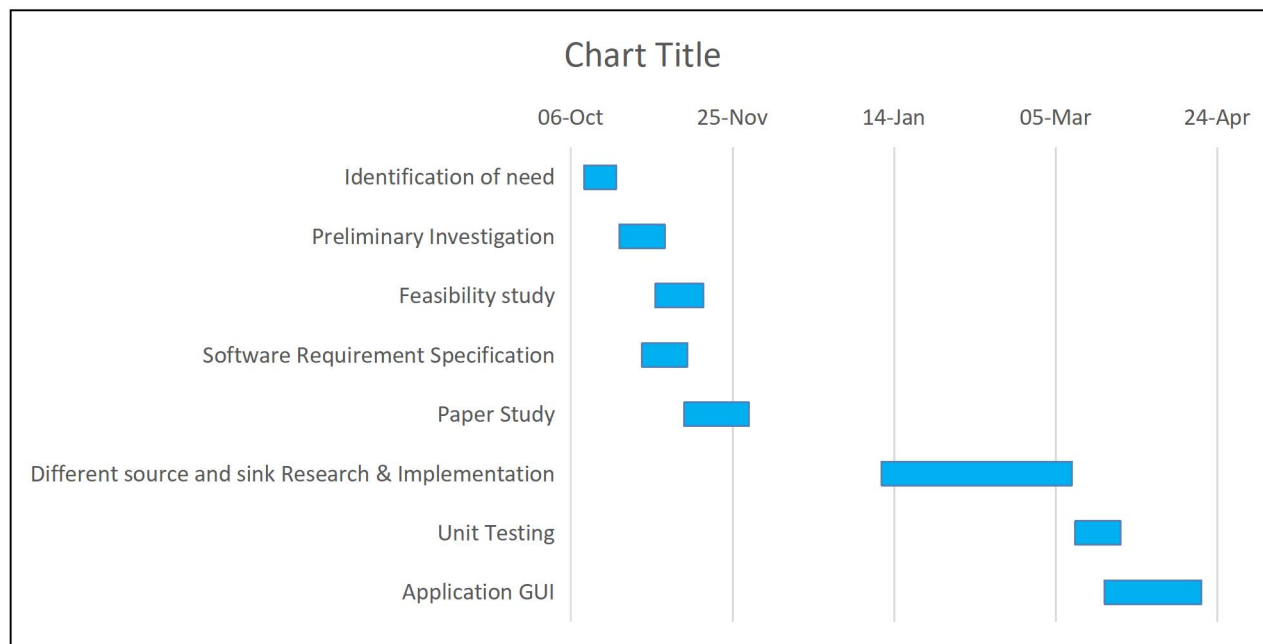


Figure 1. Gantt Chart

PERT CHART

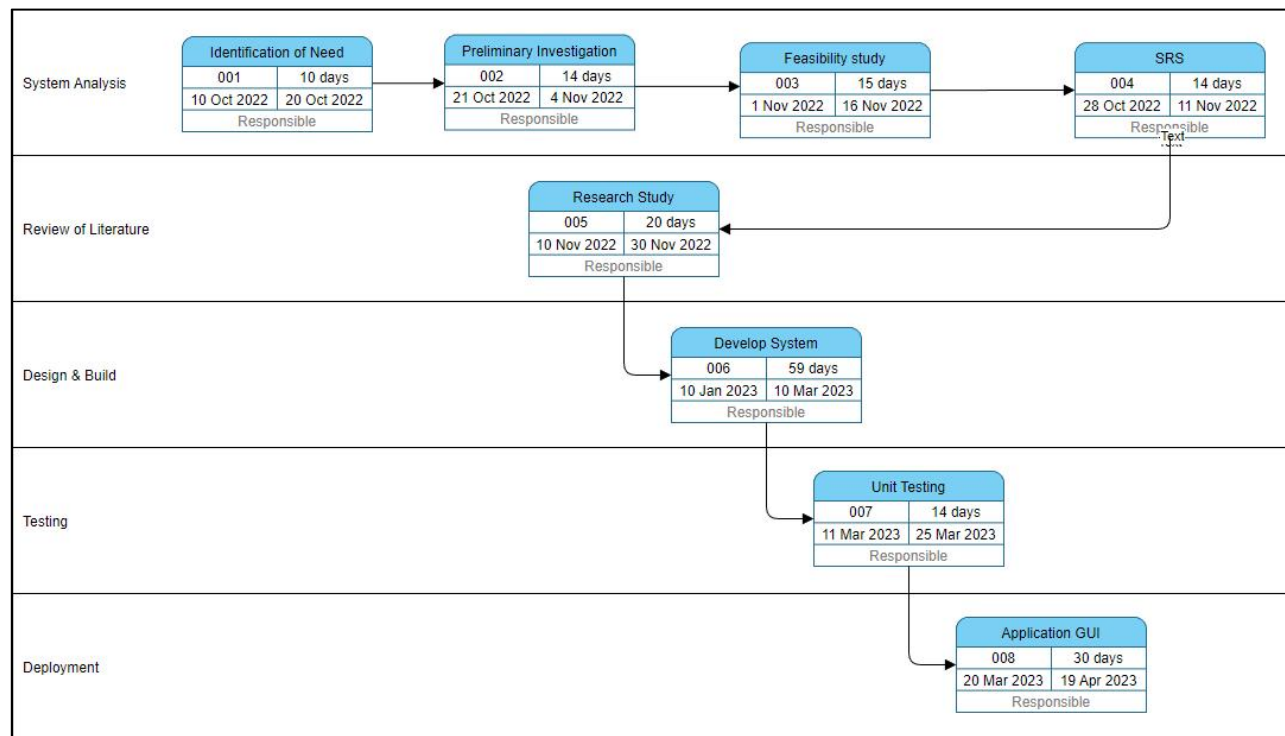


Figure 2. Pert Chart

2.6. SOFTWARE SPECIFICATION

2.6.1 FUNCTIONAL REQUIREMENTS

Protectoe is purely associated as a Nail disease identification. The nail features such as color, shape and texture used to predict diseases. Different classification techniques such as SVM classifier, KNN classifier, ANN classification used to classify the nail disease prediction. K-Nearest Neighbor samples are classified based on the class of their nearest neighbor from the training instances, distance metric is calculated each time. Store all training data to classify new points. Choose K using cross validation

Protectoe uses KNN algorithm to ensure the type of nail infection identified successfully. It provide the output based on nearest matching symptom and the information stored in data set file by using KNN model.

2.6.2 NON-FUNCTIONAL REQUIREMENTS

2.6.2.1 PERFORMANCE

Protectoe is a application where users can identify the nail disease easily without visiting doctor's clinic. This application is purely based on the Python, Flask and HTML web framework. The overall performance of the system depends on the system configuration. It works on the web and provides the predicted nail disease and risk associated with that.

2.6.2.2 SCALABILITY

This Product is scalable and can be used in different operating systems which supports python and other libraries. This application can run of any browser. For further enhancement there will be more strategies and methods implemented in the future to get more in Protectoe.

2.6.2.3 SECURITY

The security part of this system depends on the config file encryption and cryptography can also be implemented into the system depends on the security of the users.

2.7 Cost benefit analysis

The Characteristics and level for the estimation of Protectoe training:

Characteristics	Level
Complexity	high
Runtime Performance Constraint	Nominal
Domain Experience	high
Programming Capability	high
Memory Constraint	Nominal
Use of Software tools	low

Table 2. EAF for Protectoe

Effort Adjustment factor of Protectoe = $(1 * 1.15 * 1 * 0.91 * 0.95 * 1 * 1.10) = 1.1$

Effort for Protectoe = $(3.0 (0.4)^{1.12}) * \text{Effort Adjustment factor of Protectoe Tool}$
= 1.2 Person Month

Project Duration = 2.7 Calendar Months

Staffing = 1 person

3. REVIEW OF LITERATURE

Many people don't focus on nail. As a result, they ignore visiting doctor for such small issue. These small issues become big if they don't take into consideration at early stage, Hence start to spread all over the nail and sometime loss of the beautiful nail. Nail fungus is a common infection of the nail. It begins as a white or yellow-brown spot under the tip of your fingernail or toenail. As the fungal infection goes deeper, the nail may discolor, thicken and crumble at the edge. Nail fungus can affect several nails.

If your condition is mild and not bothering you, you may not need treatment. If your nail fungus is painful and has caused thickened nails, self-care steps and medications may help. But even if treatment is successful, nail fungus often comes back. The most prevalent predisposing risk factor for developing onychomycosis is advanced age. It is obvious that people are still bothered by their fungal toenail infections and are determined to get rid of them. Unfortunately, this is easier said than done.

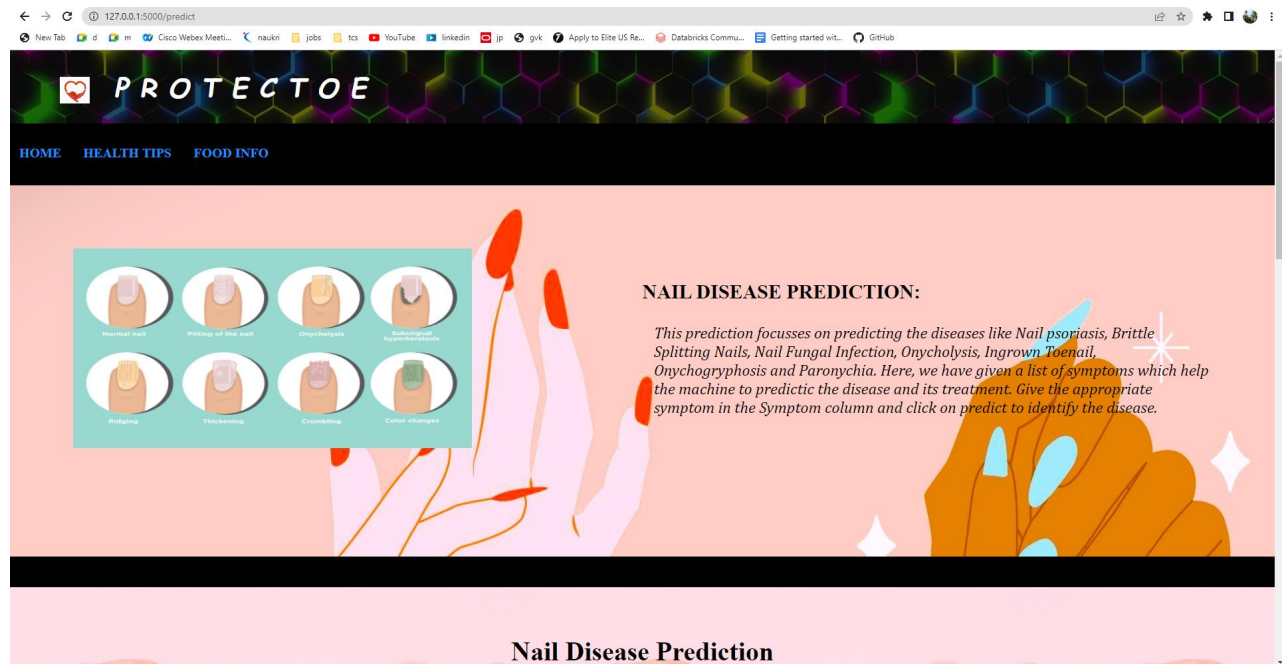
To successfully cure toenail onychomycosis requires long treatment duration that may extend to a full year. Even then, complete cure, defined as clinical cure (implying nail clearing) plus mythological cure (both negative microscopy and dermatophyte culture), is often unattainable With the help of Protectoe, they can avoid such issue and get the information at home and take necessary action cost-effectively.

4. DESIGN

Protectoe is simple to use. User need to follow the link and they can get the home page where they can get various options to do. We are taking symptom from user and the model predict the type of nail infection based on training data. Also, Protectoe can give the risk level based on user input. This application provide the health tips and disease, doctor information as well.

If user want to visit the doctor for particular disease they can book an appointment by clicking on the link.

User interface :



DATA FLOW DIAGRAM

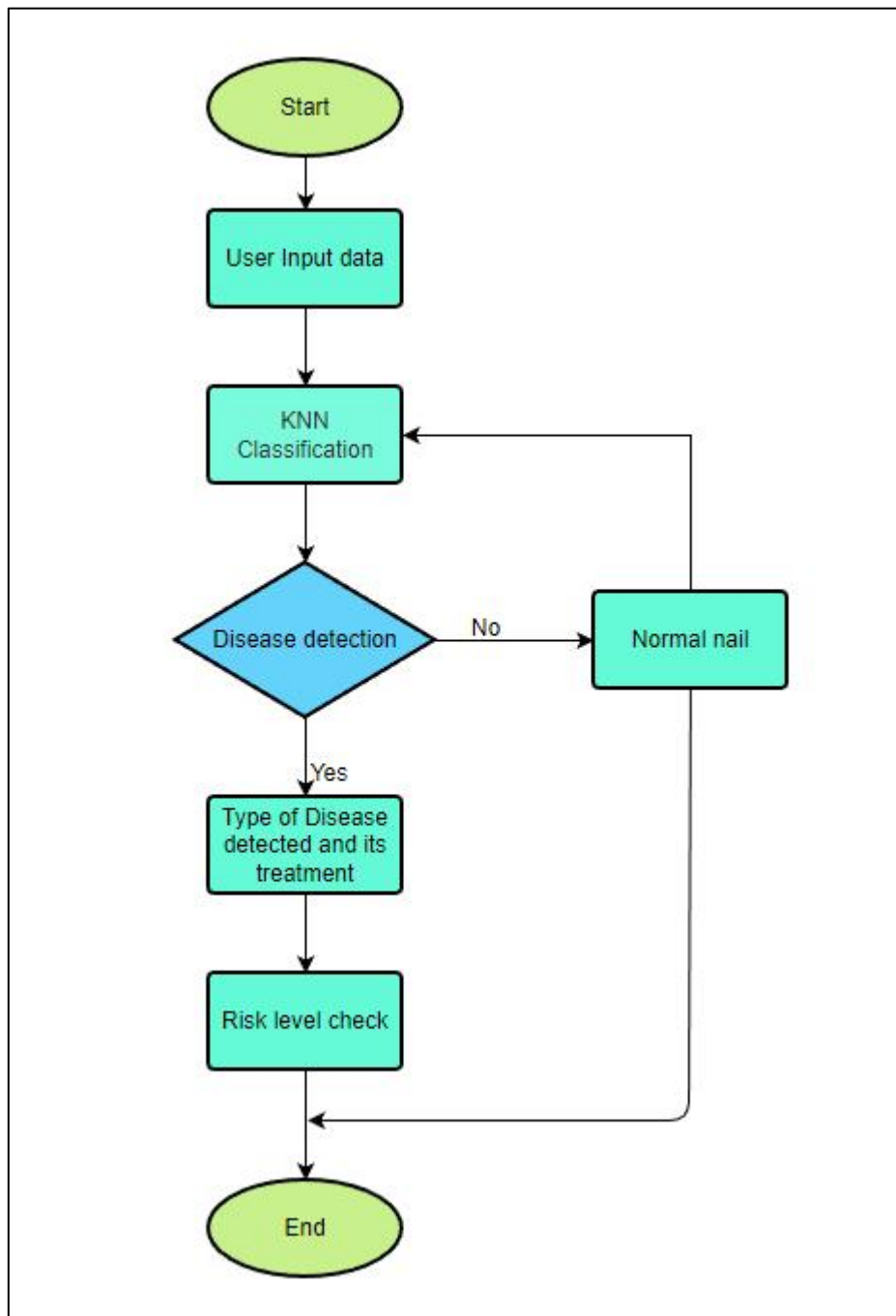
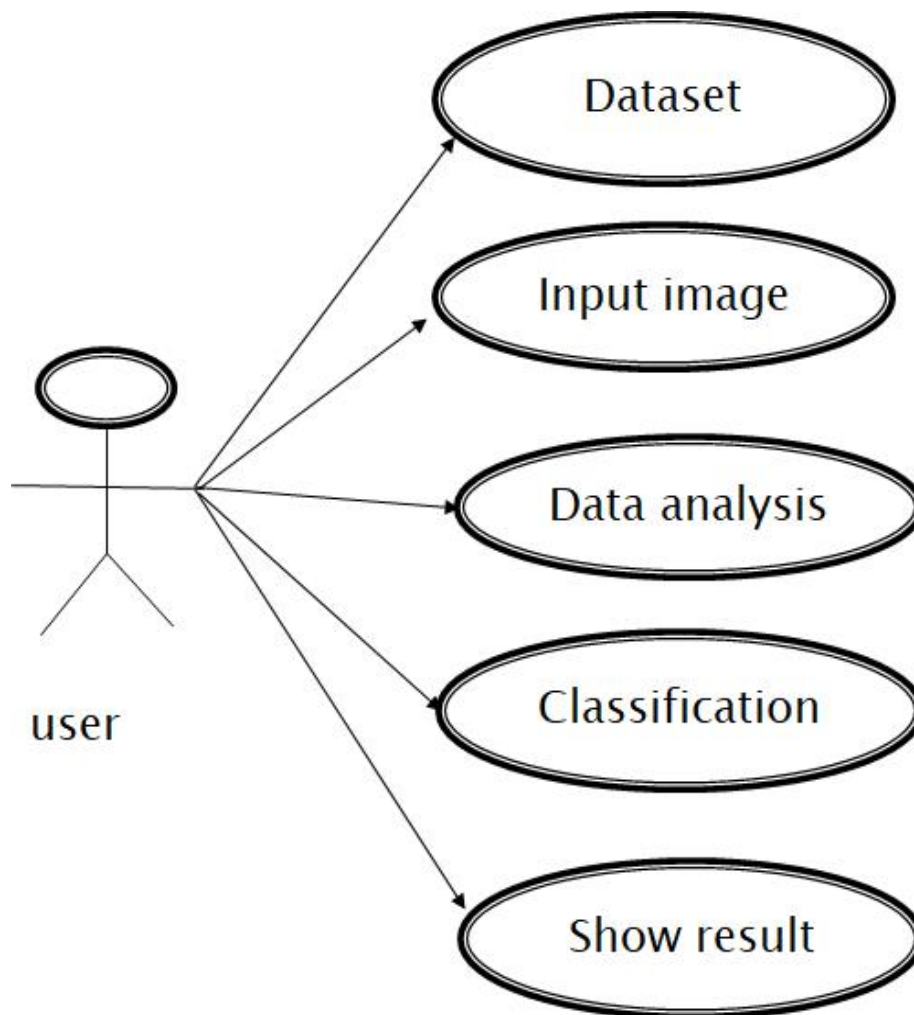


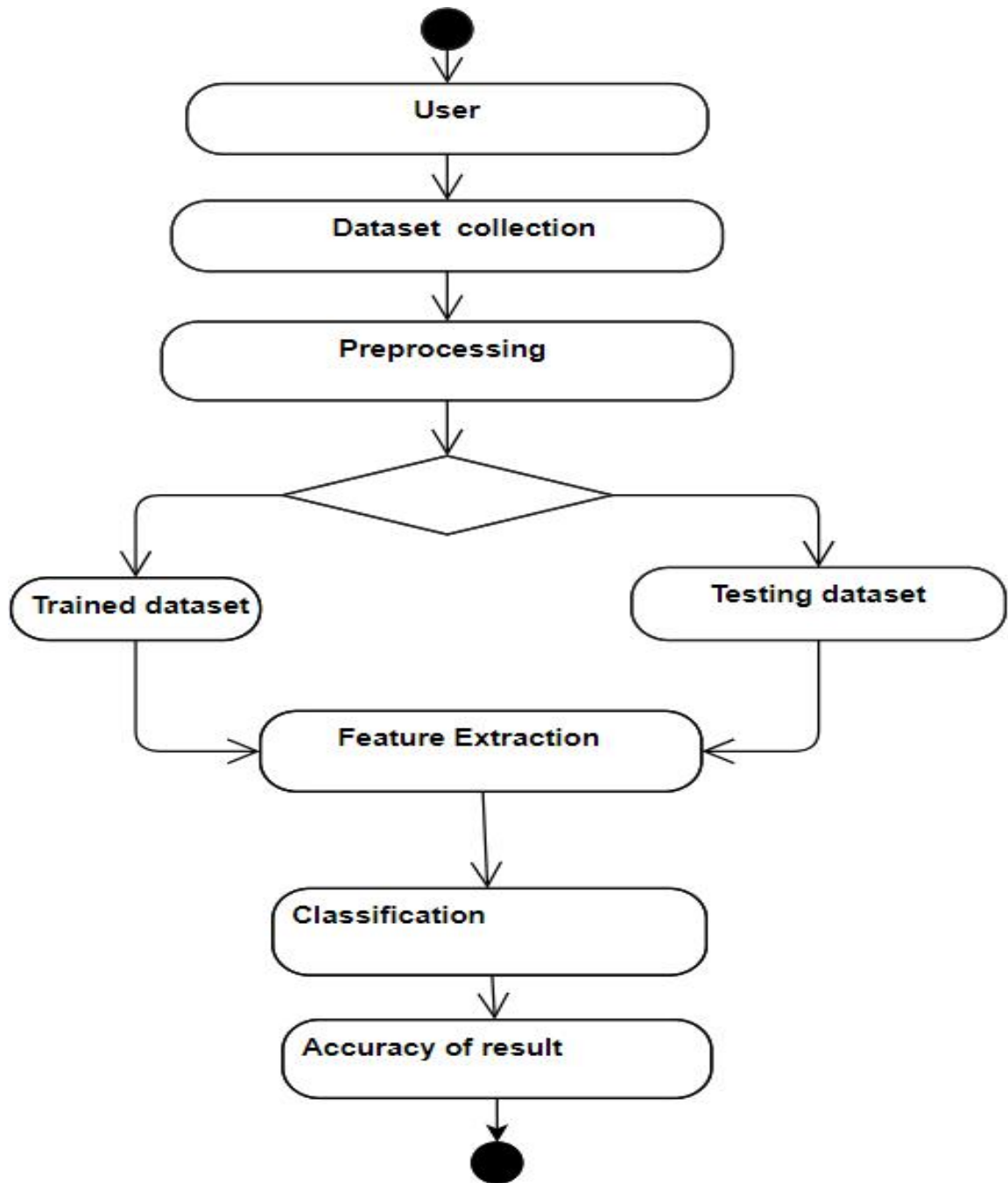
Figure 3. Project flow

UML Diagram:

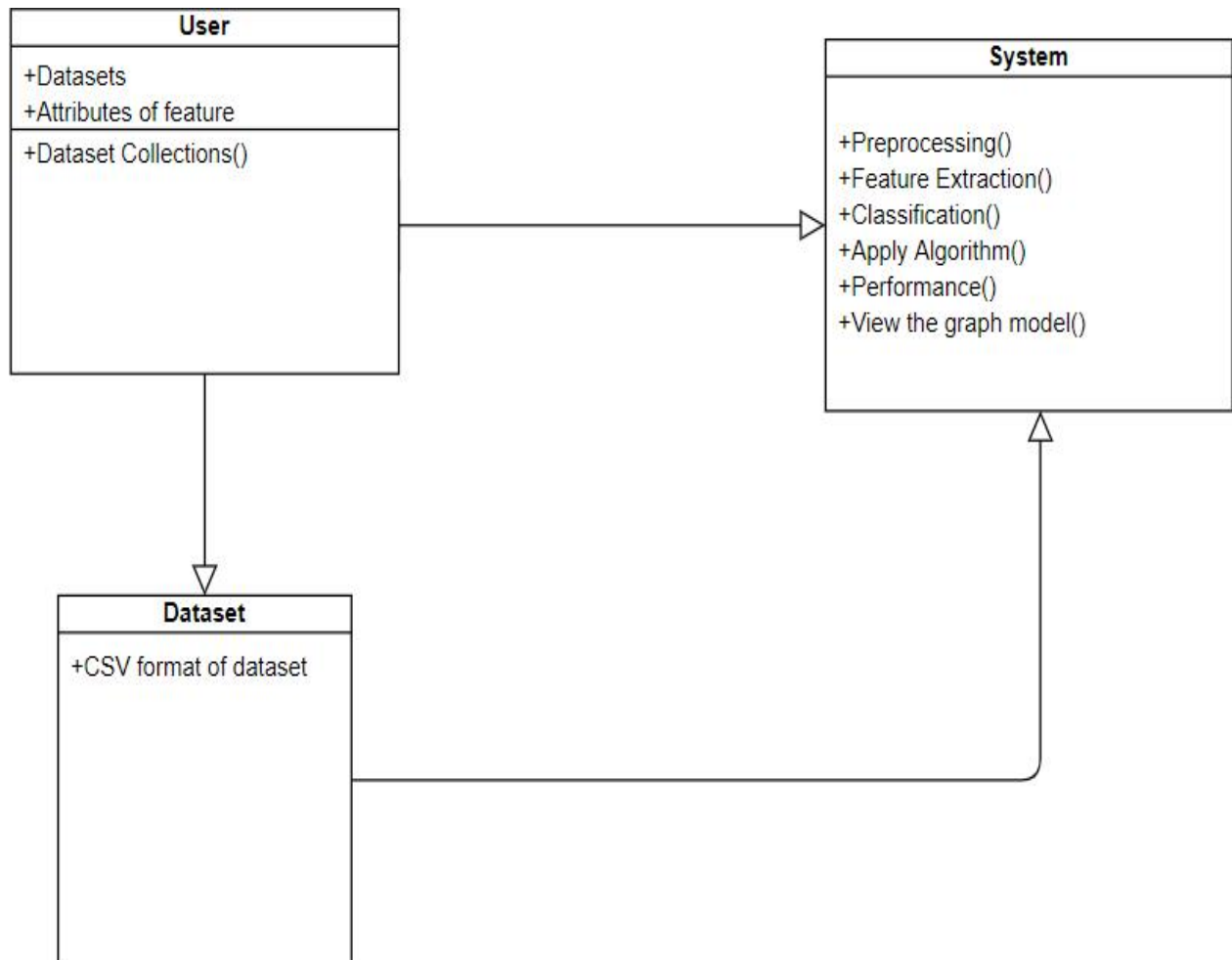
Use Case Diagram



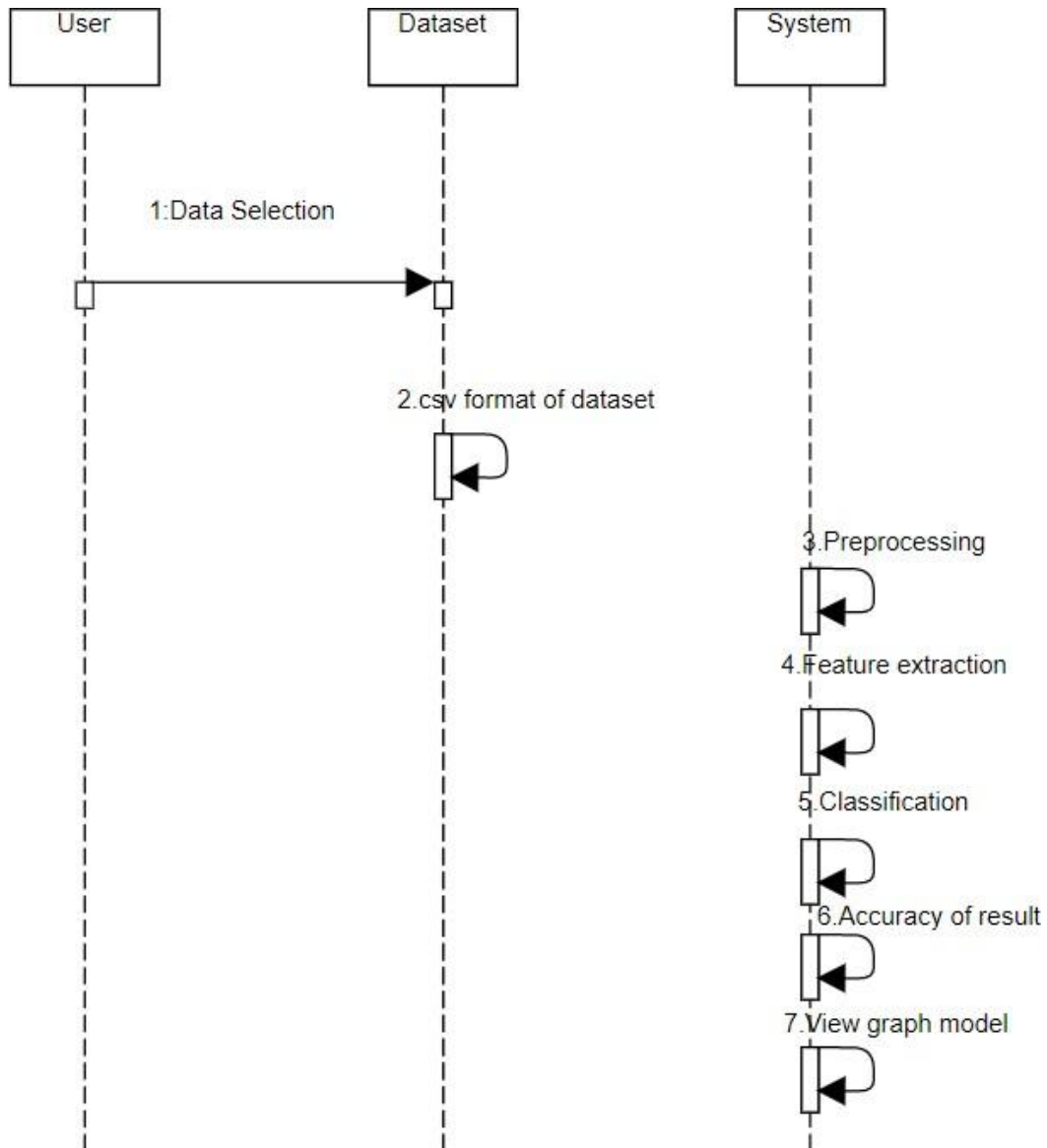
Activity Diagram:



Class Diagram



Sequence Diagram:



5. EVALUATION

Training Data:

SYMPTOM 1	SYMPTOM 2	SYMPTOM 3	DISEASE	TREATMENT
Crumbling Nail	Pitting	Change in color,Blood under the nails	Nail psoriasis	Strong Corticosteroids,injection of Corticosteroids and laser treatment
Crumbling Nail	Change in color,Blood under the nails	Pitting	Nail psoriasis	Strong Corticosteroids,injection of Corticosteroids and laser treatment
Crumbling Nail	Pitting	The nail separates from the bed	Nail psoriasis	Strong Corticosteroids,injection of Corticosteroids and laser treatment
Pitting	Crumbling Nail	Change in color,Blood under the nails	Nail psoriasis	Strong Corticosteroids,injection of Corticosteroids and laser treatment
Pitting	Change in color,Blood under the nails	Crumbling Nail	Nail psoriasis	Strong Corticosteroids,injection of Corticosteroids and laser treatment
Pitting	Crumbling Nail	The nail separates from the bed	Nail psoriasis	Strong Corticosteroids,injection of Corticosteroids and laser treatment
Change in color,Blood under the nails	Crumbling Nail	Pitting	Nail psoriasis	Strong Corticosteroids,injection of Corticosteroids and laser treatment
Change in color,Blood under the nails	Pitting	Crumbling Nail	Nail psoriasis	Strong Corticosteroids,injection of Corticosteroids and laser treatment
Change in color,Blood under the nails	Crumbling Nail	The nail separates from the bed	Nail psoriasis	Strong Corticosteroids,injection of Corticosteroids and laser treatment
The nail separates from the bed	Pitting	Crumbling Nail	Nail psoriasis	Strong Corticosteroids,injection of Corticosteroids and laser treatment
The nail separates from the bed	Crumbling Nail	Pitting	Nail psoriasis	Strong Corticosteroids,injection of Corticosteroids and laser treatment
The nail separates from the bed	Change in color,Blood under the nails	Crumbling Nail	Nail psoriasis	Strong Corticosteroids,injection of Corticosteroids and laser treatment

Nail breaks easily	Drying the nails	Typically affects only finger nail	Brittle Splitting Nails	Moisturizer
Nail breaks easily	Affects both finger nail and toe nail	Typically affects only finger nail	Brittle Splitting Nails	Moisturizer
Nail breaks easily	Affects both finger nail and toe nail	Drying the nails	Brittle Splitting Nails	Moisturizer
Affects both finger nail and toe nail	Nail breaks easily	Drying the nails	Brittle Splitting Nails	Moisturizer
Affects both finger nail and toe nail	Drying the nails	Nail breaks easily	Brittle Splitting Nails	Moisturizer
Affects both finger nail and toe nail	Nail breaks easily	Typically affects only finger nail	Brittle Splitting Nails	Moisturizer
Drying the nails	Affects both finger nail and toe nail	Nail breaks easily	Brittle Splitting Nails	Moisturizer
Drying the nails	Nail breaks easily	Affects both finger nail and toe nail	Brittle Splitting Nails	Moisturizer
Drying the nails	Affects both finger nail and toe nail	Typically affects only finger nail	Brittle Splitting Nails	Moisturizer
Typically affects only finger nail	Affects both finger nail and toe nail	Nail breaks easily	Brittle Splitting Nails	Moisturizer
Typically affects only finger nail	Nail breaks easily	Affects both finger nail and toe nail	Brittle Splitting Nails	Moisturizer
Typically affects only finger nail	Affects both finger nail and toe nail	Drying the nails	Brittle Splitting Nails	Moisturizer
Thick Nail	Discolored nail that are brown,yellow,white	Fragile and cracked nail	Nail Fungal Infection	Antifungal Medication
Thick Nail	Fragile and cracked nail	Discolored nail that are brown,yellow,white	Nail Fungal Infection	Antifungal Medication
Discolored nail that are brown,yellow,white	Fragile and cracked nail	Thick Nail	Nail Fungal Infection	Antifungal Medication
The nail separates from the bed	Discoloration of nail yellow,green or opaque	Nail pitting,Nail thickening	Onycholysis	Treating psoriasis with oral
The nail separates from the bed	Nail pitting,Nail thickening	Discoloration of nail yellow,green or opaque	Onycholysis	Treating psoriasis with oral

The nail separates from the bed	Discoloration of nail yellow,green or opaque	Bending of nail edges	Onycholysis	Treating psoriasis with oral
Discoloration of nail yellow,green or opaque	The nail separates from the bed	Nail pitting,Nail thickening	Onycholysis	Treating psoriasis with oral
Discoloration of nail yellow,green or opaque	Nail pitting,Nail thickening	The nail separates from the bed	Onycholysis	Treating psoriasis with oral
Discoloration of nail yellow,green or opaque	The nail separates from the bed	Bending of nail edges	Onycholysis	Treating psoriasis with oral
Nail pitting,Nail thickening	The nail separates from the bed	Discoloration of nail yellow,green or opaque	Onycholysis	Treating psoriasis with oral
Nail pitting,Nail thickening	Discoloration of nail yellow,green or opaque	The nail separates from the bed	Onycholysis	Treating psoriasis with oral
Bending of nail edges	Discoloration of nail yellow,green or opaque	The nail separates from the bed	Onycholysis	Treating psoriasis with oral
Bending of nail edges	The nail separates from the bed	Discoloration of nail yellow,green or opaque	Onycholysis	Treating psoriasis with oral
Bending of nail edges	Nail pitting,Nail thickening	Discoloration of nail yellow,green or opaque	Onycholysis	Treating psoriasis with oral
Swelling,Tenderness	Redness,soreness	Pus	Ingrown Toenail	Surgery
Swelling,Tenderness	Pus	Redness,soreness	Ingrown Toenail	Surgery
Redness,soreness	Pus	Swelling,Tenderness	Ingrown Toenail	Surgery
Circulation issues	Genetics,Injury	Ichthyosis	Onychogryphosis	Podiatrist or Dermatologist
Ichthyosis	Genetics,Injury	Circulation issues	Onychogryphosis	Podiatrist or Dermatologist
Swelling	Pain,redness	Fever and gland pain	Paronychia	Tropical or oral antibiotics,corticosteroids
Swelling	Fever and gland pain	Pain,redness	Paronychia	Tropical or oral antibiotics,corticosteroids
Yellow pus	Pain,redness	Swelling	Paronychia	Tropical or oral antibiotics,corticosteroids

Protectoe uses kNN Algorithm to predict nail Disease.

The kNN algorithm is a supervised machine learning model. That means it predicts a target variable using one or multiple independent variables.

There are multiple ways of evaluating models, but the most common one is the train-test split. When using a train-test split for model evaluation, you split the dataset into two parts:

1. Training data is used to fit the model. For kNN, this means that the training data will be used as neighbors.
2. Test data is used to evaluate the model. It means that you'll make predictions of each of the disease in the test data and compare those results to the known true disease.

You can split the data into training and test sets in Python using scikit-learn's built-in `train_test_split()`. Also, We can use Matplotlib to see the graphical representation of the best matched data.

6. RESULTS

The result will be the nail disease prediction based on symptoms provided by user. Also they can get risk level and accuracy of prediction. User can take necessary decision based on result and take necessary step to stop the infection and save the nail from getting into worst condition.

In addition, User can book an appointment with the doctor and may visit the clinic. User can also get various details like disease information, Healthy food information, Healthy tips.

7. CONCLUSION & SUGGESTIONS

8.1. Conclusion

Protectoe is used to predict the type of nail infection from anywhere and to identify the risk level of nail disease. It can also give information on types of nail disease. It provides the type of treatment to go-through for identified nail disease and which doctor you can visit for their treatment. Protectoe can help us to achieve all our goals to predict nail infection and treatment that can cure the nail disease, so that user can regain their healthy and beautiful nail.

It needs a little more analysis and research to identify accurate information on the type of nail infection, for a human being, it may be difficult and challenging to handle so much data and study it. Protectoe can help to reduce the efforts for effective results. Secondly, It will create a better environment for the people and will help them to identify and save their nail.

8.2 Future Work

For the future of this product, I will be implementing and researching about more methods and strategies to get the disease identification and risk level information more helpful and powerful.

More methodology, approaches and result oriented methods will be added. Combine different prediction model for more accuracy and can include more number of disease prediction. All other disease prediction and other strong research will be done to make prediction easier and helpful.

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<https://www.lybrate.com/mumbai/treatment-for-nail-infection>
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Continuing Medical Education

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