

Empowering Hair Health with Intelligent Hair Disease Detection Systems (Hair Diary)

TMP-23-154



- Supervisor - Ms. Lokesha Weerasinghe
- Co-Supervisor - Ms. Thamali Dassanayake
- External – Supervisor - Dr. Mallika Hewawitharana



Group Details

STUDENT NAME

Wickramarathma D.G.N.L

STUDENT ID

IT20154158

Nanayakkara V.G

IT20159580

Bandaranayake V.R.W

IT20232290

Alahakoon D.Y.R

IT20129026



Introduction



This research topic explores the use of intelligent hair disease management systems to empower hair health. These systems utilize machine learning to accurately diagnose hair diseases and develop personalized treatment plans for patients. The main objectives of this research include identifying common hair diseases, developing intelligent systems for diagnosis, creating personalized treatment plans, monitoring treatment outcomes, and improving patient education. The ultimate goal is to improve the accuracy and effectiveness of hair disease diagnosis and treatment, reduce the healthcare burden, and enhance patients' quality of life.



Research Problem

- High cost of full hair diseases analysis.
- Lack of awareness of hair diseases information
- Inability to identify what hair disease is due to the inherent characteristics of different hair diseases.
- Not being able to identify the necessary treatment in a way that does not damage the hair.



Main Objectives

The main objective of "Empowering Hair Health with Intelligent Hair Disease Management Systems" research is to identify, understand, and develop effective treatments for various hair and scalp disorders that affect human beings. All are doing in mobile application through.

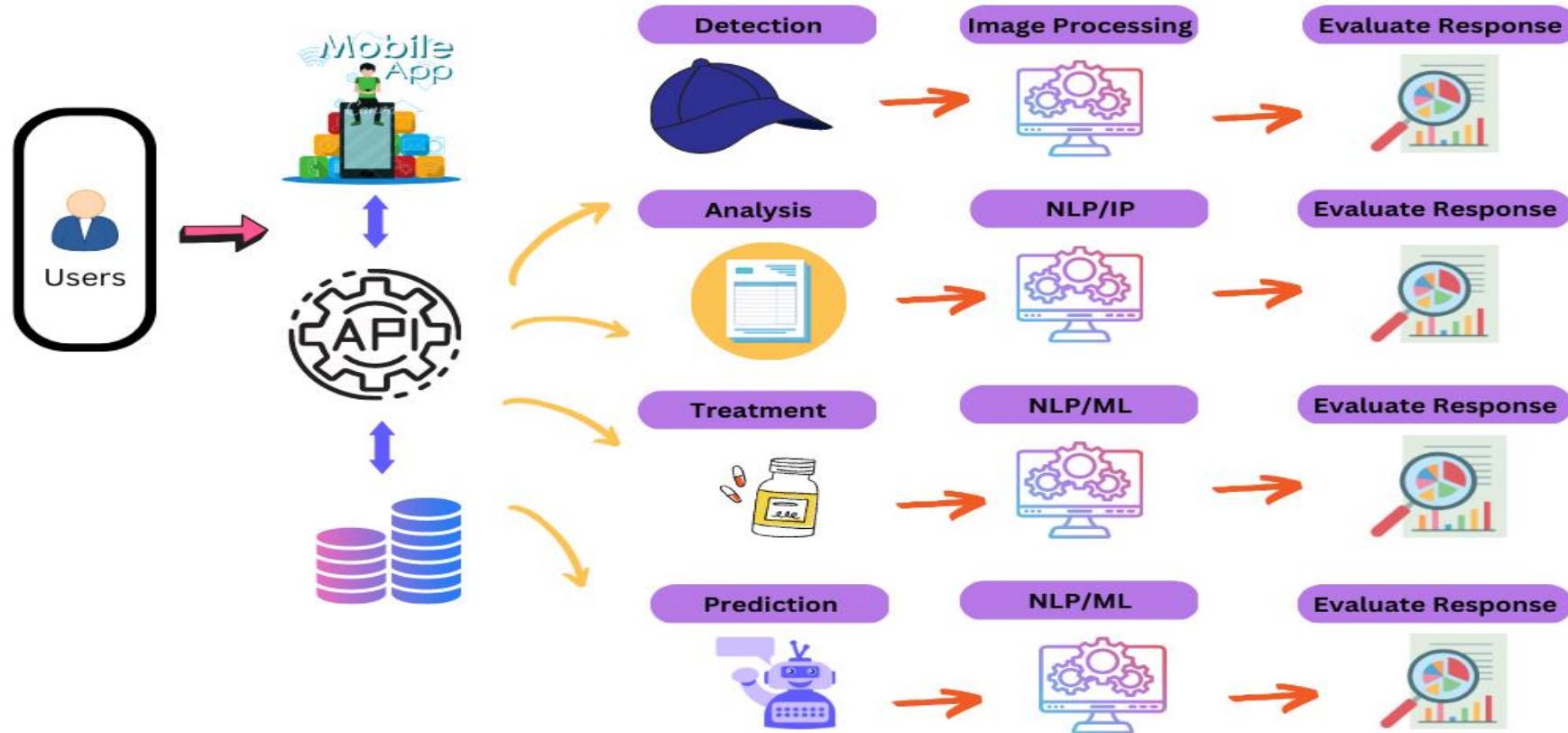


Sub Objectives

- Extracting patient prescription data using easyOCR and Analyzing those data using NLP.
- Hair Disease Treatment Recommendations for using Machine Learning-based Model.
- Predicting Hair Diseases through Patient History and Symptom-Based Predictive Modeling and recommend doctor.
- Automatic hair scratch and hair losing detection using IOT device with machine learning.



System Diagram





IT20154158 | D.G.N.L.WICKRAMARATHNA

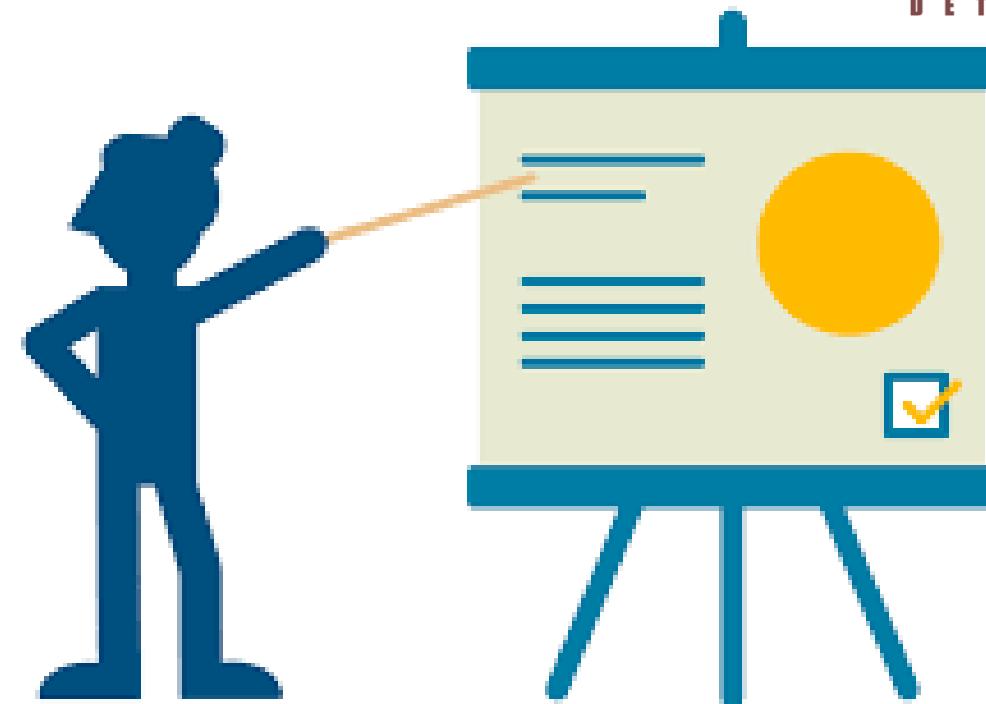
Specialize in Information Technology

Extracting patient prescription data using easyOCR and Analyzing those data using NLP.



Introduction

- Background
- Research Problem
- Research Gap
- Main Objective
- Sub Objectives



Background



- How to extract patient prescription data and analyzing those data.
- How to set the reminders for take medicine and next the doctor meeting time according extracted patient prescription.

Research Problem



- Accuracy and Reliability of OCR.
- Extraction of Relevant Information in patient prescription.
- NLP Analysis and Understanding.



Research Gap



- Domain-specific focus : Prescription documents have their own specific terminology, abbreviations, and formats. Designing OCR and NLP approaches tailored to this domain requires understanding and handling these unique aspects.
- Integration of OCR and NLP: While OCR and NLP are individual research areas, combining them to process prescription data introduces a novel integration. OCR enables the extraction of textual information from prescription documents, while NLP techniques provide the means to analyze and derive insights from the extracted data.



Main Objective



- Extract patient prescription data using easyOCR.
- Analyzing the patient's report using NLP.



Sub Objective

- Extract patient prescription data using easyOCR.
- Analyzing the patient's report using NLP.



Current progress (50%)

- Extracting prescription data -Completed

§ Import packages and install easyOCR

```
In [ ]: import torch
         from torch import nn
         import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt

         from torchvision import transforms
         import torchvision
         from torch.utils.data import Dataset
         from torch.utils.data import DataLoader
         from torchvision import datasets

         from tqdm.auto import tqdm
         import sklearn
         from sklearn.model_selection import train_test_split
```

```
In [ ]: !pip install easyOCR -q
```

```
In [ ]: import easyocr
```

- Current progress (50%)

§import easyOCR and read the data in English language

```
In [ ]: import easyocr
```

```
In [ ]: image_path="prescription_1.png"
ocr=easyocr.Reader(["en"])
results=(ocr.readtext(image_path))
```

- Current progress (50%)

- Show data read

```
▶ ▾ results
[5] Python
...
[[[[191, 68], [599, 68], [599, 105], [191, 105]],
  'PRESCRIPTION TEMPLATE',
  0.886196844894186),
 ([[107, 153], [215, 153], [215, 169], [107, 169]],
  'Prescription No_',
  0.9591512510611125),
 ([[399, 152], [519, 152], [519, 169], [399, 169]],
  'Prescription Date',
  0.7824227455985134),
 ([[105, 175], [141, 175], [141, 193], [105, 193]], '0001', 0.990249752998352),
 ([[397, 175], [525, 175], [525, 195], [397, 195]],
  'November 8, 2021',
  0.7324017845895405),
 ([[107, 221], [255, 221], [255, 237], [107, 237]],
  'Patient Information',
  0.7846285586878028),
 ([[107, 257], [151, 257], [151, 271], [107, 271]],
  'Name',
  0.9999961853027344),
 ([[399, 257], [427, 257], [427, 275], [399, 275]], 'Age', 0.9999690974075516),
 ([[107, 281], [197, 281], [197, 297], [107, 297]],
  'Anne Burton',
```

• Current progress (50%)

• Set an array using data read

```
In [ ]: array=np.array(results)
```

```
<ipython-input-19-e274a33d38e7>:1: VisibleDeprecationWarning: Creating an ndarray from ragged nested sequences (which is a list-or-tuple of lists-or-tuples-or ndarrays with different lengths or shapes) is deprecated. If you meant to do this, you must specify 'dtype=object' when creating the ndarray.
array=np.array(results)
```

```
In [ ]: array[:,1]
```

```
Out[ ]: array(['PRESCRIPTION TEMPLATE', 'Prescription No_', 'Prescription Date',
 '0001', 'November 8, 2021', 'Patient Information', 'Name', 'Age',
 'Anne Burton', 'Phone Number', 'Date of Birth', '(123) 123-4567',
 'Wednesday; November 8, 1989', 'Email', 'Gender',
 'anne burton@noemailtestcom', 'Female', 'Address',
 '1372 Payne Street', 'Richlands; VA; 24641', 'Allergies',
 'Notable Health Condition', 'Seafood', 'None',
 'List of Prescribed Medications', 'Medication Name', 'Purpose',
 'Dosage', 'Route', 'Frequency', 'Removes', 'Expectorant', 'tablet',
 'Oral', 'Every', 'hours', 'phlegm', 'Paracetamol', 'For fever',
 'tablet', 'Oral', 'Every', 'hours', 'Bacterial', 'Anti-biotic',
 'Oral', 'Every 8 hours', 'infection', 'Vitamin', 'Immune system',
 'Oral', 'Once', 'day', 'Vitamin D', 'Immune System', 'tablet',
 'Oral', 'Once', 'Physician Name', 'Physician Phone Number',
 'Leslie Holden', '(112) 312-3456', 'Physician Signature',
 'Physician Email', 'leslie h@noemail com', 'November 9, 2021',
 'soomg', 'soomg', 'day'], dtype=object)
```

• Dataset

- We choose 5 diseases to find data set

- Head Lice
- Alopecia Areata
- Telogen Effluvium
- Tinea Capitis
- Folliculitis

					Dr. H. D. Abeyasirigunawardana RMO S. L. M. C. Reg. No. 2846 Tel : 0716534445
Name: U.G.Samanthi Id: 040 Age: 7 Sex: Female Allergy: None Notable Condition: None	Name: Y.N.Nirmal Id: 049 Age: 37 Sex: Male Allergy: Allergic to penicillin Notable Condition: Hypertension	Name: K.K.Sureshmi Id: 048 Age: 27 Sex: Female Allergy: None Notable Condition: None	Name: J.K.layanga Id: 047 Age: 33 Sex: Male Allergy: None Notable Condition: None	Name: D.K. Kamali Id: 013 Age: 12 Sex: Female Allergy: None Notable Condition: None	Disease : Head Lice Severity : Severe Duration : 6 weeks Treatment Period : 4 week Treatment_Medicine : 01. Lindane shampoo Dosage Apply to wet hair and scalp, leave on for 4 minutes, then rinse thoroughly
Disease: Tinea Capitis Severity: Mild Duration : 4 weeks Treatment Period : 2 weeks Treatment_Medicine : 01. Miconazole powder	Disease: Folliculitis Severity: Moderate Duration : 4 weeks Treatment Period : 4 weeks Treatment_Medicine : 01. Oral antibiotics (Erythromycin)	Disease: Folliculitis Severity: Mild Duration : 2 weeks Treatment Period : 1 weeks Treatment_Medicine : 01. Salicylic acid cleanser	Disease: Folliculitis Severity: Severe Duration : 6 weeks Treatment Period : 4 weeks Treatment_Medicine : 01. Oral antibiotics (Doxycycline)	Disease: Folliculitis Severity: Severe Duration : 6 weeks Treatment Period : 4 week Treatment_Medicine : 01. Lindane shampoo	02. 03.
02.	02.	02.	02.	02.	03.
11/1,Arachchikanda, Hikkaduwa.	11/1,Arachchikanda, Hikkaduwa.	11/1,Arachchikanda, Hikkaduwa.	11/1,Arachchikanda, Hikkaduwa.	11/1,Arachchikanda, Hikkaduwa.	20.05.2023 Date

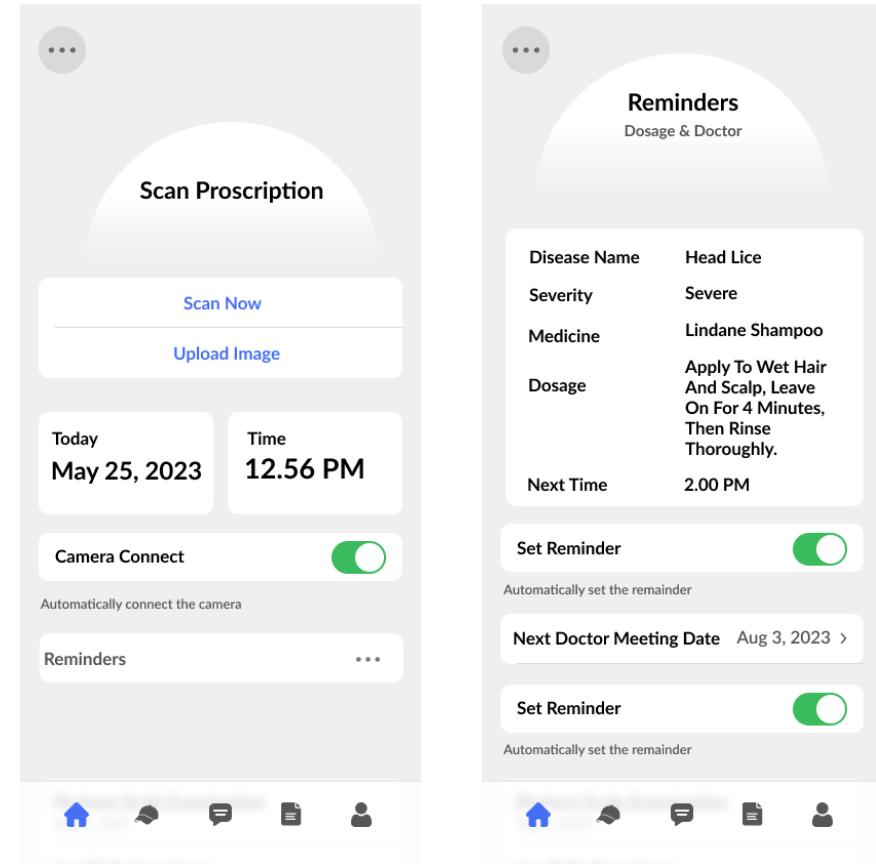
- <https://drive.google.com/drive/u/0/folders/1zWFJhSXsv5pc5H-CTHY96c-rkJdXZeLS>

Mobile Application Front-end development- 75% Complete

§Prototype - Completed

Link - <https://www.figma.com/file/H1rVv6cUjoUzxEJXI3A9Kk/Untitled?type=design&node-id=0-1&t=Ku8h0YccHd0UGOVx-0>

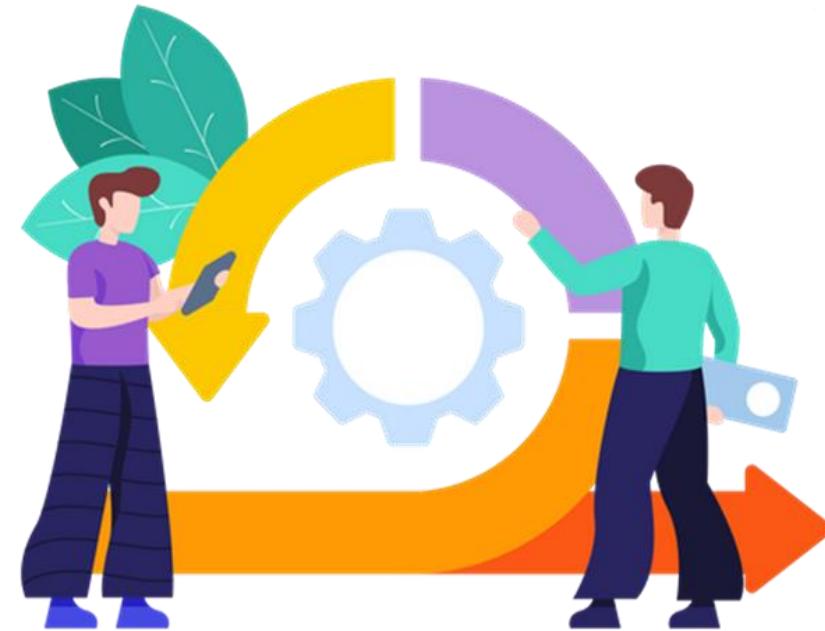
- Showing Scan image or Upload image buttons.
- Showing Current Time and Date.
- Show If Camera is connected or not.
- Show prescription data.
- Show Next doctors meeting date.
- Show reminders are set or not.



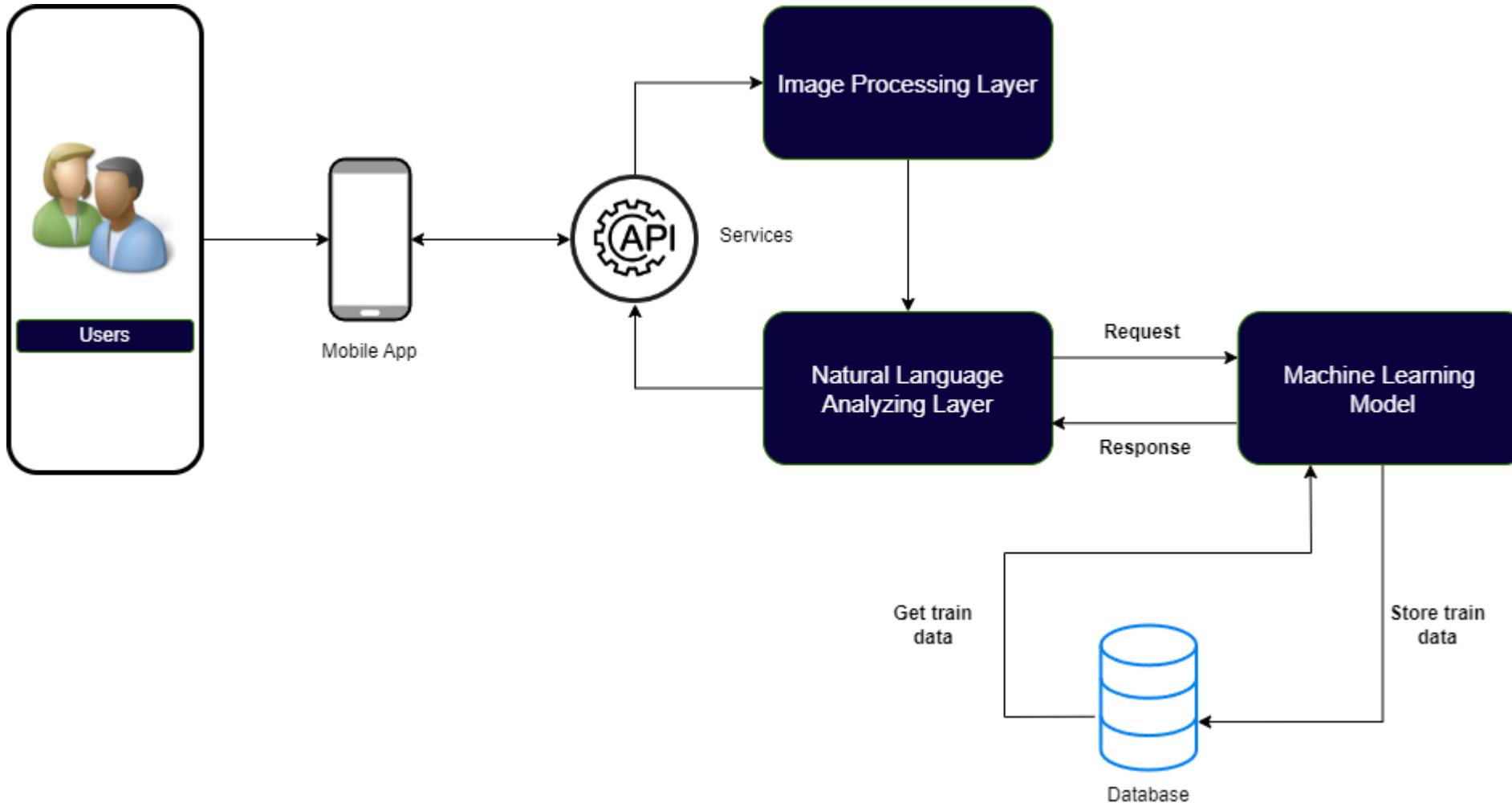
§Development – In Progress

Methodology

- System Diagram
- Requirements
- Tools and Technologies
- Work Breakdown Structure



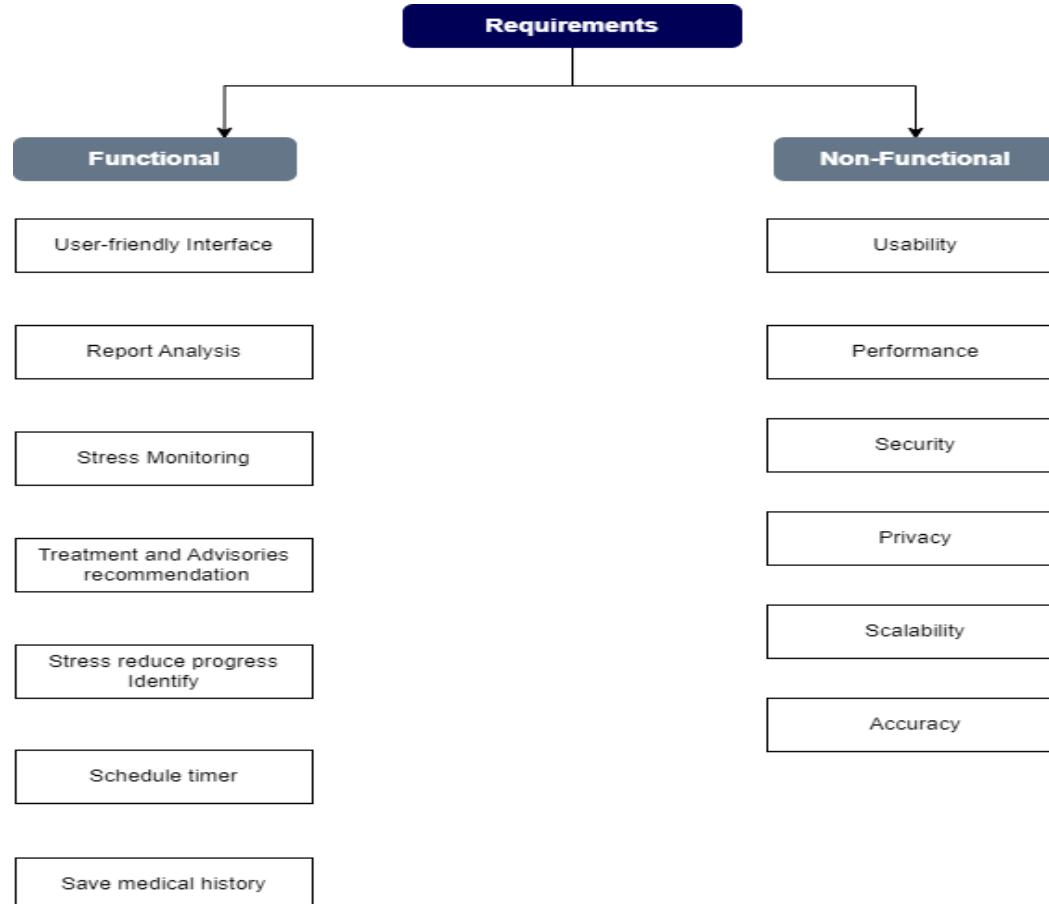
System Diagram



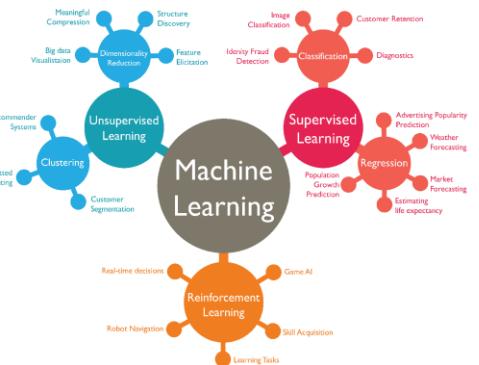
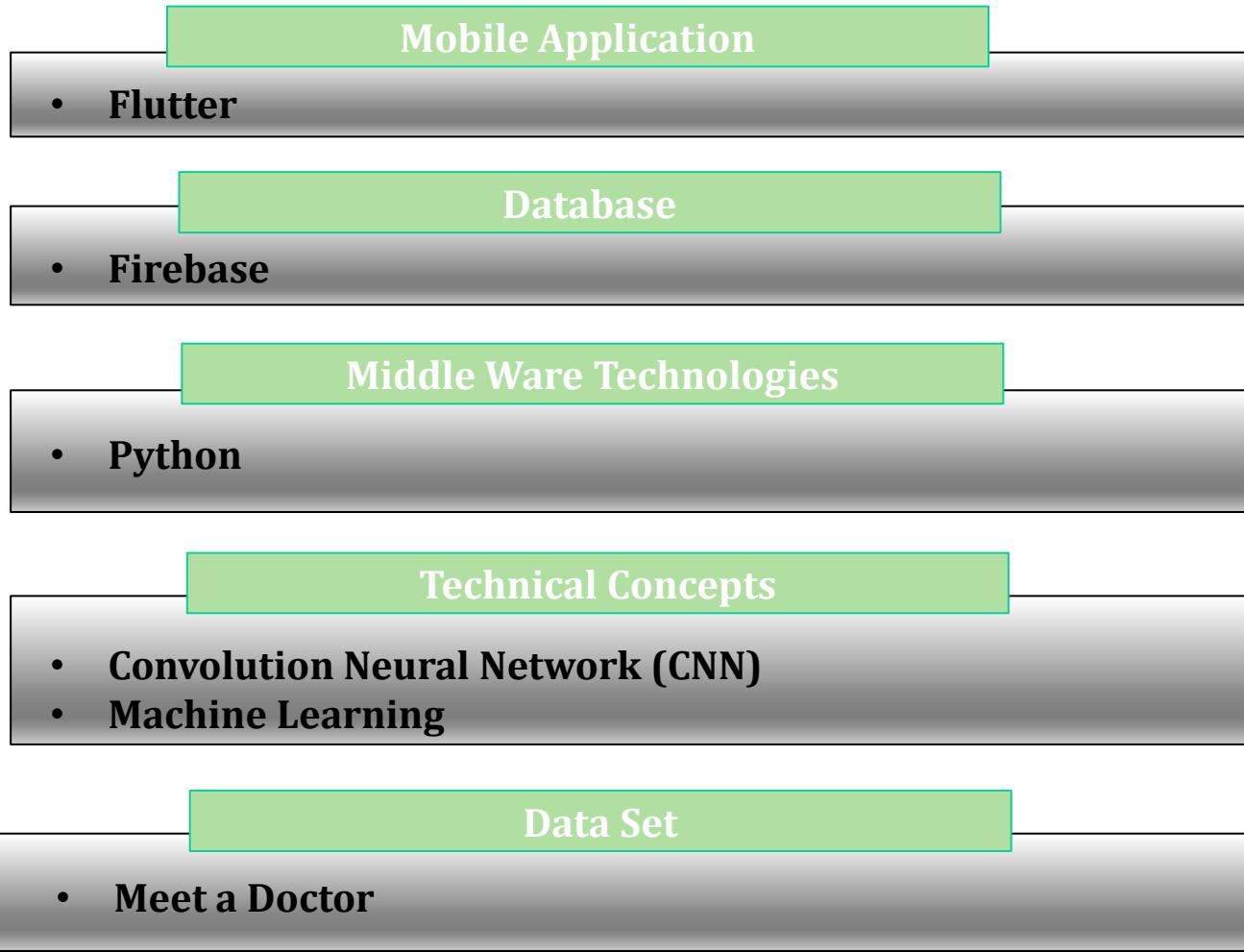
Requirements



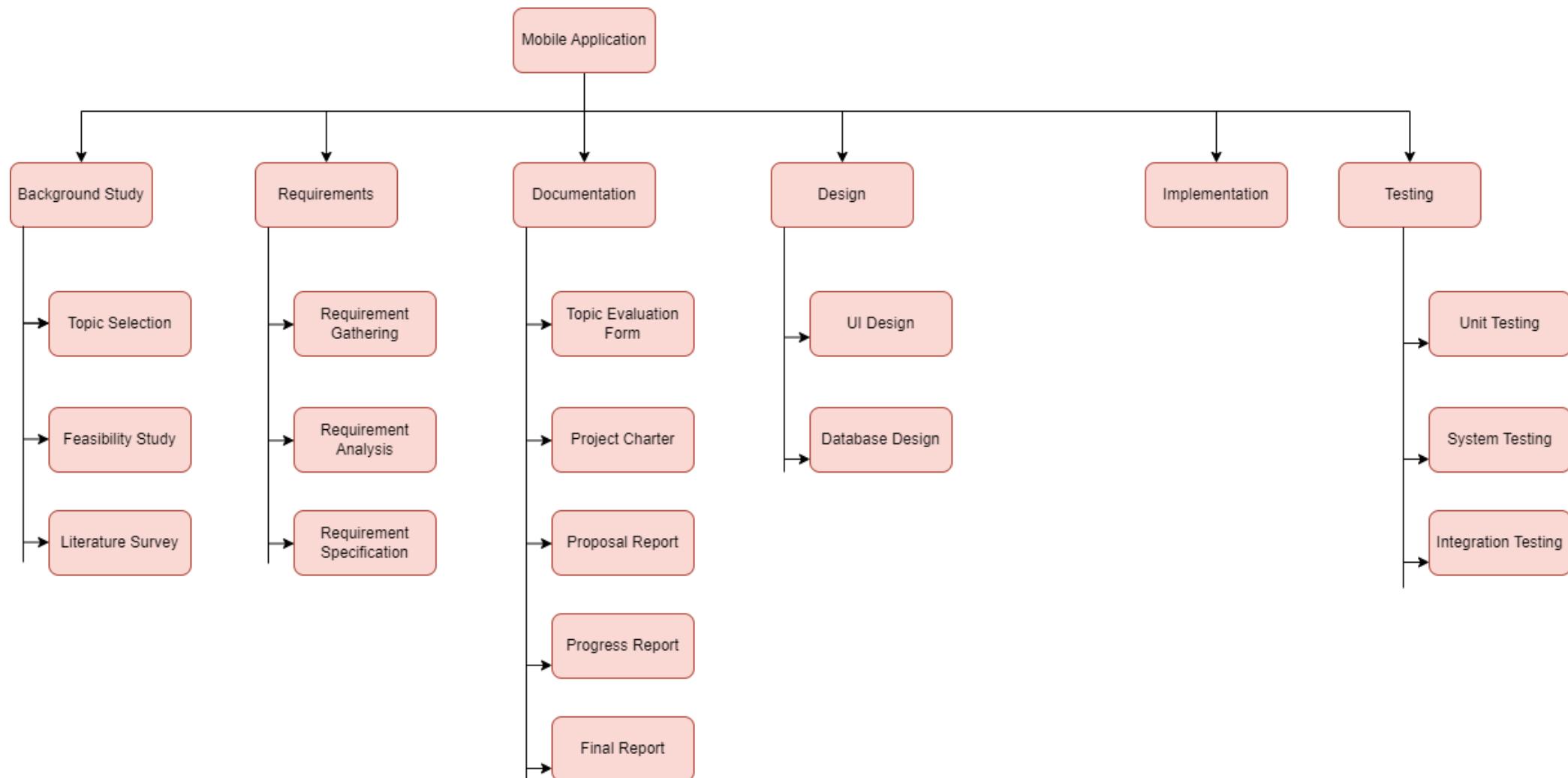
- Functional and Non-Requirements



Tools and Technologies



Work Breakdown Structure



What's to be done

- Finishing the ML model creating and training the model.
- Set reminders part using extracted data.
- Completing the mobile App.
- Integrating the components and testing the Application .



Achievements



- ✓ Collecting Necessary Dataset.
- ✓ Preparing the necessary environment in the machine.
- ✓ Drawing Necessary Wireframes.

Gantt Chart



REFERENCES



- Xiong, Y., Cai, Y., Li, Y., Li, W., Li, X., Li, Y., & Wu, J. (2021). An intelligent hair loss diagnosis and treatment system based on machine learning and knowledge graph. *BMC medical informatics and decision making*, 21(1), 1-13.
- Chiang, P. C., Wu, T. Y., Huang, P. Y., Wu, M. T., & Hsu, C. Y. (2018). Design and implementation of a smart hair care system. *International Journal of Human-Computer Studies*, 110, 18-28.
- Al-Taee, M. A., & Al-Yasiri, A. (2021). Intelligent health-care system for hair disease detection using machine learning techniques. *Applied Soft Computing*, 101, 107113.
- Lai, W. L., Tsai, Y. F., Huang, C. H., & Chen, W. H. (2018). Smart hair care system using fuzzy logic and neural network technologies. *Applied Soft Computing*, 70, 298-309.



**IT20159580
NANAYAKKARA V.G**

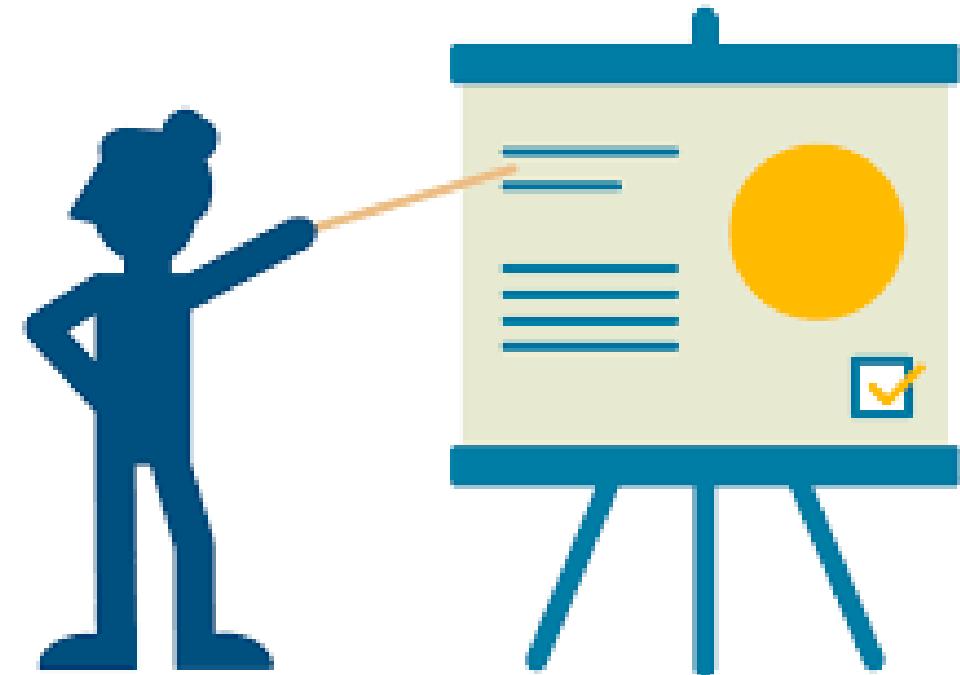
Specialize in Information Technology

Hair Disease Treatment and Medicine Recommendations using Machine Learning and NLP Technologies.



Introduction

- Background
- Research Problem
- Research Gap
- Main Objective
- Sub Objectives



Background



- Hair Diseases Treatment Recommendation Using Chatbot.
- Analyze Patient Data using Recommendation Model.
- Treatment Management.

Research Question

- ? How to recommend hair disease treatment via a mobile
- ? How to find a Dataset



Main Objective

- Develop a machine learning-based model that can provide accurate medical recommendations for head rashes, while considering cultural differences and patient preferences, to improve treatment options and empower patients to manage their own health.



Sub Objective

- Develop a machine learning-based model for reliable and accurate hair disease treatment recommendations.
- Consider cultural differences, and patient preferences in the recommendations provided.
- Collect and analyze data effectively to train the machine learning algorithms.
- Explore successful implementation of chatbot technology in healthcare for guidance.
- Evaluate the effectiveness of Western and Ayurvedic treatments for hair diseases.



Current progress (50%)

•Analyze Dataset & Preprocess -Completed

§import packages and install torch

```
In [5]: !pip install names
```

```
Defaulting to user installation because normal site-packages is not writeable
Requirement already satisfied: names in c:\users\venur\appdata\roaming\python\python39\site-packages (0.3.0)
```

```
In [6]:
```

```
import torch
from torch import nn
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

from torchvision import transforms
from torch.utils.data import Dataset
from torch.utils.data import DataLoader
from torchvision import datasets

from tqdm.auto import tqdm
import sklearn
from sklearn.model_selection import train_test_split

import names
```

```
In [6]:
```

Current progress (50%)

• Data Generation & Features Generation -Completed

```
In [10]: !pip install names
```

```
Defaulting to user installation because normal site-packages is not writeable
Requirement already satisfied: names in c:\users\venur\appdata\roaming\python\python39\site-packages (0.3.0)
```

```
In [11]: # Create the initial DataFrame
```

```
data = {
    "Name": [],
    "Age": [],
    "Gender": [],
    "Allergies": [],
    "Disease": []
}
df_2 = pd.DataFrame(data)
df_2
```

Out[11]:

Name	Age	Gender	Allergies	Disease
------	-----	--------	-----------	---------

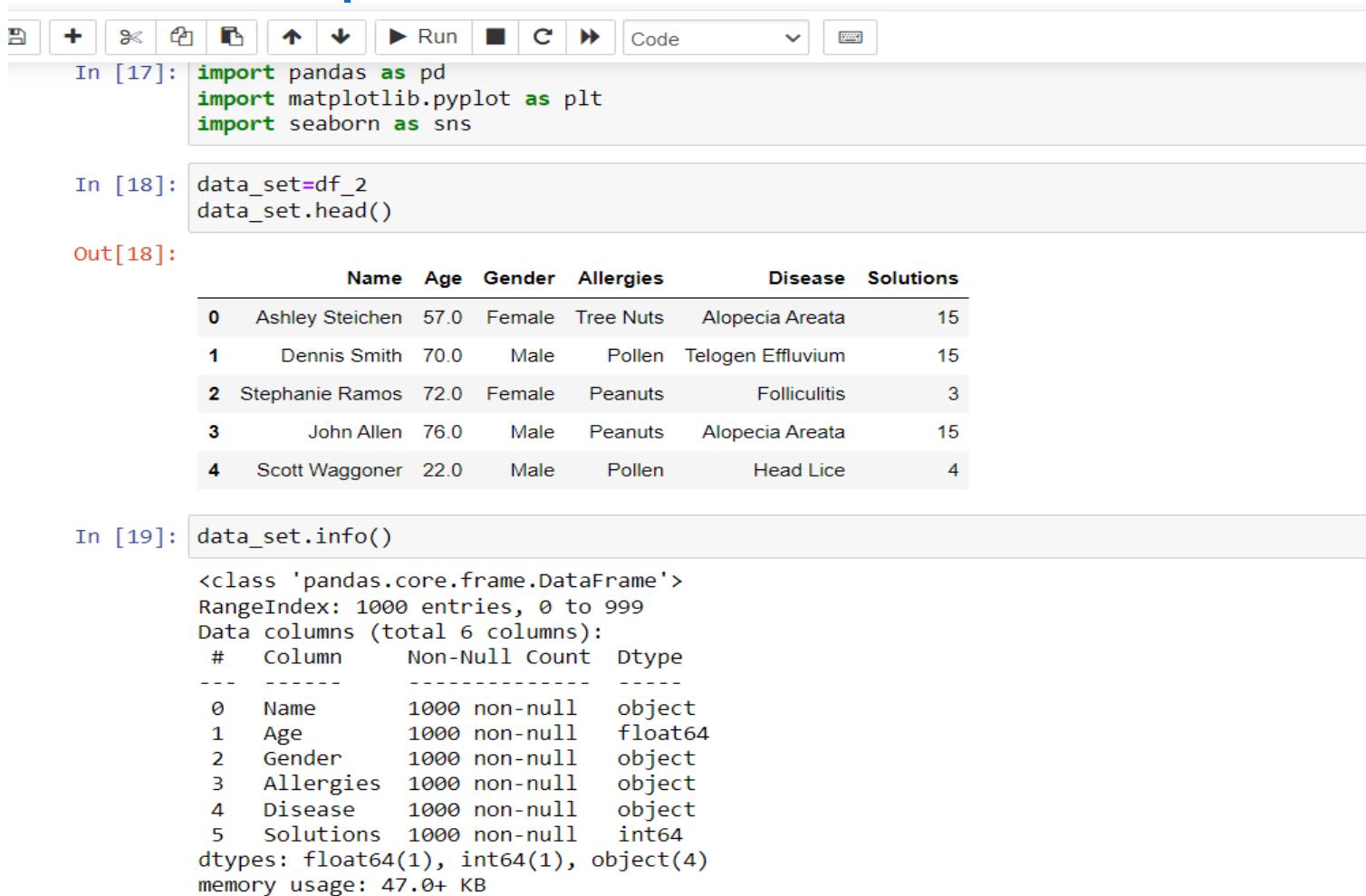
Current progress (50%)

•Solution Generation -Completed

```
In [14]: #creating a random conditions for solution
def condition(row):
    np.random.seed(seed=35)
    #print(row["Gender"],np.random.choice(['Male', 'Female']))
    if row["Gender"]==np.random.choice(['Male', 'Female']) and (row["Age"]<50.0 or row["Allergies"]==np.random.choice(['Pollen', 'Pollen'])):
        return 1
    elif row["Gender"]==np.random.choice(['Male', 'Female']) and (row["Age"]<50.0 or row["Allergies"]==np.random.choice(['Pollen', 'Pollen'])):
        return 2
    elif row["Gender"]==np.random.choice(['Male', 'Female']) and (row["Age"]<50.0 or row["Allergies"]==np.random.choice(['Pollen', 'Pollen'])):
        return 3
    elif row["Gender"]==np.random.choice(['Male', 'Female']) and (row["Age"]<50.0 or row["Allergies"]==np.random.choice(['Pollen', 'Pollen'])):
        return 4
    elif row["Gender"]==np.random.choice(['Male', 'Female']) and (row["Age"]<50.0 or row["Allergies"]==np.random.choice(['Pollen', 'Pollen'])):
        return 5
    elif row["Gender"]==np.random.choice(['Male', 'Female']) and (row["Age"]<50.0 or row["Allergies"]==np.random.choice(['Pollen', 'Pollen'])):
        return 6
    elif row["Gender"]==np.random.choice(['Male', 'Female']) and (row["Age"]<50.0 or row["Allergies"]==np.random.choice(['Pollen', 'Pollen'])):
        return 7
    elif row["Gender"]==np.random.choice(['Male', 'Female']) and (row["Age"]<50.0 or row["Allergies"]==np.random.choice(['Pollen', 'Pollen'])):
        return 8
    elif row["Gender"]==np.random.choice(['Male', 'Female']) and (row["Age"]<50.0 or row["Allergies"]==np.random.choice(['Pollen', 'Pollen'])):
        return 9
    elif row["Gender"]==np.random.choice(['Male', 'Female']) and (row["Age"]<50.0 or row["Allergies"]==np.random.choice(['Pollen', 'Pollen'])):
        return 10
    elif row["Gender"]==np.random.choice(['Male', 'Female']) and row["Age"]<70.0 or row["Allergies"]==np.random.choice(['Pollen', 'Pollen']):
        return 11
    elif row["Gender"]==np.random.choice(['Male', 'Female']) and row["Age"]<70.0 or row["Allergies"]==np.random.choice(['Pollen', 'Pollen']):
        return 12
    elif row["Gender"]==np.random.choice(['Male', 'Female']) and row["Age"]<70.0 and row["Allergies"]==np.random.choice(['Pollen', 'Pollen']):
        return 13
    elif row["Gender"]==np.random.choice(['Male', 'Female']) and row["Age"]<80.0 and row["Allergies"]==np.random.choice(['Pollen', 'Pollen']):
        return 14
    elif row["Gender"]==np.random.choice(['Male', 'Female']) and row["Age"]<80.0 or row["Allergies"]==np.random.choice(['Pollen', 'Pollen']):
        return 15
```

Current progress (50%)

- Data process -Completed



The screenshot shows a Jupyter Notebook interface with the following content:

- In [17]:**

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```
- In [18]:**

```
data_set=df_2
data_set.head()
```
- Out[18]:**

	Name	Age	Gender	Allergies	Disease	Solutions
0	Ashley Steichen	57.0	Female	Tree Nuts	Alopecia Areata	15
1	Dennis Smith	70.0	Male	Pollen	Telogen Effluvium	15
2	Stephanie Ramos	72.0	Female	Peanuts	Folliculitis	3
3	John Allen	76.0	Male	Peanuts	Alopecia Areata	15
4	Scott Waggoner	22.0	Male	Pollen	Head Lice	4
- In [19]:**

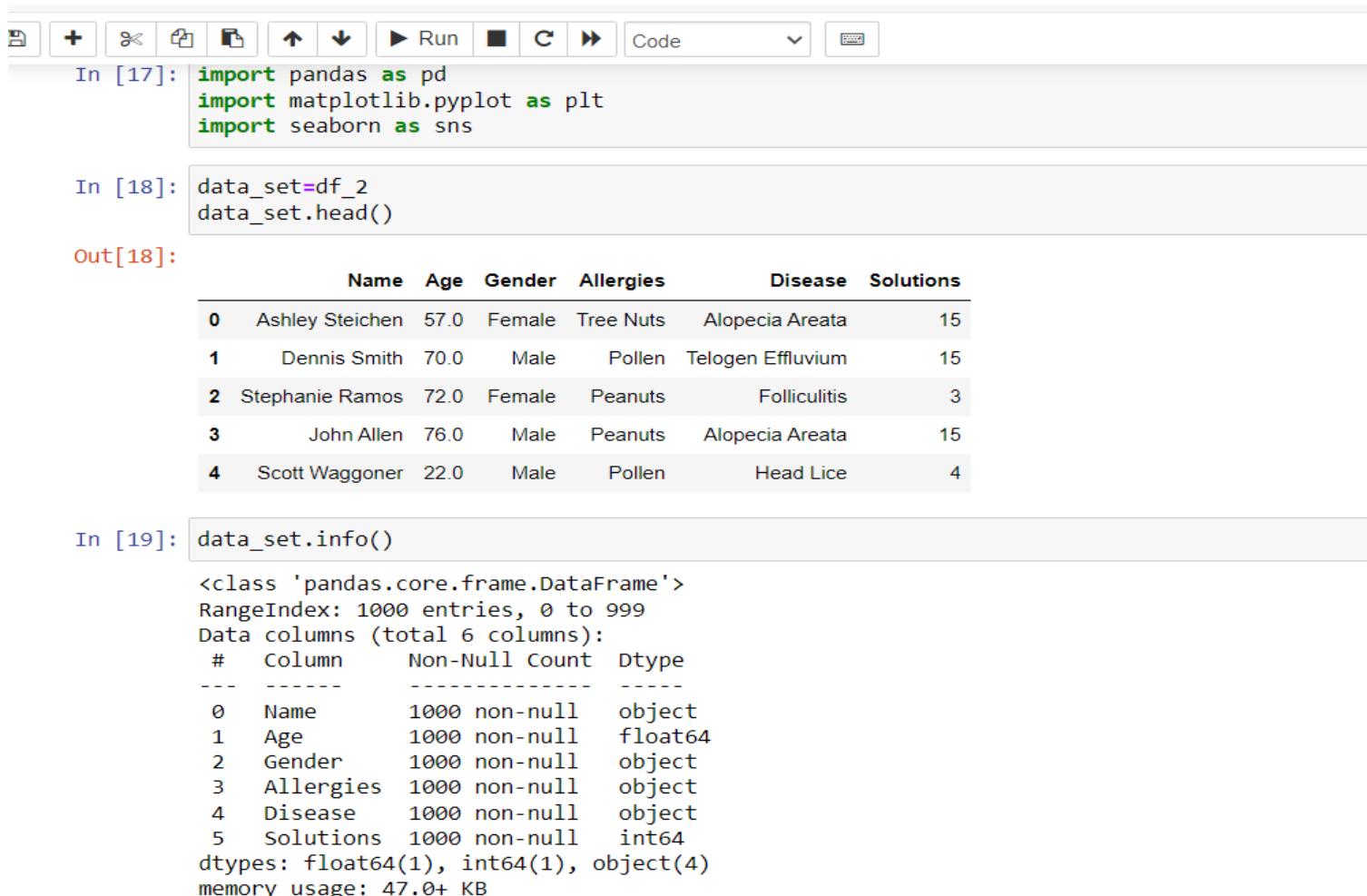
```
data_set.info()
```

`<class 'pandas.core.frame.DataFrame'>`
RangeIndex: 1000 entries, 0 to 999
Data columns (total 6 columns):
 # Column Non-Null Count Dtype

 0 Name 1000 non-null object
 1 Age 1000 non-null float64
 2 Gender 1000 non-null object
 3 Allergies 1000 non-null object
 4 Disease 1000 non-null object
 5 Solutions 1000 non-null int64
 dtypes: float64(1), int64(1), object(4)
 memory usage: 47.0+ KB

Current progress (50%)

• Mapping(Cat Data -> Numerical Data) -Completed



The screenshot shows a Jupyter Notebook interface with the following content:

- In [17]:**

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```
- In [18]:**

```
data_set=df_2
data_set.head()
```
- Out[18]:** A table showing the first 5 rows of the dataset:

	Name	Age	Gender	Allergies	Disease	Solutions
0	Ashley Steichen	57.0	Female	Tree Nuts	Alopecia Areata	15
1	Dennis Smith	70.0	Male	Pollen	Telogen Effluvium	15
2	Stephanie Ramos	72.0	Female	Peanuts	Folliculitis	3
3	John Allen	76.0	Male	Peanuts	Alopecia Areata	15
4	Scott Waggoner	22.0	Male	Pollen	Head Lice	4

- In [19]:**

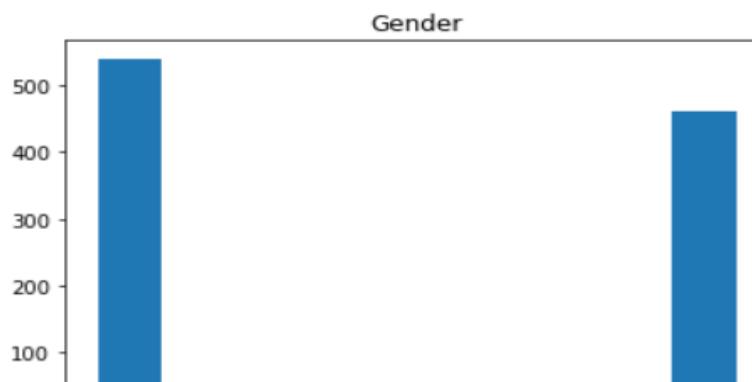
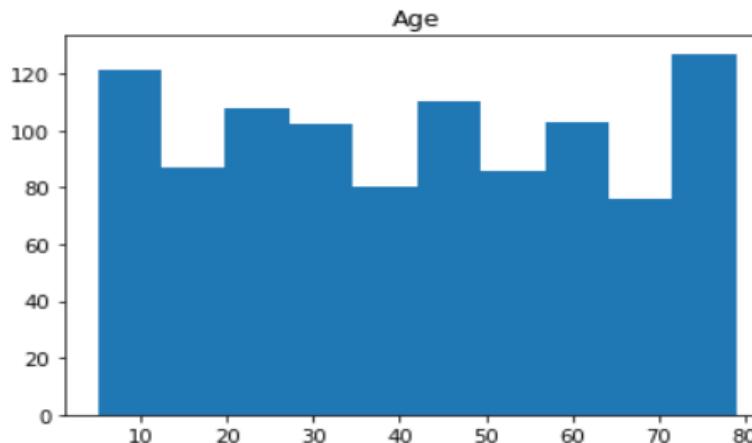
```
data_set.info()
```
- Out[19]:** The output of the `data_set.info()` command, showing the DataFrame structure:

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 6 columns):
 #   Column      Non-Null Count  Dtype  
--- 
 0   Name        1000 non-null   object 
 1   Age         1000 non-null   float64
 2   Gender      1000 non-null   object 
 3   Allergies   1000 non-null   object 
 4   Disease     1000 non-null   object 
 5   Solutions   1000 non-null   int64  
dtypes: float64(1), int64(1), object(4)
memory usage: 47.0+ KB
```

Current progress (50%)

- Data Visualizing -Completed

```
In [24]: for i in data_set.columns:  
    plt.hist(data_set[i])  
    plt.title(i)  
    plt.show()
```



Current progress (50%)

- Model -Completed

```
In [34]: torch.manual_seed(8)
class Recommender(nn.Module):
    def __init__(self,in_,out_):
        super().__init__()
        #model_structer
        self.dnn=nn.Sequential(
            nn.Linear(in_,4),
            nn.ReLU(),
            nn.Linear(4,8),
            nn.ReLU(),
            nn.Linear(8,5),
            nn.ReLU(),
            nn.Linear(5,out_))

    def forward(self,x: torch.Tensor) -> torch.Tensor:

        return self.dnn(x)

model=Recommender(in_=4,out_=18)
model.state_dict()

Out[34]: OrderedDict([('dnn.0.weight',
    tensor([[ 0.0979,  0.3453,  0.4464, -0.2035],
           [ 0.0138,  0.1443,  0.3991, -0.4859],
           [ 0.0785, -0.3782,  0.4181,  0.1805],
           [-0.3000, -0.3879, -0.4981,  0.3928]])),
    ('dnn.0.bias', tensor([ 0.3047, -0.2453, -0.0317, -0.3318])),
    ('dnn.2.weight',
    tensor([[-0.3287,  0.0103, -0.3932,  0.0911],
           [ 0.2893, -0.4146, -0.1321, -0.0239],
           [ 0.1386, -0.0520, -0.4205, -0.1801],
           [-0.4968, -0.0762, -0.1931,  0.4529],
```

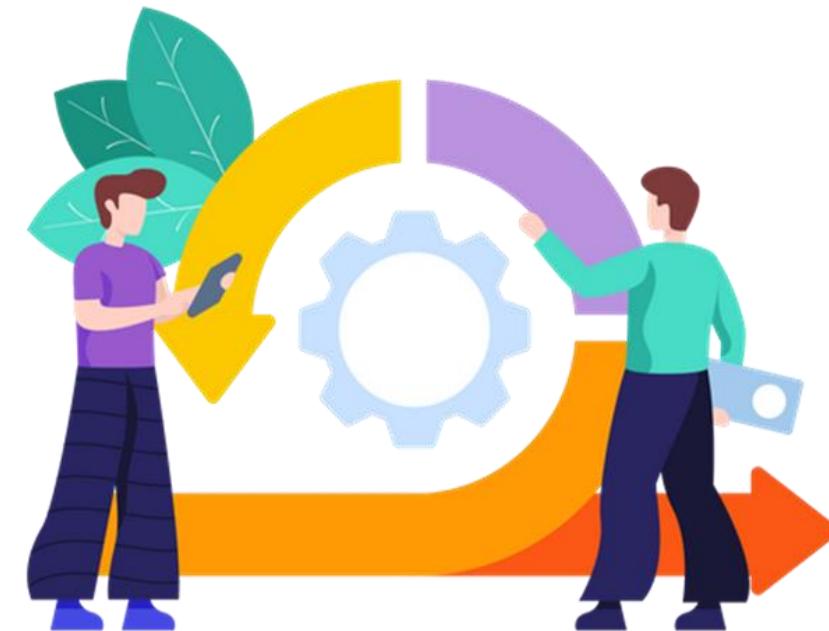
Achievements



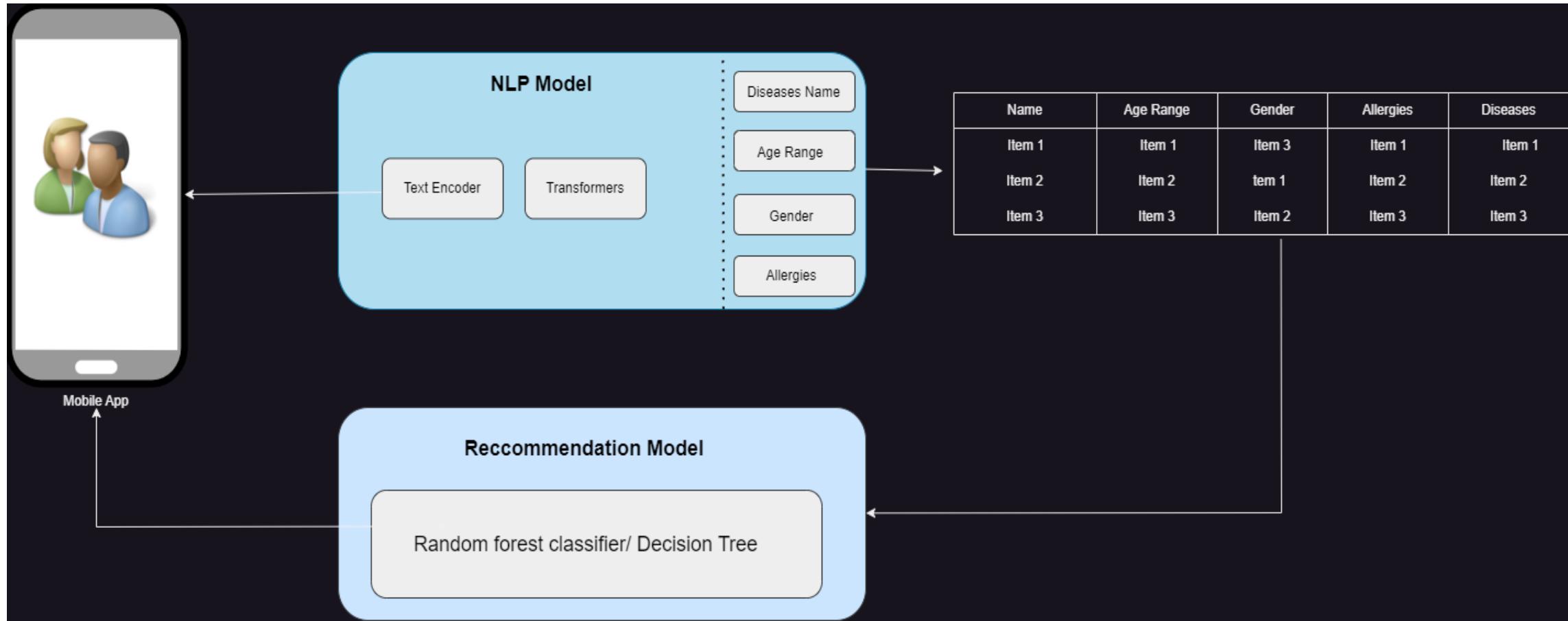
- ✓ Collecting Necessary Dataset
- ✓ Preparing the necessary environment in the machine
- ✓ Drawing Necessary Wireframes

Methodology

- System Diagram
- Requirements
- Tools & Technologies
- Work Breakdown Structure

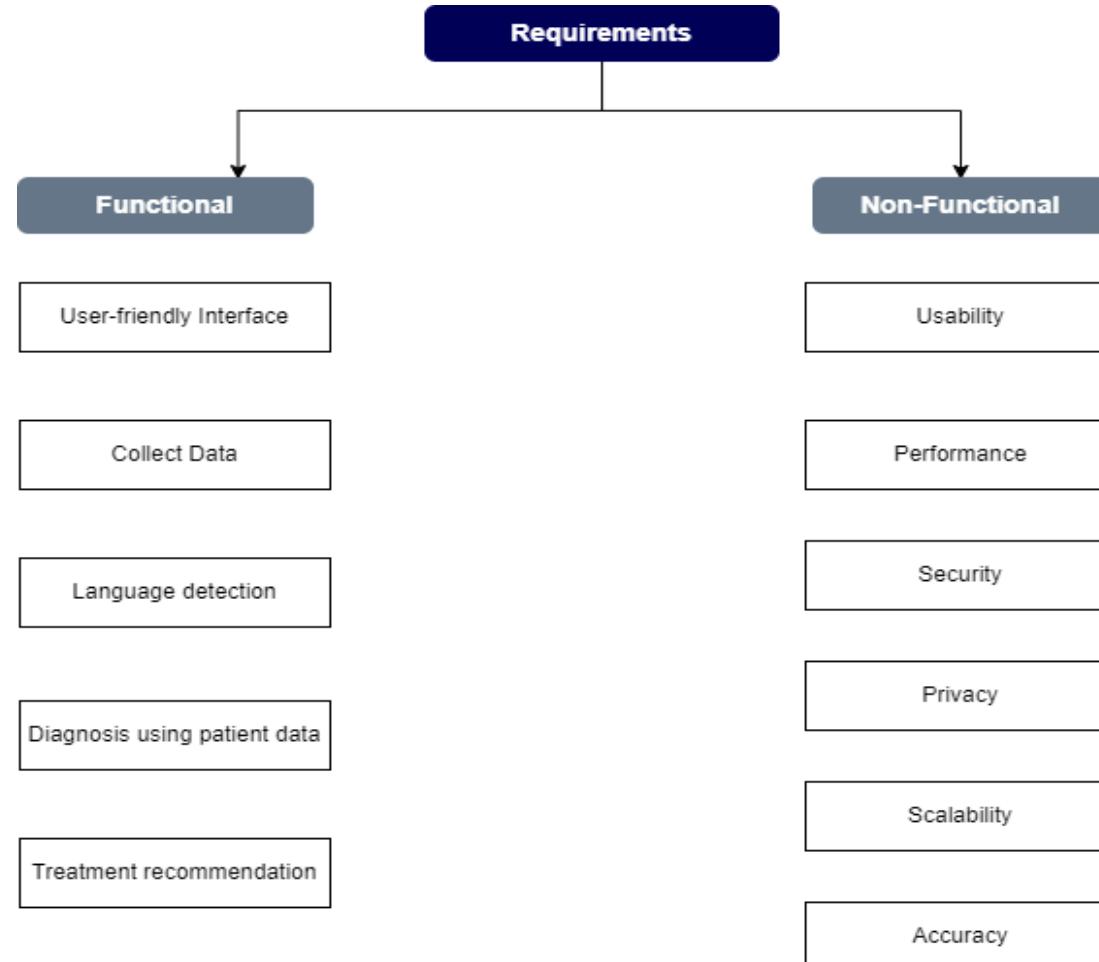


System Diagram



Requirements

- Functional and Non-Functional Requirements



Tools and Technologies



Mobile Application

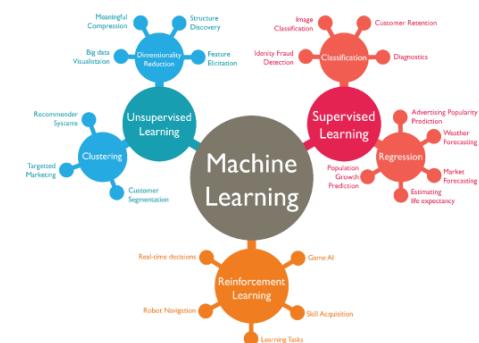
- Flutter

Dependencies

- Pandas
- numpy
- matplotlib

Technical Concepts

- PyTorch(Deep Learning Framework)
- Machine Learning



Wireframes

Link

<https://www.figma.com/file/H1rVv6cUjoUzxEJXI3A9Kk/Untitled?type=design&node-id=0-1&t=SLyTfogfUGlUdJr2-0>

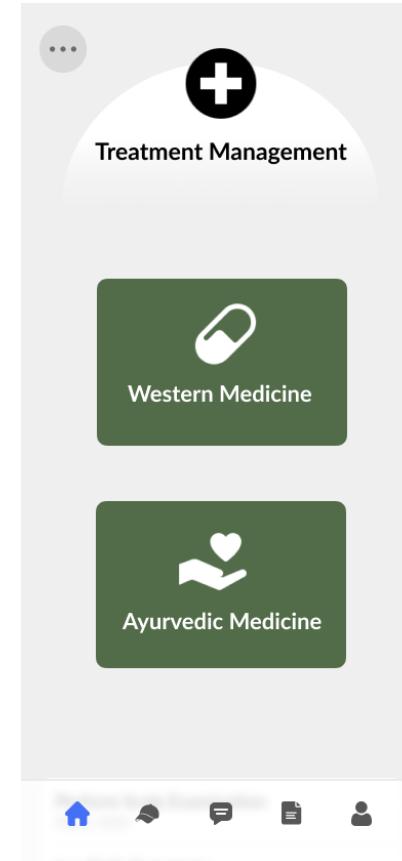
Treatment Management Home UI

- Western Medicine Button
- Ayurvedic Medicine Button

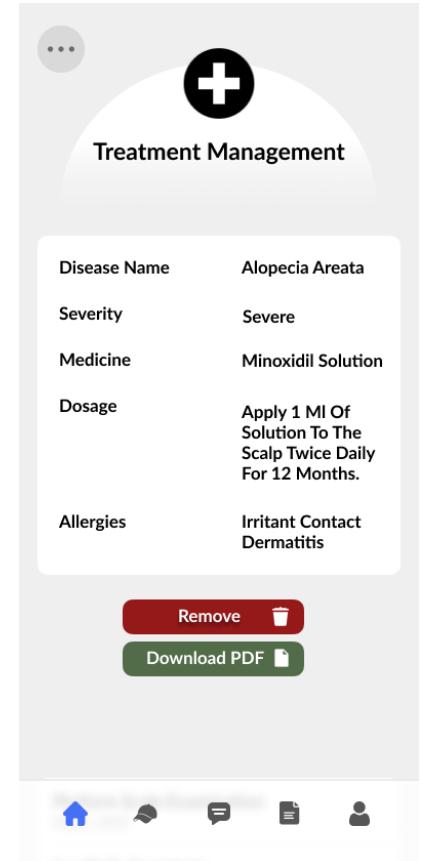
Treatment Management UI

- Treatment Details
- Remove Button
- Report Generate Button
- Log out button

Treatment Home UI



Treatment Management UI



Datasets



We choose 5 diseases.

- Head Lice
- Alopecia Areata
- Telogen Effluvium
- Tinea Capitis
- Folliculitis

<https://onedrive.live.com/edit.aspx?resid=B7E2F4D920B16893!54538&ithint=file%2cxlsx&authkey=!ABV70SNSqnpKZCI>

What's to be done

- Convert and Clean the collected data for the ML model training
- Finishing the ML model creating and training the model
- Completing the mobile App
- Integrating the components and testing the Application





IT20232290
BANDARANAYAKE V.R.W

Specialize in Information Technology

Predicting Hair Diseases through Patient History and Symptom Based Predictive Modeling and Recommend Doctor.



Background



- Hair diseases symptom prediction Using chatbot.
- Doctor Recommendation.
- Shown the doctor location using Google map.

Research Question

- ? How machine-learning-based mobile systems take place the prediction of hair diseases using symptoms?
- ? Find Most Suitable Dataset?



Novelty

According to the historical characteristics of those diseases and future symptom data, by understanding the current situation through the chatbot, it is possible to recommend this situation in the future through this method.



Main Objective



Using machine learning to deduce what hair disease is caused by unique symptoms and predict what symptoms of this disease may appear in the future.



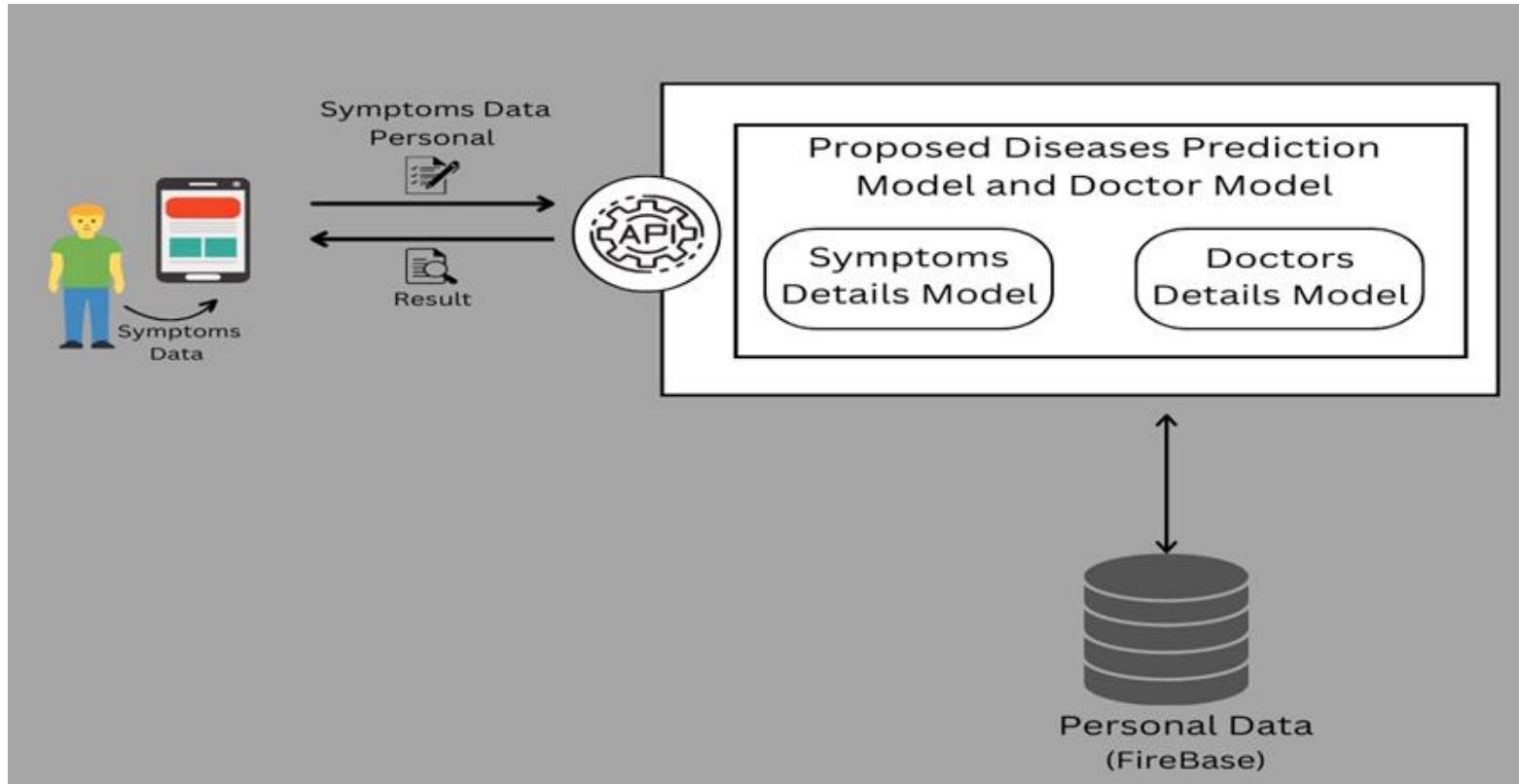
Sub Objective



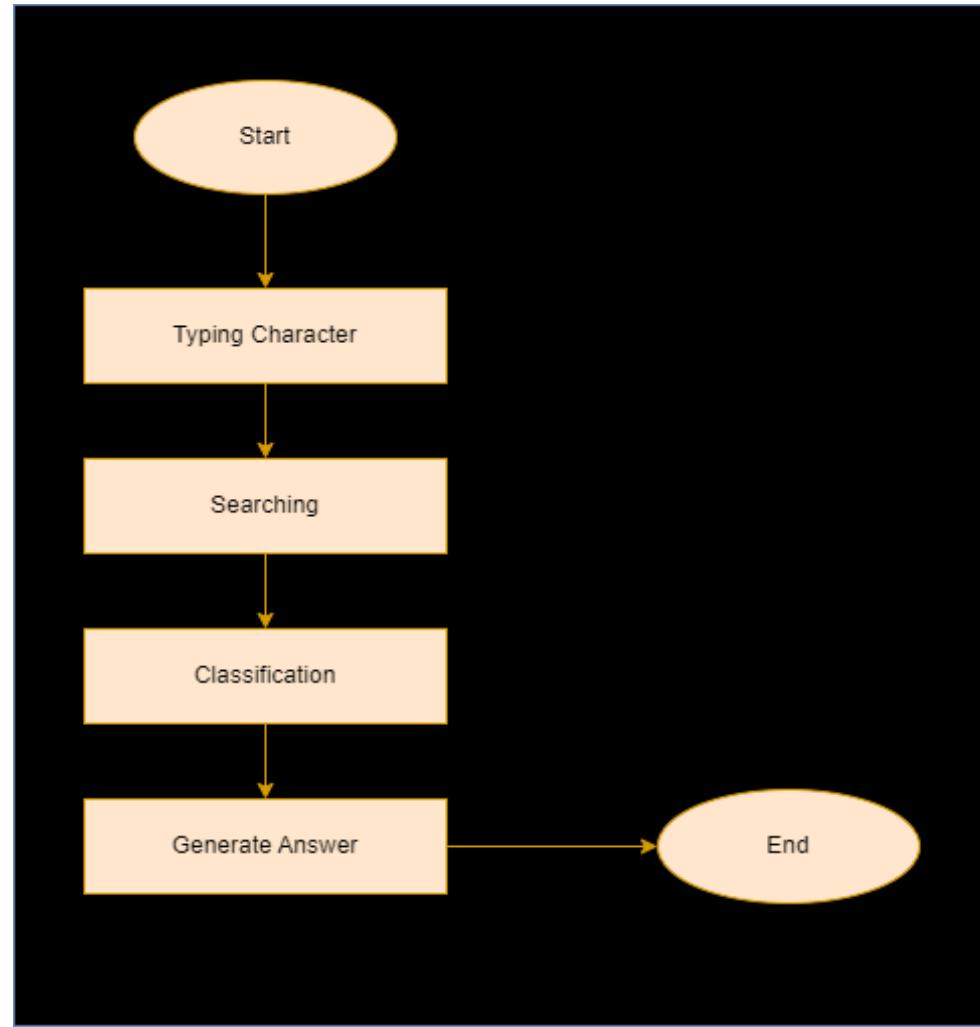
- Build various ML model to predict to hair diseases symptom.
- Predict the status of the patient.
- Show the Doctor location using google map.
- Build various ML model to recommend doctors for hair disease.



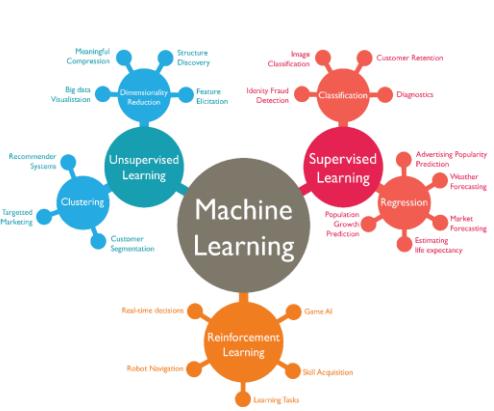
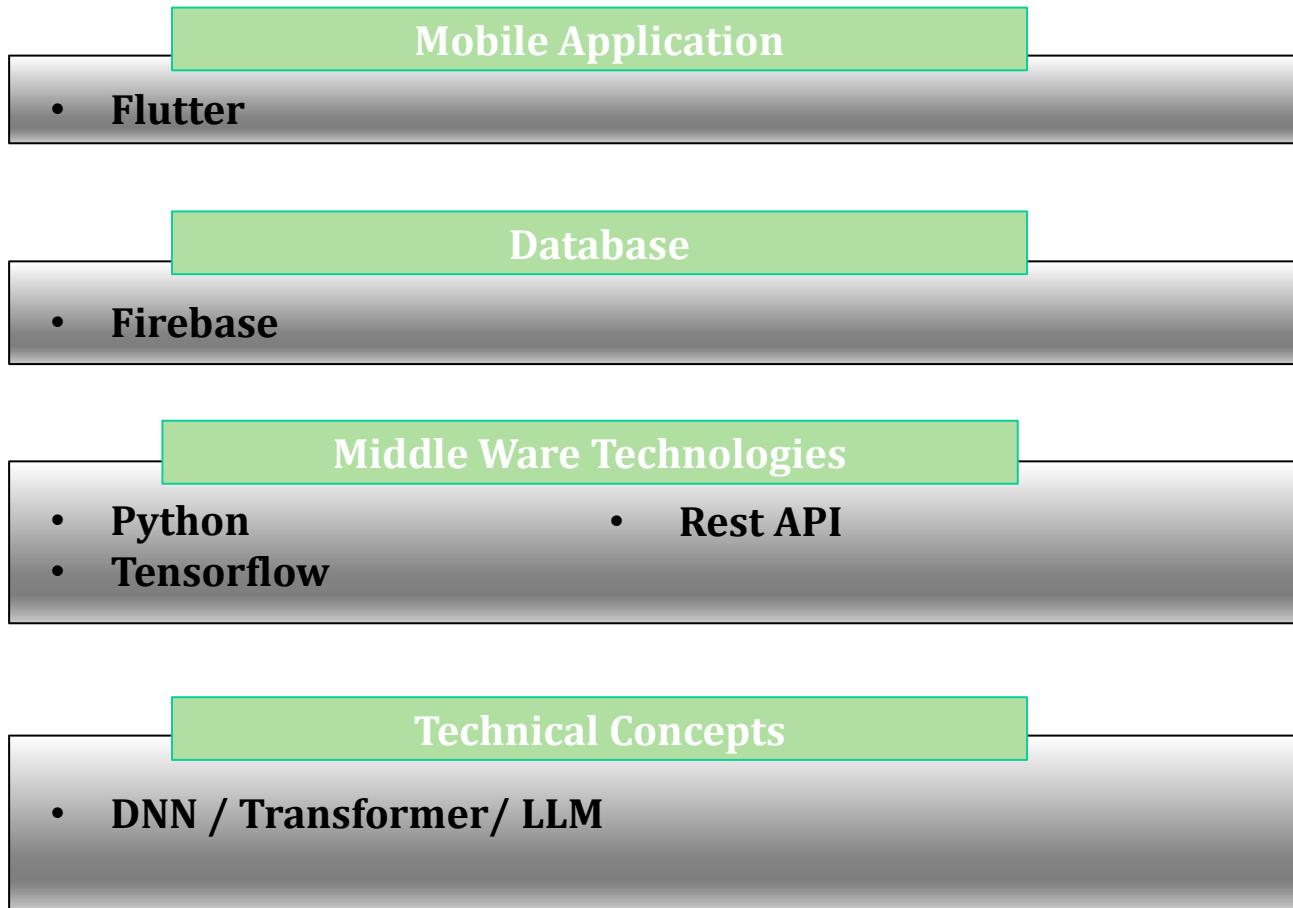
System Diagram



Flow Chart



Tools and Technologies



Wireframes

Link :-

<https://www.figma.com/file/H1rVv6cUjoUzxEJXI3A9Kk/Untitled?type=design&node-id=0%3A1&t=1vhaNti6wruweQxT-1>

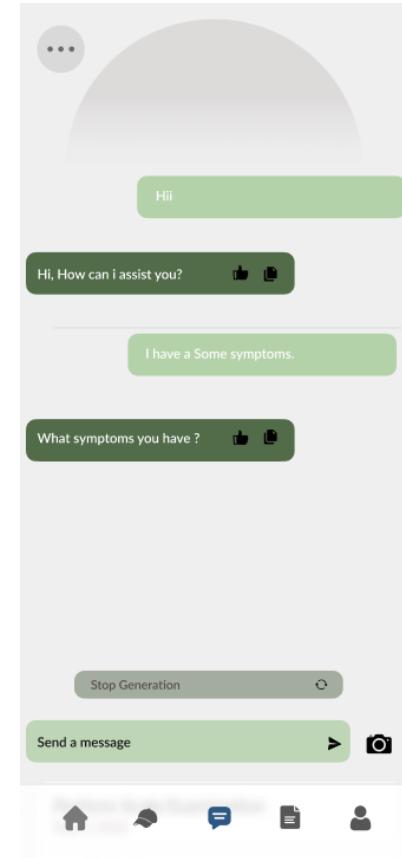
Chat UI

- Like and unlike button
- Stop generating button
- Send button

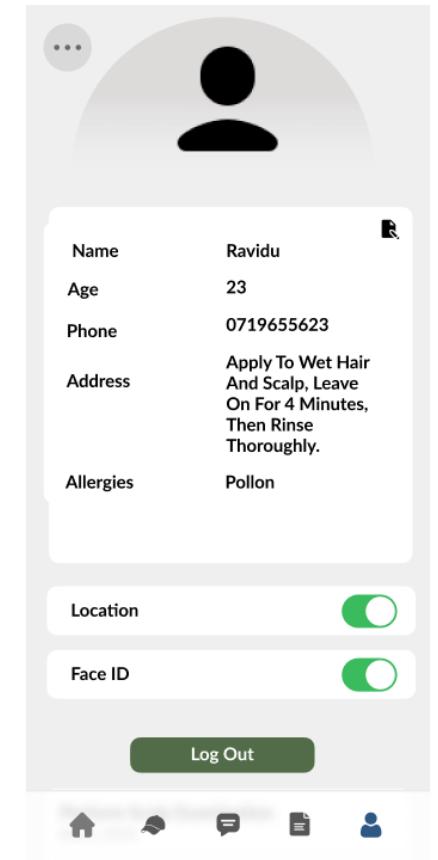
Profile UI

- Location turn on/off button
- Edit Button
- Face ID button
- Log out button

Chat UI



Profile UI



Datasets



We choose 5 diseases.

- Head Lice
- Alopecia Areata
- Telogen Effluvium
- Tinea Capitis
- Folliculitis

https://docs.google.com/document/d/1hK_ZNHuKGII2uajjSns3V54rVGwW6aTT/edit?usp=share_link&ouid=110882450111625739954&rtpof=true&sd=true

Head Lice Symptoms

1. scalp itchiness that never stops.
2. a feeling of tickling or crawling on the scalp.
3. detecting movement in the hair.
4. on the scalp, irritation and pain.
5. irritation or redness on the scalp.
6. scalp sores or little red pimples.
7. sores brought on by frequent scratching.
8. Presence of small white or yellowish oval-shaped eggs (nits) attached to the hair shafts near the scalp.
9. the discovery of nits or lice on combs, brushes, or other hair accessories.
10. scratching at the nape of the neck or behind the ears.
11. lymph nodes that are swollen on the neck or behind the ears.
12. Itching that causes sleep disruptions.
13. lower performance at work or school or difficulty focusing.
14. rundown or feeling exhausted.
15. Rash or hives are allergic responses to lice bites.
16. the scalp's sensitivity or tenderness.
17. Lice can be seen moving when the hair is split.
18. increased heat sensation on the scalp.
19. difficult-to-manage or style hair.
20. hair that seems unhealthy or lifeless.
21. On pillows, caps, or collars, tiny black or brown specks (lice feces).
22. Hair thinning or loss in cases of severe infestations.
23. greater sensitivity to the heat of hot water on the scalp.
24. hair that is prone to tangling or forming knots.
25. feeling humiliated or self-conscious about the infestation.
26. even after taking anti-lice remedies, having trouble getting relief from itching.
27. greasy or oily-looking hair, despite regular washing.
28. Skin irritation or itching in other places where lice could have spread, such as the eyelashes or eyebrows.

Alopecia areata

1. scalp hair loss in patches
2. Oval or circular bald patches
3. Loss of hair on the brows
4. decrease in eyelashes
5. Beard or mustache hair that is insufficient or nonexistent
6. Hair on the scalp thinning or falling out entirely
7. Hair loss in other body parts, such as the arms and legs
8. Hair that is fragile or readily broken
9. hair growth in certain places but baldness elsewhere
10. graying or whitening of newly growing hair
11. Headache or tingling on the scalp
12. On the scalp, a burning or stinging feeling
13. Redness or swelling in the wounded regions
14. the scalp flaking or scaling
15. ridges or pitting on the nails
16. anomalies in the nails, such as white patches and roughness
17. Pain or sensitivity in the afflicted regions
18. abrupt or quick hair loss
19. Alopecia universalis, or whole body hair loss
20. Increasingly more severe hair loss
21. emotional pain or psychological effects
22. lowered self-esteem or self-consciousness
23. anxiety or melancholy brought on by thinning hair
24. textural changes in the hair, such as wavy hair going straight
25. Hair color changes.
26. hair that has grown back is finer or thinner than it was previously Hair loss relapses or recurrence
27. greater likelihood of getting sunburned on the scalp
28. Intolerance to scalp treatments or cosmetic hair products
29. Soreness or sensitivity in the afflicted regions
30. scalp swelling or inflammation
31. readily accessible hair follicles
32. areas of alopecia that converge
33. Itchy or dry scalp
34. Increased hair shedding during periods of illness or hormonal changes
35. Scalp tenderness when wearing hats or head coverings
36. Nail abnormalities that coincide with hair loss

Telogen Effluvium

1. increased loss of hair
2. Hair loss all over the scalp Hair loss that is noticeable
3. more hair loss during washing or brushing
4. Unacceptable amounts of hair on pillows, towels, or clothing Hair strands that come out with little effort
5. Hair density loss Scalp visible through the hair
6. compromised hair roots
7. Reduced hair volume and altered hair structure
8. slowed pace of hair growth
9. Hair that is fragile or readily broken
10. Lackluster or sparse hair
11. dull or dry hair
12. sensitivity or soreness in the scalp
13. rough scalp
14. Symptoms that are flakes or dandruff-like
15. rash on the scalp
16. Loss of hair that starts off suddenly
17. hair loss brought on by a certain incident
18. hair loss after experiencing mental or physical stress
19. With hormonal changes, hair loss
20. hair loss with the introduction or discontinuation of some drugs
21. Hair loss with a substantial weight reduction or diet change
22. hair loss during a severe sickness or high temperature
23. Hair loss following a stressful experience
24. Chronic disease or medical problems that cause hair loss
25. following a dietary deficit, hair loss
26. Associated with hormonal abnormalities is hair loss
27. particular regions are affected by hair loss
28. A widespread or universal pattern of hair loss Hair loss that becomes worse over time.

Tinear Capitis

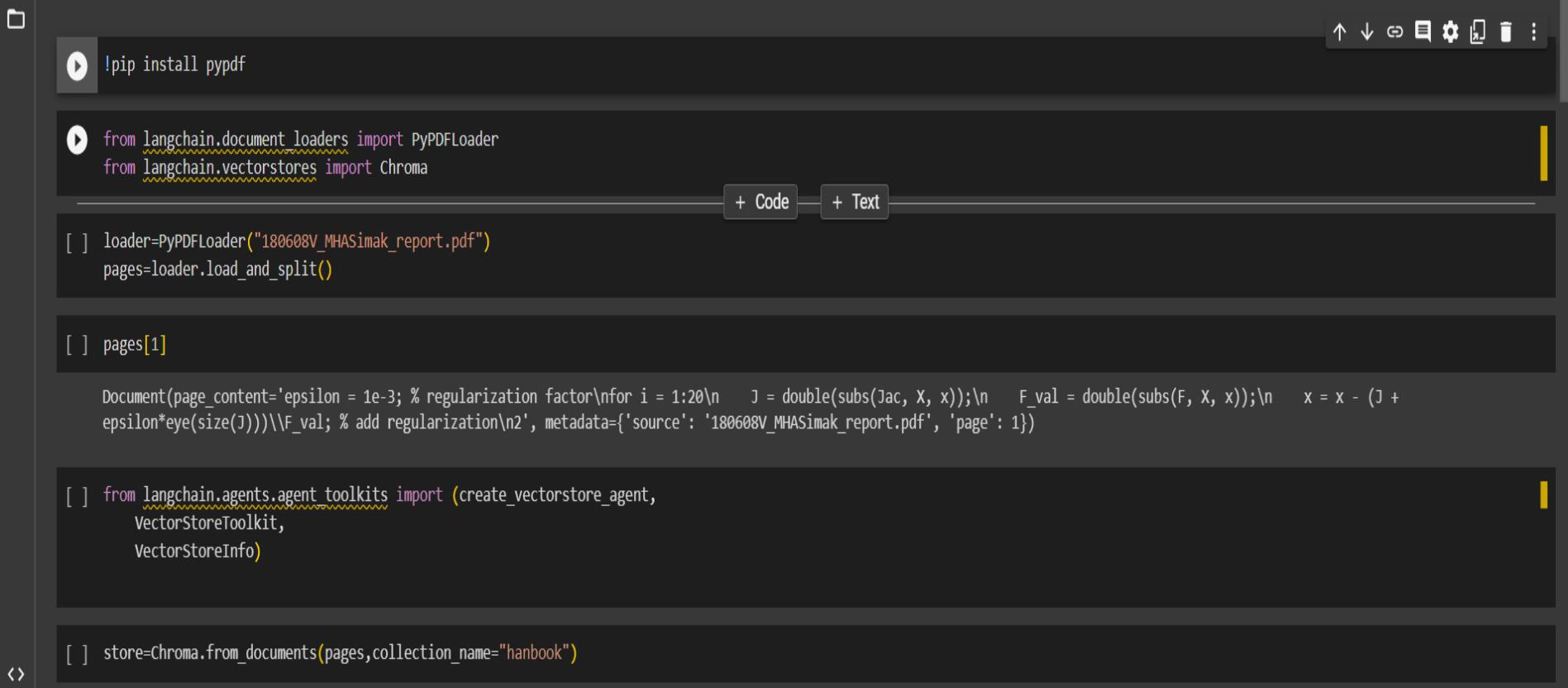
1. rough scalp
2. the color of one's scalp
3. the scalp flaking or scaling
4. uneven or circular hair loss patches
5. Hair that is fragile or readily broken
6. Patches of damaged or brittle hair
7. bald patches with breaking hairs in the form of black spots
8. lumps or pustules on the scalp
9. inflammation or swelling of the scalp.
10. irritated or hurting scalp.
11. Scalp oozing or experiencing crunch.
12. On the scalp, there are thick or elevated areas of skin.
13. bald spots that are dry or scaly
14. Scales of gray or silver on the scalp
15. neck lymph nodes that are enlarged
16. scalp odor that is unpleasant
17. hair that is lifeless or dull
18. The scalp's hair that is readily taken out
19. hair that looks twisted or crooked
20. Hair that feels coarse or tangle-prone
21. Unmanageable or matted hair
22. An appearance of stubby hair
23. hair that falls out above the surface of the scalp
24. Slowly deteriorating hair loss
25. spread of hair loss to different parts of the scalp
26. particular regions are affected by hair loss.
27. hair loss that occurs in overlapping patches
28. hair loss areas where there are little red lumps.
29. Red or itchy spots may appear on the upper torso, neck, or face.
30. Bruises or sores on the scalp
31. neck lymph nodes that are swollen or sore
32. In some circumstances, fever
33. fatigue or unwell feeling
34. Other body areas' lymph nodes that are enlarged or swollen
35. Redness or a skin rash in other parts of the body
36. Nails that are thick or have stains.
37. irregularities in nails
38. Brittle or cracked nails.

Folliculitis

1. The area around the hair follicles is red.
2. little red pustules or lumps
3. Angry or itchy skin
4. Skin that has sore or painful spots
5. stinging or burning feeling
6. discomfort or pain in the afflicted regions
7. inflammation or swelling around the hair follicles
8. blisters or abscesses with pus
9. Skin that has rusty or scaly spots
10. raised lumps with a hair shaft in the middle
11. Acne with white heads surrounding the hair follicles
12. emergence of tiny scabs
13. growth of boils or significant, painful abscesses
14. spread of the pimples or rash
15. red pimples or pustules in groups
16. Feeling of itchiness or tingling in the troubled regions
17. discharge or oozing from the lumps
18. development of skin scabs or crusts
19. Touching the afflicted regions causes pain or soreness.
20. increased sensitivity or discomfort when shaving
21. hyperpigmentation or skin darkening of the afflicted area
22. lymph nodes that are swollen or enlarged in the afflicted area
23. Chronic or recurrent folliculitis
24. Boils or carbuncles appearing
25. creation of cysts or nodules filled with pus
26. development of exposed wounds or ulcers
27. blood in the fluid dripping from the lumps
28. infection spreading to surrounding skin regions
29. Flu-like symptoms or a fever
30. fatigue or unwell-feeling
31. sensitive or painful scalp
32. Hair thinning or loss in the affected area
33. rapidly advancing or getting worse symptoms
34. Previous history of chronic or recurring folliculitis
35. history of using hot tubs or pools with low levels of chlorine
36. a history of using grooming items that were dirty or contaminated
37. heavy perspiration or rubbing on the afflicted skin in the past
38. a history of donning constrictive garments or other moisture-retaining gear
39. Skin disorders that have damaged the skin barrier in the past
40. Immune system weaker in the past
41. recent history of antibiotic usage
42. previous history of exposure to hot, muggy conditions
43. previous exposure to animals or unclean surfaces
44. Previous history of pinching or scratching the afflicted regions
45. Use of harsh or irritant-causing cleansers or chemicals on the skin in the past
46. recent history of sun exposure or sunburn
47. History of using dull blades or shaving against the grain

Completion of the Project

- Import PyPDFLoader and upload pdf



The screenshot shows a Jupyter Notebook interface with the following code cells:

- Cell 1: `!pip install pypdf`
- Cell 2: `from langchain.document_loaders import PyPDFLoader
from langchain.vectorstores import Chroma`
- Cell 3: `[] loader=PyPDFLoader("180608V_MHASimak_report.pdf")
pages=loader.load_and_split()`
- Cell 4: `[] pages[1]`
- Cell 5: `Document(page_content='epsilon = 1e-3; % regularization factor\nfor i = 1:20\n J = double(subs(Jac, X, x));\n F_val = double(subs(F, X, x));\n x = x - (J +\n epsilon*eye(size(J)))\\F_val; % add regularization\n', metadata={'source': '180608V_MHASimak_report.pdf', 'page': 1})`
- Cell 6: `[] from langchain.agents.agent_toolkits import (create_vectorstore_agent,
VectorStoreToolkit,
VectorStoreInfo)`
- Cell 7: `[] store=Chroma.from_documents(pages, collection_name="hanbook")`

- Import OpenAI and Insert openAI key

```
import os
os.environ["OPENAI_API_KEY"]="sk-EuUAKK6zImpWVyrp2TaeT3B1bkFJ3KU1Z52PmDTxtpbu0m1S"

[ ] import os
from langchain.llms import OpenAI
from langchain.document_loaders import PyPDFLoader
from langchain.vectorstores import Chroma
from langchain.agents.agent_toolkits import (create_vectorstore_agent,
    VectorStoreToolkit,
    VectorStoreInfo)
llm=OpenAI(temperature=0.9)

vectorstore_info=VectorStoreInfo(
    name="uom_handbook",
    description="All details students require",
    vectorstore=store
)
toolkit=VectorStoreToolkit(vectorstore_info=vectorstore_info)

agent_executor=create_vectorstore_agent(
    llm=llm,
    toolkit=toolkit,
    verbose=True
)
```

- Result(Output)

```
[ ] prompt="what is the name of the document"

▶ response=agent_executor.run(prompt)

👤
> Entering new AgentExecutor chain...
I need to determine which tool can answer this
Action: uom_handbook
Action Input: what is the name of the document
Observation: This is a piece of code.
Thought: I need to determine which tool can answer this
Action: uom_handbook_with_sources
Action Input: what is the name of the document
Observation: {"answer": "The name of the document is 180608V_MHASimak_report.pdf.\n", "sources": "180608V_MHASimak_report.pdf"}
Thought: I now know the final answer
Final Answer: The name of the document is 180608V_MHASimak_report.pdf.

> Finished chain.

[ ] response
'Plnr. A. L. Susantha is a full-time multi-disciplinary academic staff member of the Department of Town & Country Planning at the University of Moratuwa. They have a BSc in Estate Management and Valuation, an MSc in Town & Country Planning, and a PhD in Reading. They are also a Chartered Town Planner.'
```

Achievements



- ✓ Collecting Necessary Dataset
- ✓ Preparing the necessary environment in the machine
- ✓ Drawing Necessary Wireframes

What's to be done

- Convert and Clean the collected data for the ML model training
- Finishing the ML model creating and training the model
- Completing the mobile App
- Integrating the components and testing the Application

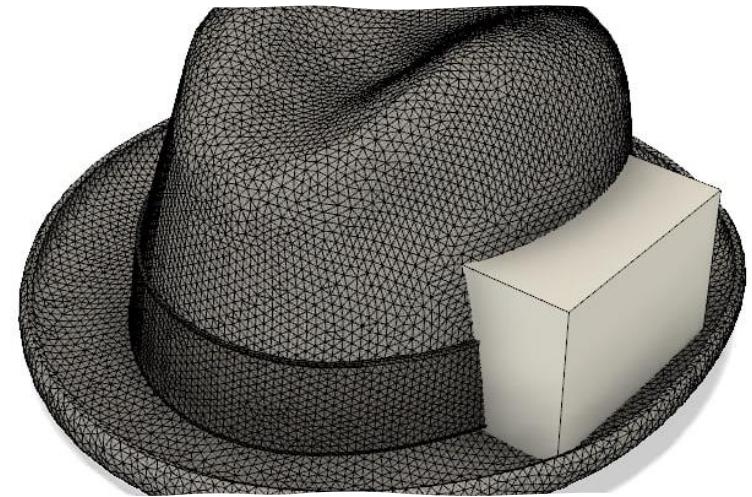




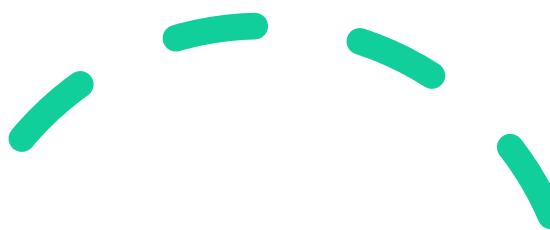
IT20129026
Alahakoon D.Y.R

Specialize in Information Technology

Smart Hair Health Monitoring.

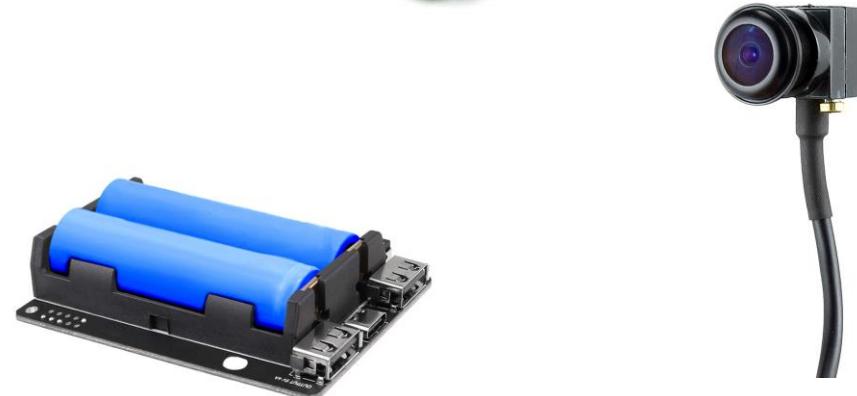


IOT Hat Design



IOT Device Components.

- Rasberry PI Board
- 2MP wide angle 2.4mm camera
- LED Flasher
- 2500mAh lithium battery 7.4V
- Jumper wires
- Battery Holder
- IR sensor



Background



- Why monitoring real time hair health?
- How to detect hair health



Research Problem

How machine-learning-based IOT systems take place the monitoring of hair disease using risk factors?



Research Gap



The research aims to develop an intelligent hair disease detection IoT system using machine learning algorithms and sensor technology to address the current gap in early detection of hair diseases, especially in remote areas where access to quality hair care is limited.

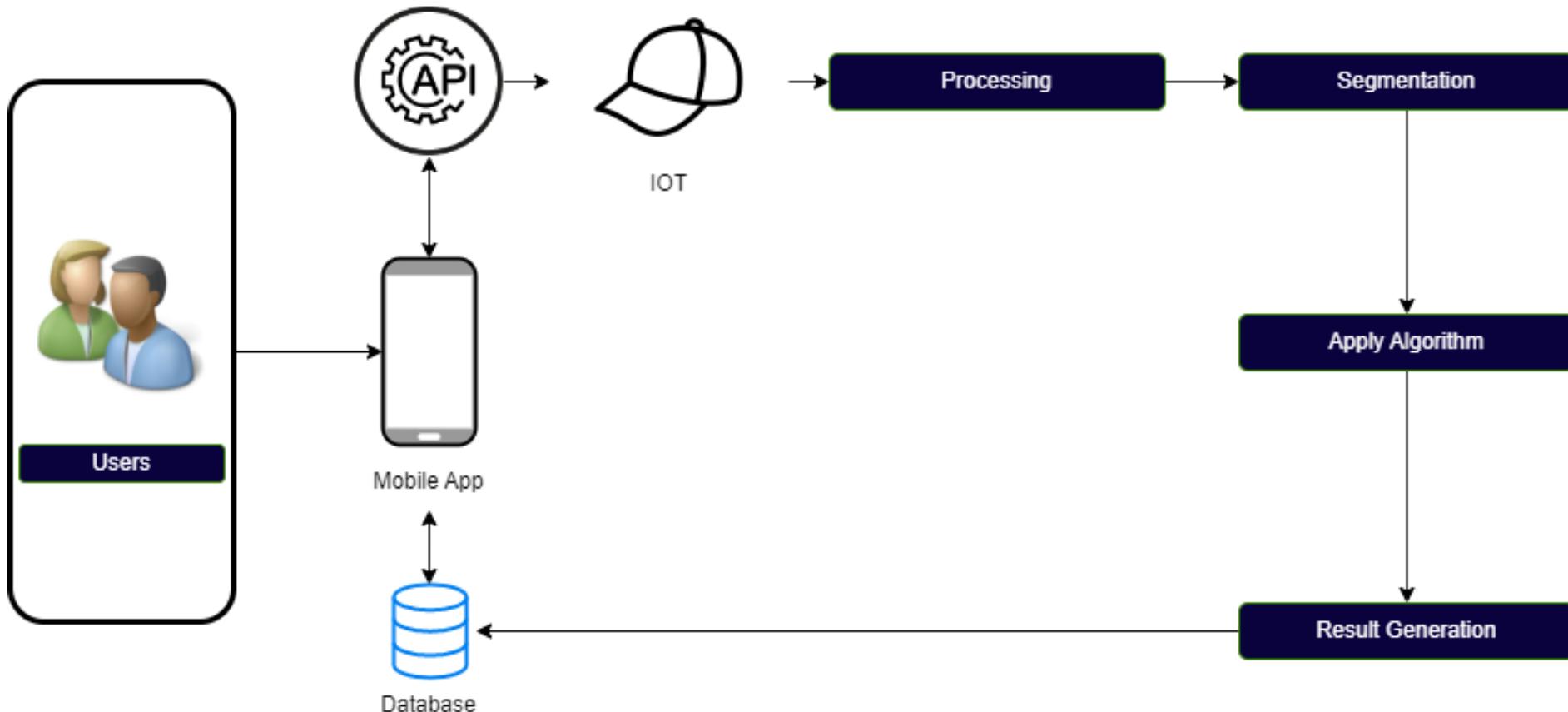


Objectives

- Collect dataset to the related images.
- Training data set and get maximum accuracy and low loss.
- Design and implement necessary mobile application.
- Testing and improving.



System Diagram



Dataset

Using KAGGLE dataset that dataset given 10 hair diseases images. We choose 5 diseases.

- Head Lice
- Alopecia Areata
- Telogen Effluvium
- Tinea Capitis
- Folliculitis



<https://www.kaggle.com/datasets/sundarannamalai/hair-diseases>

Kaggle Dataset



test (10 directories)

View Details >

Alopecia Areata 120 files	Contact Dermatitis 120 files	Folliculitis 120 files	Head Lice 120 files	Lichen Planus 120 files
Male Pattern Baldness 120 files	Psoriasis 120 files	Seborrheic Dermatitis 120 files	Telogen Effluvium 120 files	Tinea Capitis 120 files

Data Explorer

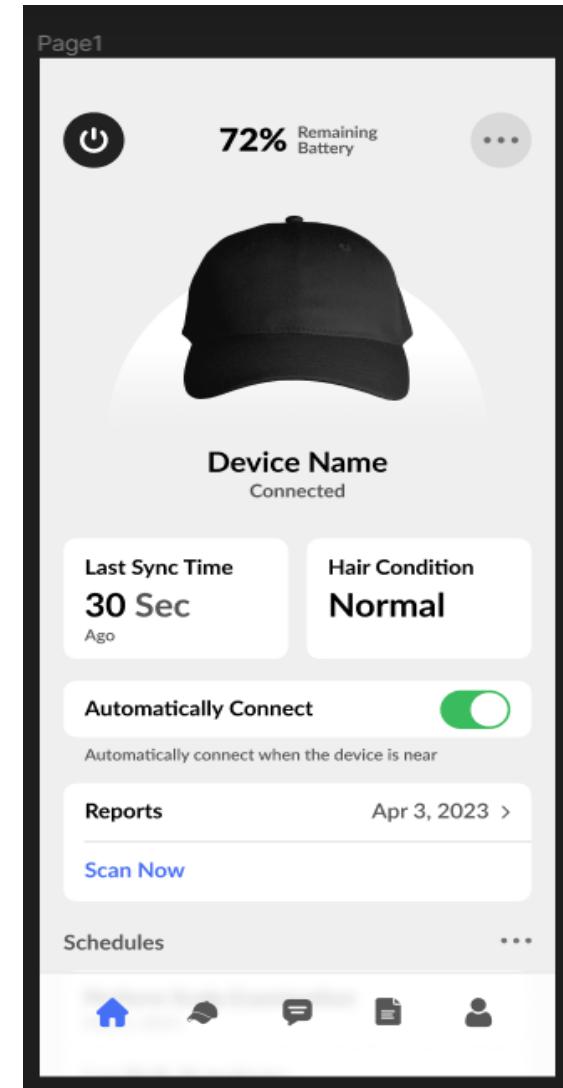
Version 1 (591.63 MB)

- ▶ Hair Diseases - Final
 - ▶ test
 - ▶ Alopecia Areata
 - ▶ Contact Dermatitis
 - ▶ Folliculitis
 - ▶ Head Lice
 - ▶ Lichen Planus
 - ▶ Male Pattern Baldne
 - ▶ Psoriasis
 - ▶ Seborrheic Dermatit
 - ▶ Telogen Effluvium
 - ▶ Tinea Capitis
 - ▶ train
 - ▶ val

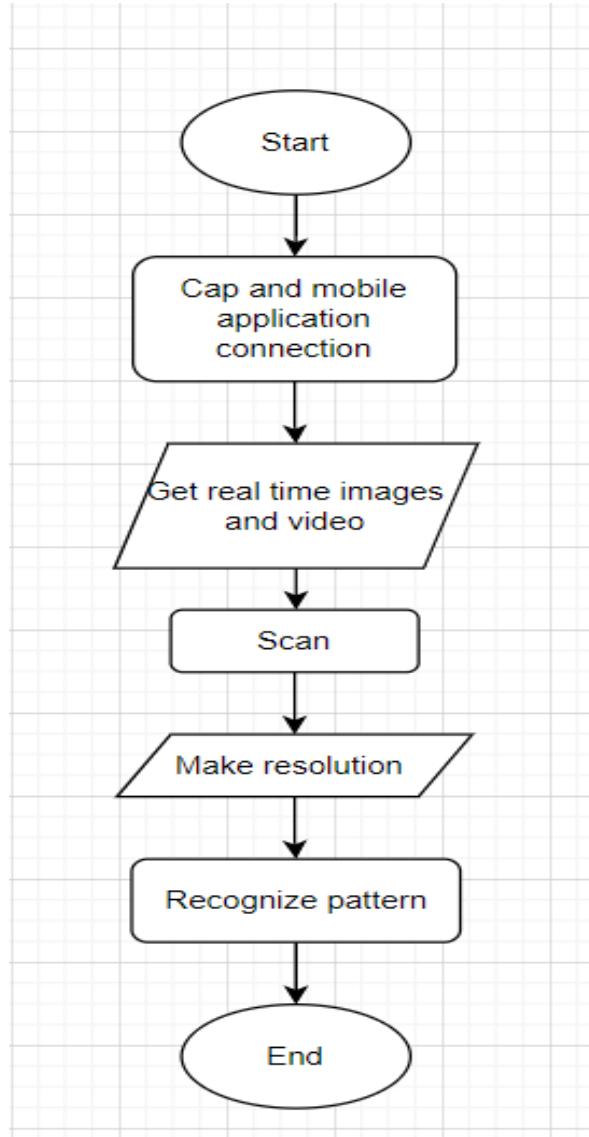
UI Design



- Showing Battery percentage.
- Showing hair condition.
- Show hair images real time.
- Show previous images.
- Show last connected time.
- IOT device power on off function given to the application.



System Flow Chart



Tools and Technologies

- **Flutter**
- **Firebase**
- **Python**
- **Conclusion Neural Network (CNN) / ML**
- **Image Processing (IP)**
- **Kaggle**



Completion of the Project

```
6s
import torch
from torch import nn
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

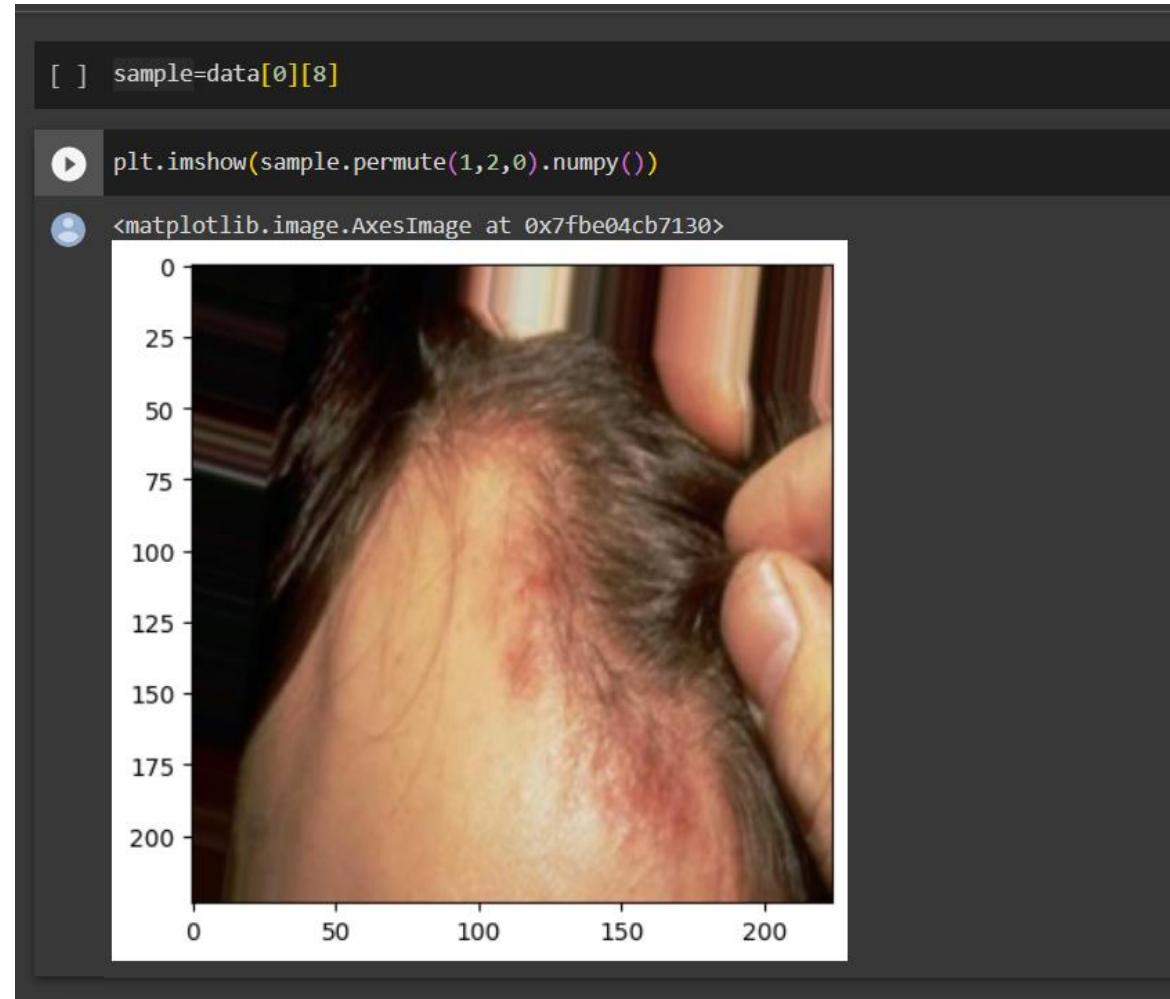
import torchvision
from torchvision import transforms
from torch.utils.data import Dataset
from torch.utils.data import DataLoader
from torchvision import datasets

from tqdm.auto import tqdm
import sklearn
from sklearn.model_selection import train_test_split
```

Completion of the Project

```
▶ #imade_transforms
  all_transforms=transforms.Compose([
    transforms.Resize((224, 224)),
    transforms.ToTensor()])
#Data_folder_read
  train_dataset=torchvision.datasets.ImageFolder(
    transform=all_transforms,
    root="data_set/data/train")
)
  test_dataset=torchvision.datasets.ImageFolder(
    transform=all_transforms,
    root="data_set/data/test")
)
```

Completion of the Project



Completion of the Project

```
    test_loss=test_loss/len(test_dataloader)
    test_accuracy=test_accuracy/len(test_dataloader)

    print(f"Testing loss: {test_loss:.5f} Test_accuracy {test_accuracy:.2f}")

#evaluation function
def evaluate(model:torch.nn.Module,
            loss_func:torch.nn.Module,
            data_loader:torch.utils.data.DataLoader,
            accu,
            device
            ):
    model_name=model.__class__.__name__
    model.eval()
    loss,accuracy=0,0
    with torch.inference_mode():
        for x,y in tqdm(data_loader):
            x,y=x.to(device),y.to(device)
            predict=model(x)
            loss+=loss_func(predict,y)
            accuracy+=accu(predict.squeeze().argmax(dim=1),y)
    loss=loss/len(data_loader)
    accuracy=accuracy/len(data_loader)
    return {"Model Name":model_name,"Accuracy":accuracy,"Loss":loss.item()}
```

COLAB LINK

<https://colab.research.google.com/drive/1ZghC5f6BWMWo1izweuUEACgI3ZOSlMja?usp=sharing>



What's to be done

- Implement IOT Hat
- Finishing the ML model creating and training the model
- Training dataset.
- Completing the mobile App
- Integrating the components and testing the Application



Any
Question



Thank You

