Sri Lanka Institute of Information Technology

DISTRIBUTED HEALTH CARE FRAMEWORK FOR PATIENT HEALTH RECORD MANAGEMENT AND PHARMACEUTICAL DIAGNOSIS

Project ID: **2022-110**

STATUS DOCUMENT

Lekamalage U.L.V.M. - IT19111766

Group Details

Supervisor: **Mr. Jeewaka Perera**

Co-Supervisor: **Ms. Laneesha Ruggahakotuwa**

Student Name	Student Number
Wickramarathna W.G.M.S.	IT19004778
De Silva K.H.K.L	IT19006994
Lekamalage U.L.V.M.	IT19111766
Chathuranga S.J	IT19043388

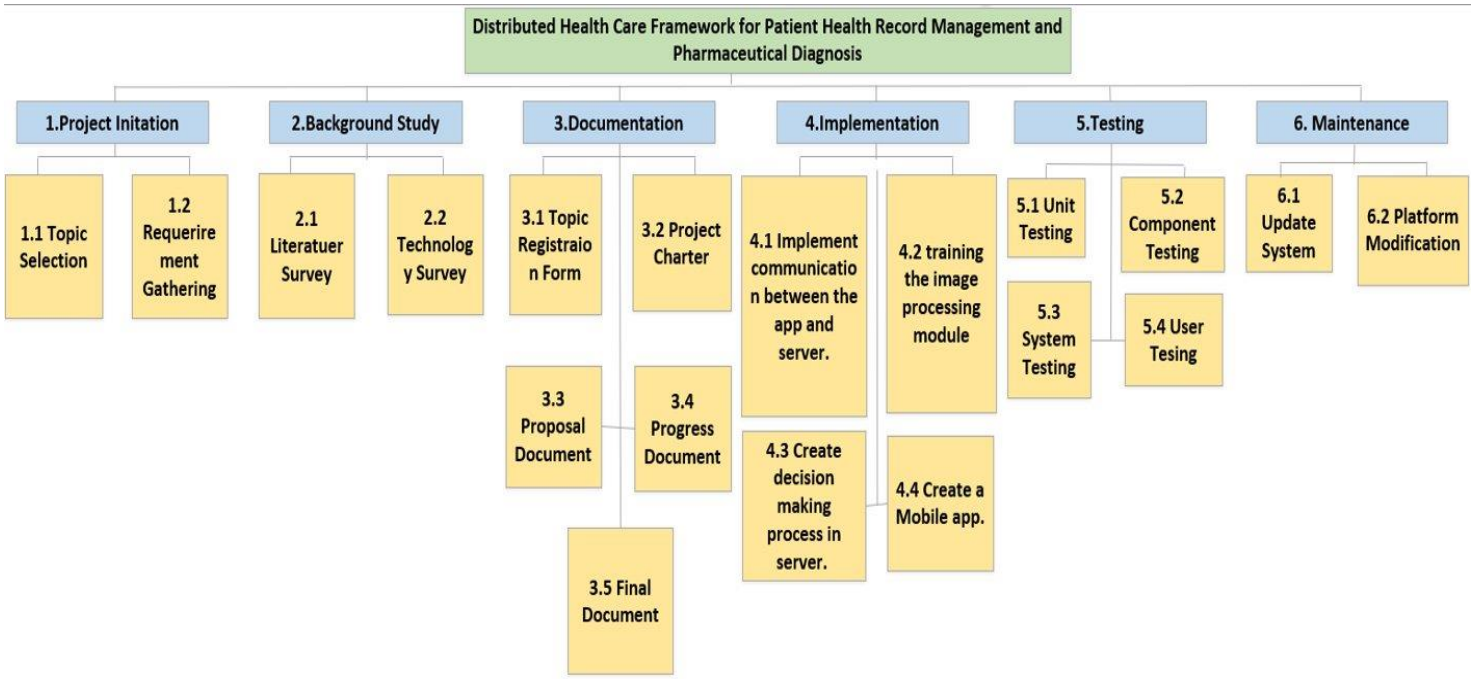
Contents

Group Details i
1. Gantt Chart 1
2. Work Breakdown Structure 1
3. Screenshots of MS Teams 2
3.1 SCRUM Meetings 2
3.2 Teams Shared Folder 8
3.3 Team Members 9
4. Screenshots of Teams Planner 9
4.1 Teams Board 9
4.2 Teams Chart Overview 10
5. Screenshots of GitLab 11
5.1 Project Overview 11
5.2 Members 11
5.3 READEME file with Project Details 12
5.4 Git Commits 13
5.5 Git Charts 14
5.6 Folder Structure 16
6. Task Output / Progress – 50% 17

1. Gantt Chart

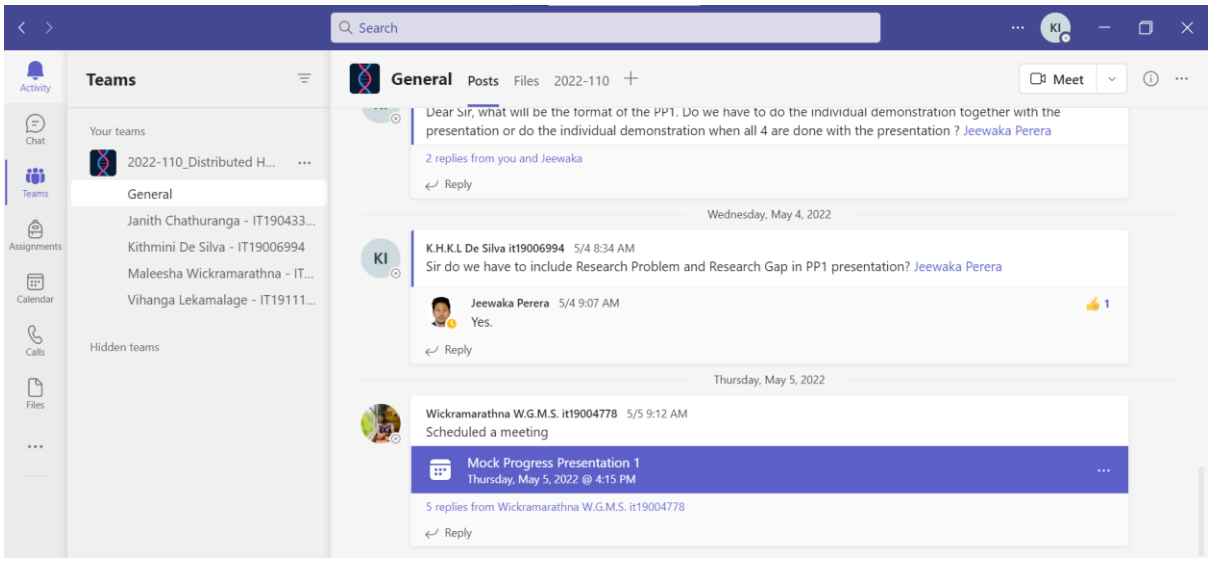
Description	December	January	February	March	April	May	June	July	August	September	October	November	December
Project Initiation													
Evaluation													
Project Charter													
Proposal Draft													
Proposal Presentation													
Project Phase													
Collecting Required Data													
System Planning													
Selecting Technologies													
Research Paper													
Implementation Phase													
Implement communication between the app and server.													
training the image processing module													
Create an application to Carry out all the related functions.													
Create decision making process in server.													
Testing Phase and Evaluation													
Testing													
Final Report and Research paper													
Final Evaluation													

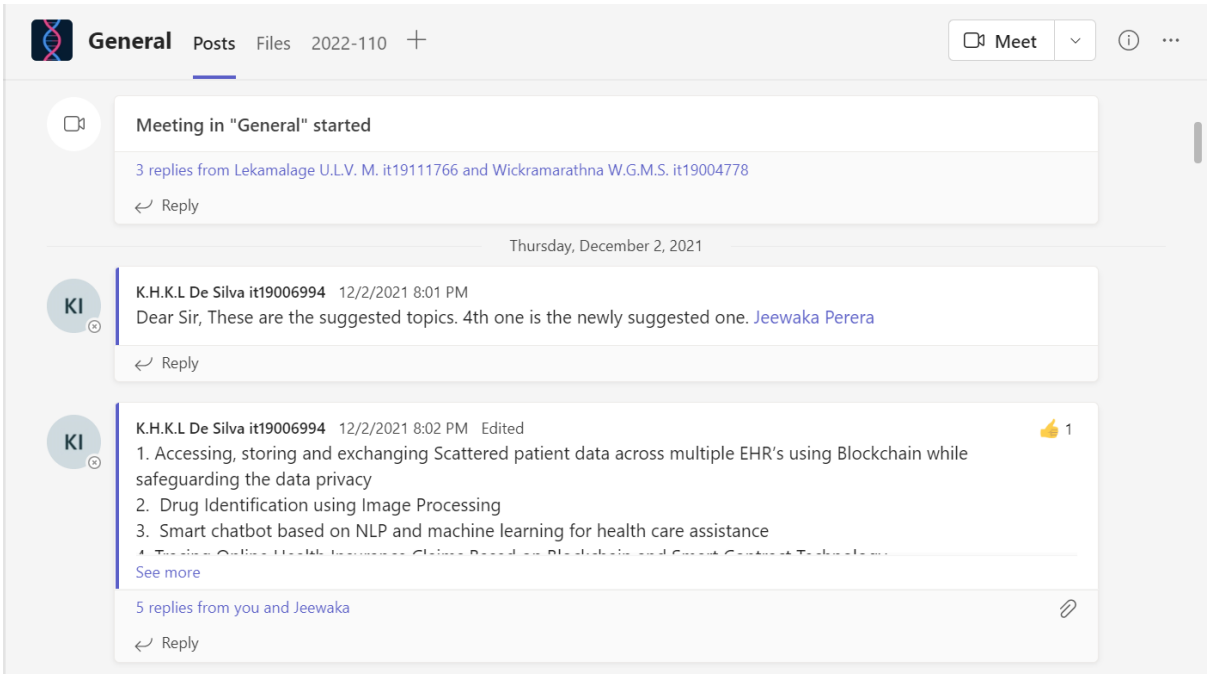
2. Work Breakdown Structure

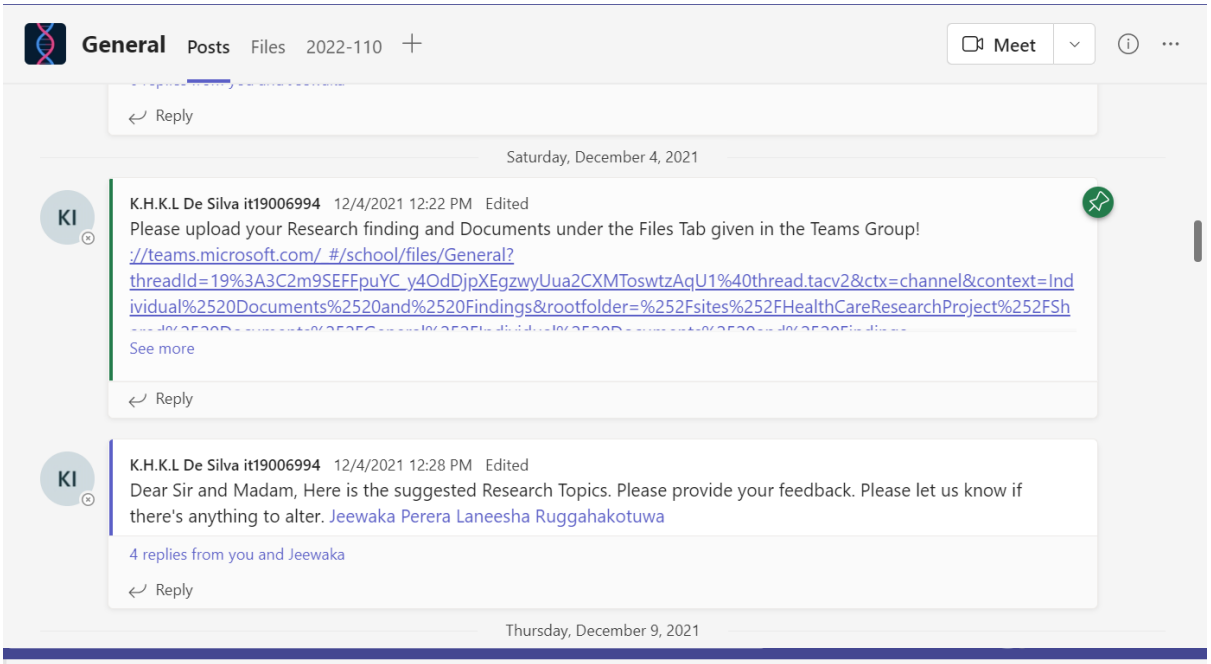


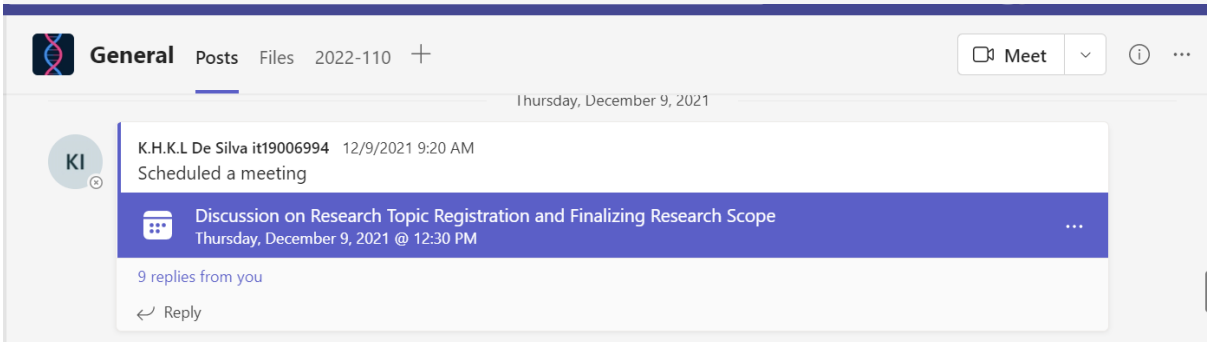
3. Screenshots of MS Teams

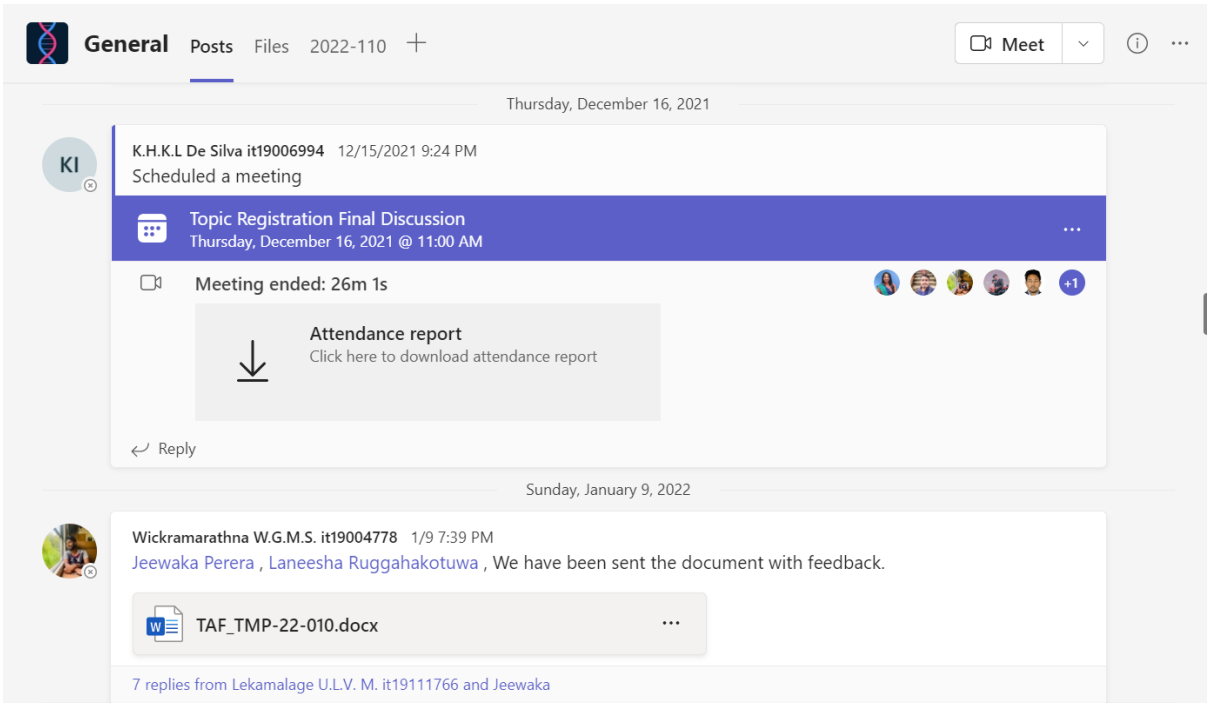
3.1 SCRUM Meetings

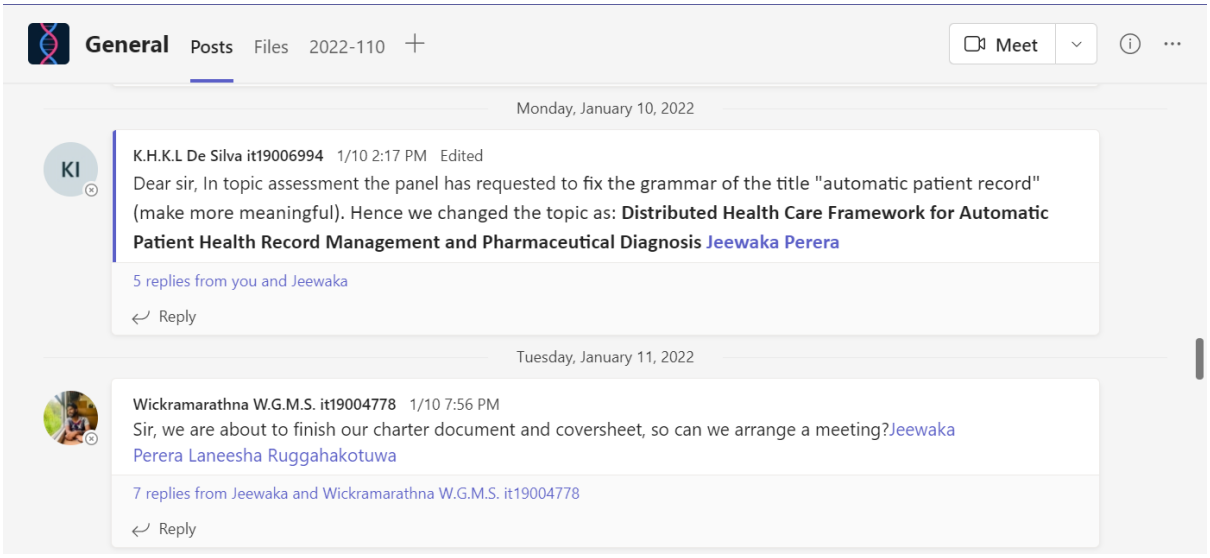


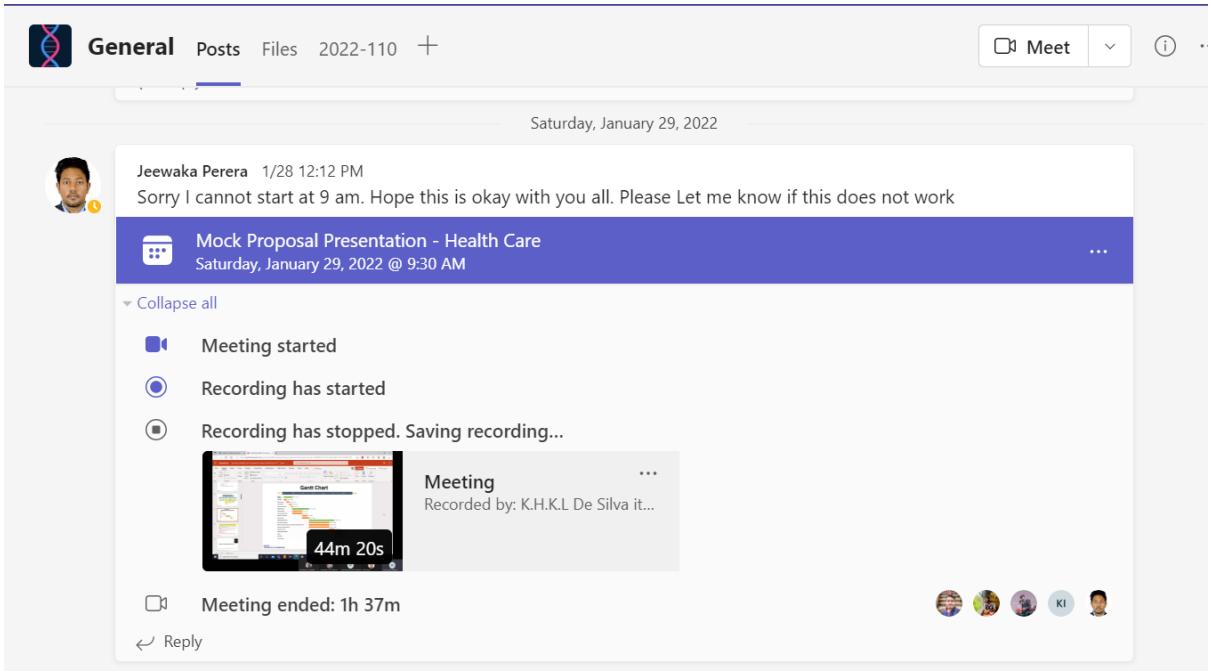


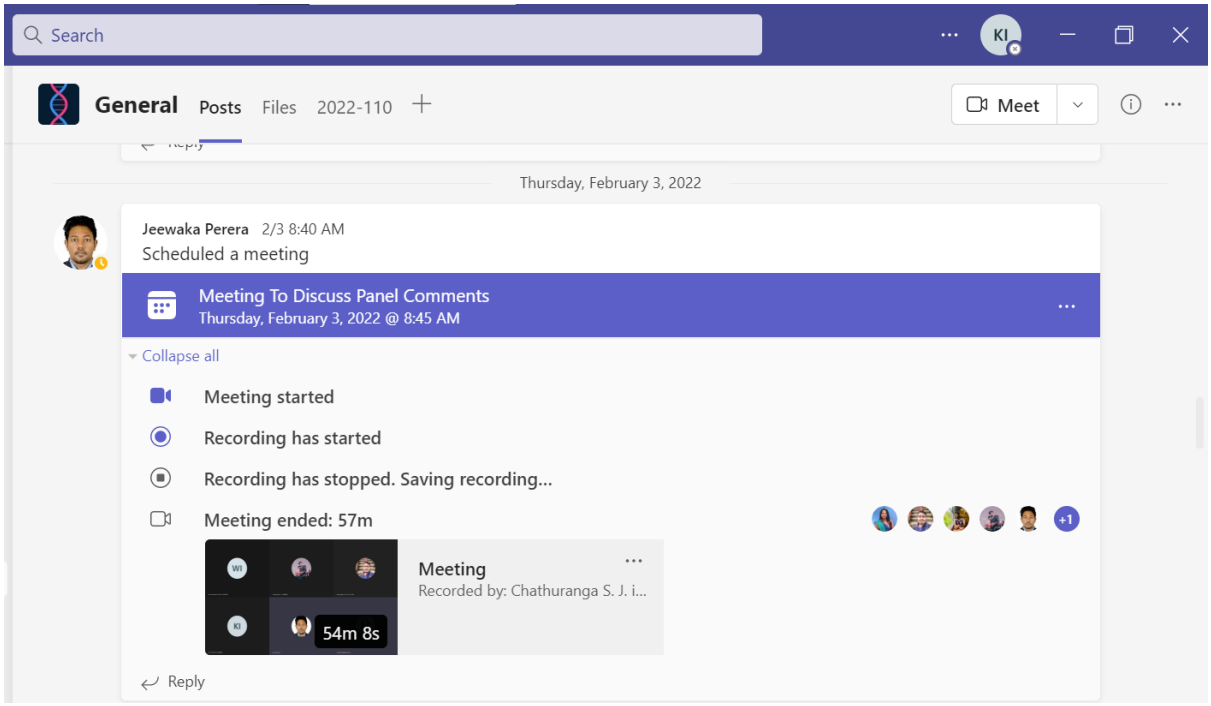

General
Posts
Files
2022-110
Meet
Reply
Saturday, December 4, 2021
KI
K.H.K.L De Silva it19006994 12/4/2021 12:22 PM Edited
Please upload your Research finding and Documents under the Files Tab given in the Teams Group!
://teams.microsoft.com/ #/school/files/General?
threadId=19%3A3C2m9SEFFpuYC_y4OdDjpXEgzwyUua2CXMToswtzAqU1%40thread.tacv2&ctx=channel&context=Individual%2520Documents%2520and%2520Findings&rootfolder=%252Fsites%252FHealthCareResearchProject%252FSh
See more
Reply
KI
K.H.K.L De Silva it19006994 12/4/2021 12:28 PM Edited
Dear Sir and Madam, Here is the suggested Research Topics. Please provide your feedback. Please let us know if there's anything to alter. Jeewaka Perera Laneesha Ruggahakotuwa
4 replies from you and Jeewaka
Reply
Thursday, December 9, 2021

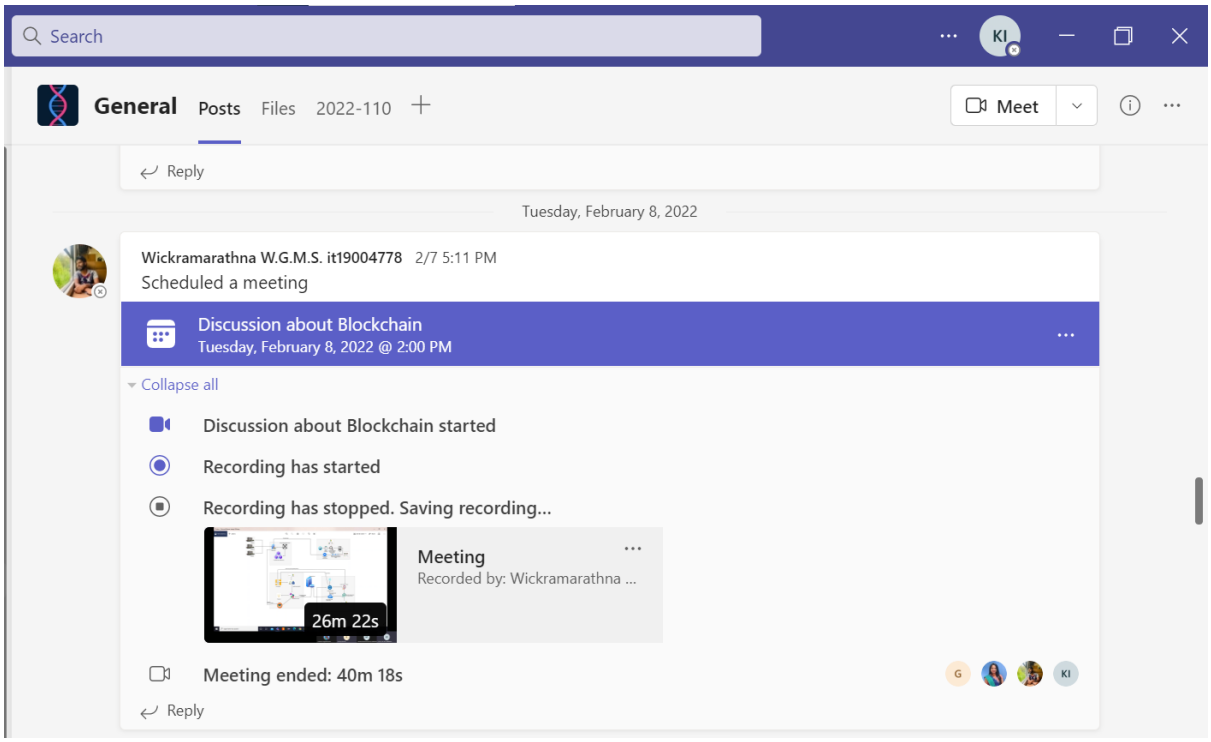

General
Posts
Files
2022-110
Meet
Thursday, December 9, 2021
KI
K.H.K.L De Silva it19006994 12/9/2021 9:20 AM
Scheduled a meeting
Discussion on Research Topic Registration and Finalizing Research Scope
Thursday, December 9, 2021 @ 12:30 PM
9 replies from you
Reply


General
Posts
Files
2022-110
Meet
Thursday, December 16, 2021
KI
K.H.K.L De Silva it19006994 12/15/2021 9:24 PM
Scheduled a meeting
Topic Registration Final Discussion
Thursday, December 16, 2021 @ 11:00 AM
Meeting ended: 26m 1s
+1
Attendance report
Click here to download attendance report
Reply
Sunday, January 9, 2022
Wickramarathna W.G.M.S. it19004778 1/9 7:39 PM
Jeewaka Perera , Laneesha Ruggahakotuwa , We have been sent the document with feedback.
TAF_TMP-22-010.docx
7 replies from Lekamalage U.L.V. M. it19111766 and Jeewaka


General
Posts
Files
2022-110
Meet
Monday, January 10, 2022
KI
K.H.K.L De Silva it19006994 1/10 2:17 PM Edited
Dear sir, In topic assessment the panel has requested to fix the grammar of the title "automatic patient record" (make more meaningful). Hence we changed the topic as: Distributed Health Care Framework for Automatic Patient Health Record Management and Pharmaceutical Diagnosis Jeewaka Perera
5 replies from you and Jeewaka
Reply
Tuesday, January 11, 2022
Wickramarathna W.G.M.S. it19004778 1/10 7:56 PM
Sir, we are about to finish our charter document and coversheet, so can we arrange a meeting?Jeewaka Perera Laneesha Ruggahakotuwa
7 replies from Jeewaka and Wickramarathna W.G.M.S. it19004778
Reply


General
Posts
Files
2022-110
Meet
Saturday, January 29, 2022
Jeewaka Perera 1/28 12:12 PM
Sorry I cannot start at 9 am. Hope this is okay with you all. Please Let me know if this does not work
Mock Proposal Presentation - Health Care
Saturday, January 29, 2022 @ 9:30 AM
Collapse all
Meeting started
Recording has started
Recording has stopped. Saving recording...
44m 20s
Meeting
Recorded by: K.H.K.L De Silva it...
Meeting ended: 1h 37m
Reply


Search
KI
General
Posts
Files
2022-110
Meet
Thursday, February 3, 2022
Jeewaka Perera 2/3 8:40 AM
Scheduled a meeting
Meeting To Discuss Panel Comments
Thursday, February 3, 2022 @ 8:45 AM
Collapse all
Meeting started
Recording has started
Recording has stopped. Saving recording...
Meeting ended: 57m
54m 8s
Meeting
Recorded by: Chathuranga S. J. i...
Reply


Search
KI
General
Posts
Files
2022-110
Meet
Reply
Tuesday, February 8, 2022
Wickramarathna W.G.M.S. it19004778 2/7 5:11 PM
Scheduled a meeting
Discussion about Blockchain
Tuesday, February 8, 2022 @ 2:00 PM
Collapse all
Discussion about Blockchain started
Recording has started
Recording has stopped. Saving recording...
26m 22s
Meeting
Recorded by: Wickramarathna ...
Meeting ended: 40m 18s
Reply

Wednesday, April 6, 2022

Meeting in "General" ended:

Attendance report
Click here to download attendance report

Reply

Wickramarathna W.G.M.S. it19004778 4/6 8:43 PM
https://teams.microsoft.com/l/meetup-join/19:meeting_NTQyMGYxNDAtOTZkYi00MTNlLTg4ODgtNThkMDY5MTA1MWMx@thread.v2/0?context=%7B%22Tid%22:%2244e3cf94-19c9-4e32-96c3-14f5bf01391a%22,%22Oid%22:%2216564c04-dfe6-4871-af4d-c77102a0eea4%22%7D

Reply

Monday, April 18, 2022

Wickramarathna W.G.M.S. it19004778 4/18 9:11 AM
Scheduled a meeting

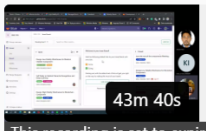
Progress Review
Monday, April 18, 2022 @ 11:00 AM

Collapse all

Progress Review started

Recording has started

Recording has stopped. Saving recording...



Meeting
Recorded by: Wickramarathna ...

This recording is set to expire. View or change the expiration date here. Learn more

Meeting ended: 1h 11m

Reply

Saturday, April 23, 2022

Meeting in "General" ended: 1h 19m

Reply

Wednesday, April 27, 2022

Meeting in "General" ended: 1h 6m

Reply

Tuesday, May 3, 2022

Meeting in "General" started

6 replies from Chathuranga S. J. it19043388, Wickramarathna W.G.M.S. it19004778, and Lekamalage U.L.V. M. it19111766

Meeting ended: 3h 22m

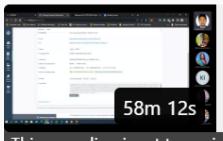
Reply

Thursday, May 5, 2022

Wickramarathna W.G.M.S. it19004778 Thursday 9:12 AM
Scheduled a meeting

Mock Progress Presentation 1
Thursday, May 5, 2022 @ 4:15 PM

4 replies from Wickramarathna W.G.M.S. it19004778



Meeting
Recorded by: K.H.K.L De Silva it...

This recording is set to expire. View or change the expiration date here. Learn more

Reply

Vihanga Lekamalage - IT191117... Posts Files + Meet

Lekamalage U.L.V. M. it19111766 12/12/2021 3:31 PM
Jeewaka Perera Dear SIr, When writing the component name shall I keep it as "Drug Identification using Image Processing " or do I have to elaborate it a little?

Lekamalage U.L.V. M. it19111766 12/12/2021 3:32 PM
This is my suggestions: Drug Identification using Image Processing and extract pharmaceutical data such as its side effects, dosage and etc. Which way is better?

Reply

Monday, January 10, 2022

This message has been deleted.

Collapse all

Lekamalage U.L.V. M. it19111766 1/10 4:57 PM
Jeewaka Perera Sir, we are going to add this part as sample data example for drug identification component. Is this Good enough or should add more?

Edited
The pill images used in this research are part of an open dataset that can be downloaded at:
https://www.nlm.nih.gov/databases/download/pill_image.html

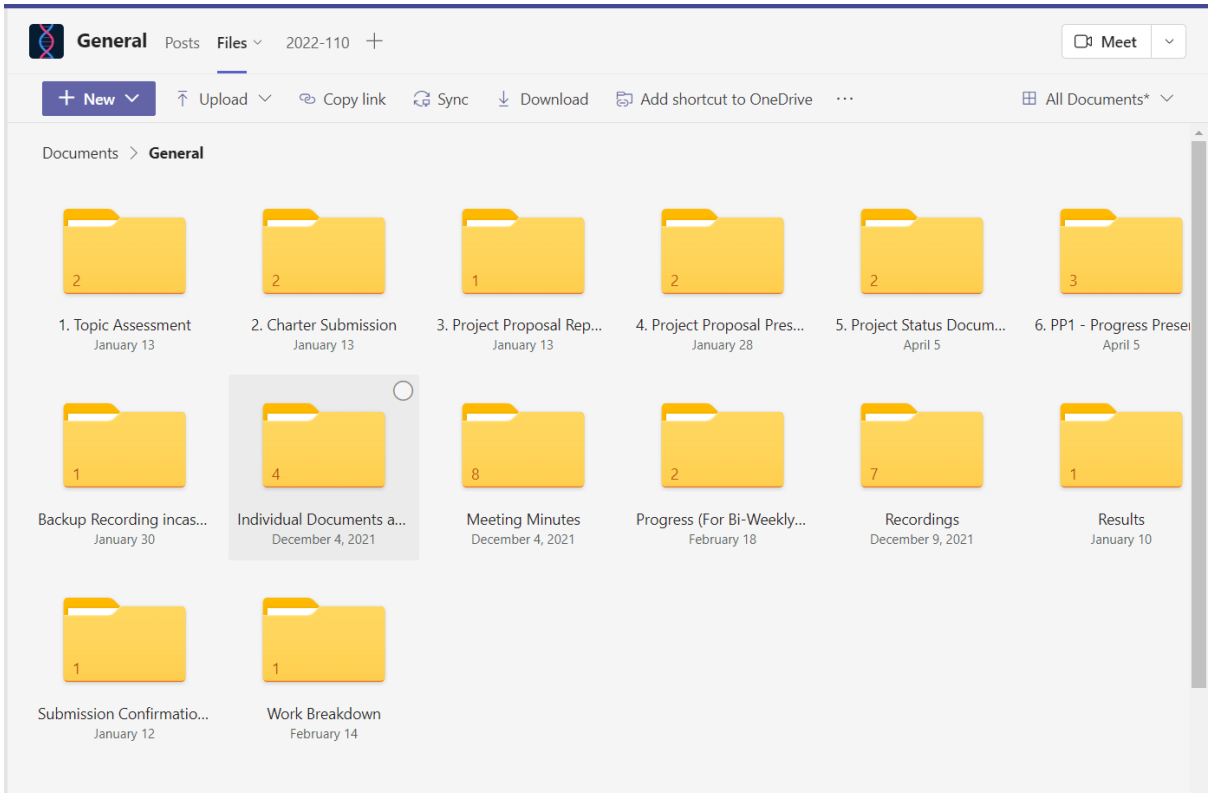
The Pill Image Recognition Challenge dataset obtained from the National Library of Medicine has two main datasets as follows:

See more

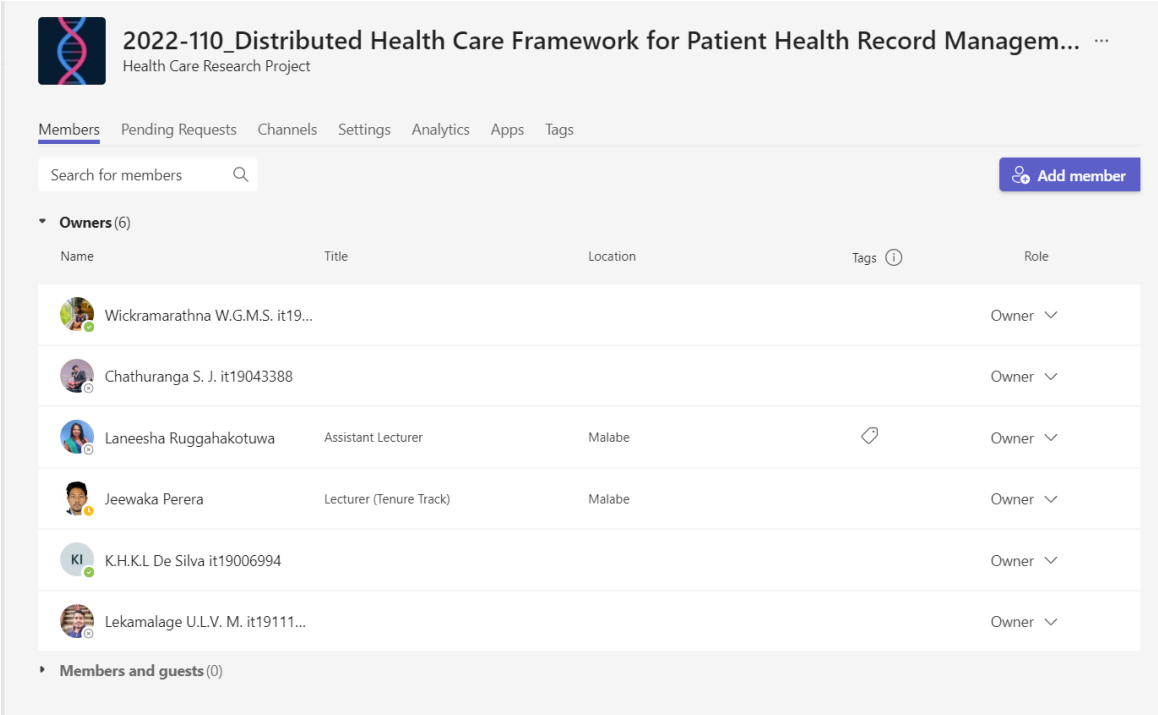
Jeewaka Perera 1/10 4:58 PM
This should be good for now

Reply

3.2 Teams Shared Folder

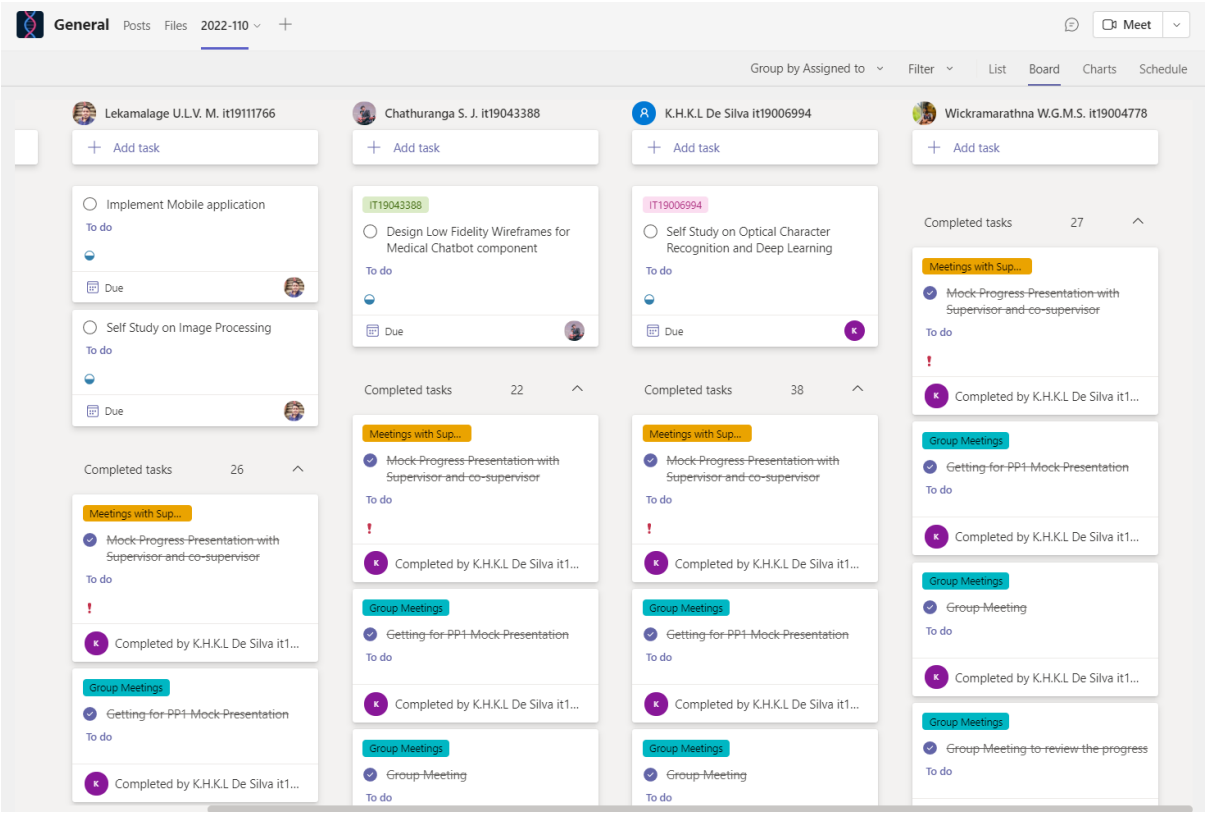


3.3 Team Members

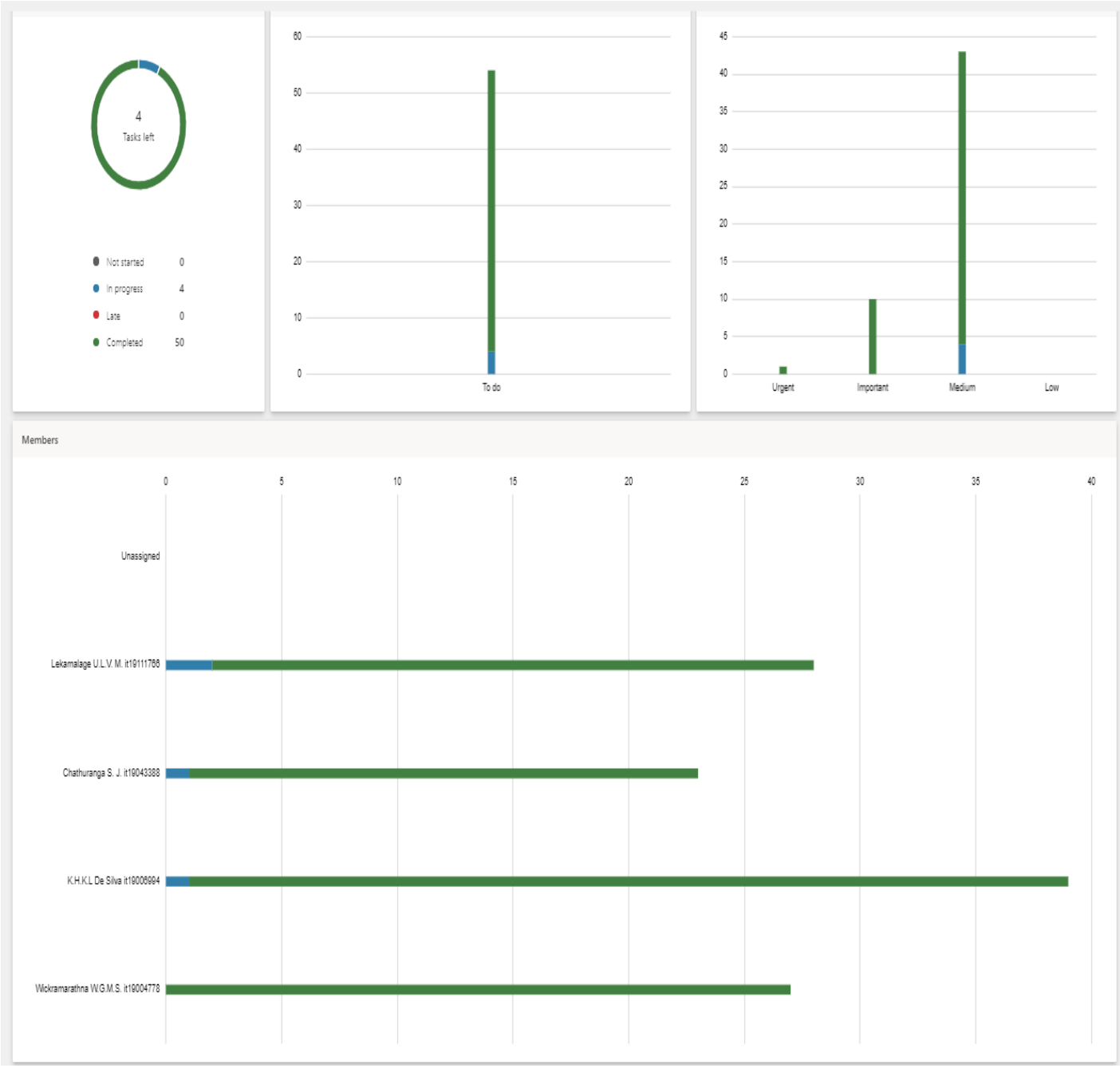


4. Screenshots of Teams Planner

4.1 Teams Board

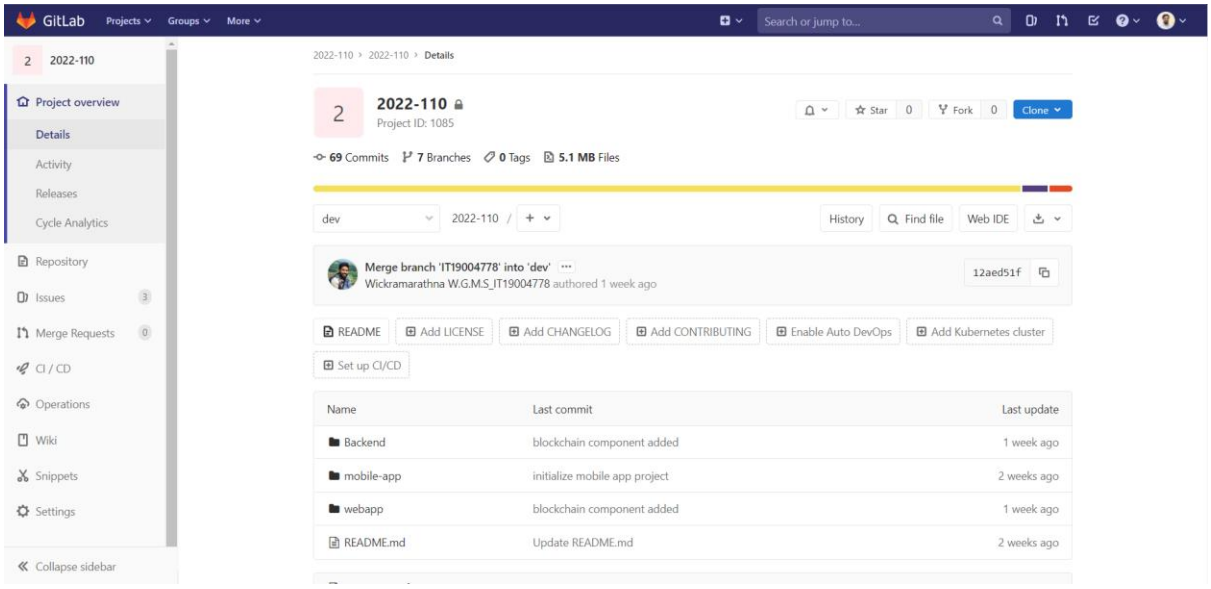


4.2 Teams Chart Overview

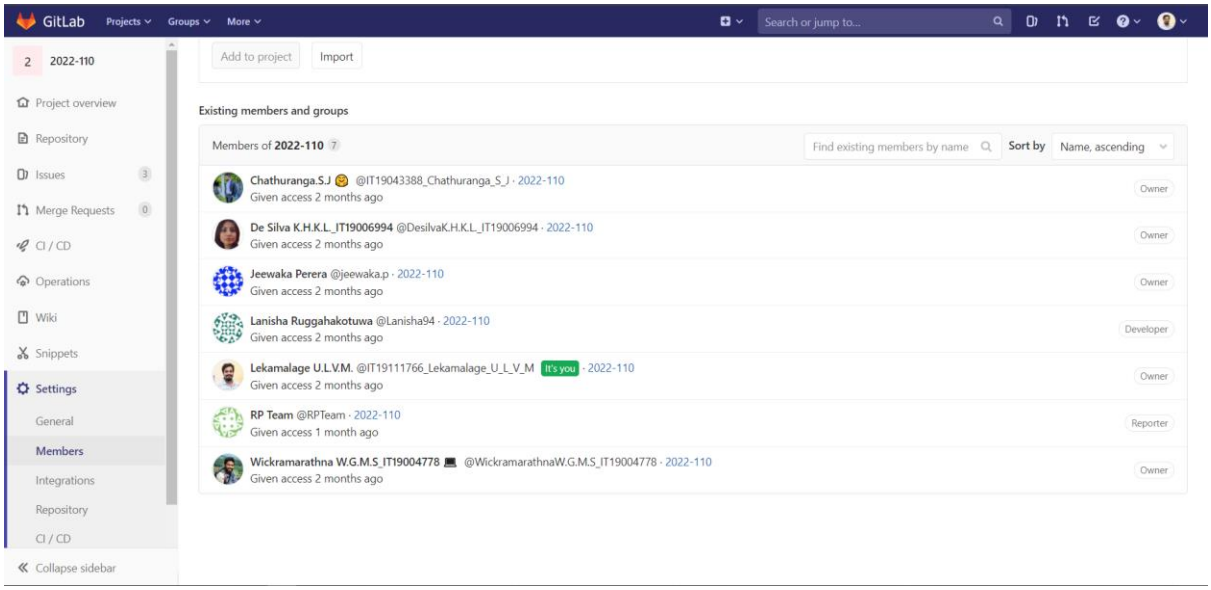


5. Screenshots of GitLab

5.1 Project Overview



5.2 Members



5.3 READEME file with Project Details

Backend	blockchain component added	4 days ago
mobile-app	initialize mobile app project	1 week ago
webapp	blockchain component added	4 days ago
README.md	Update README.md	1 week ago

README.md

2022-110

Distributed Health Care Framework for Patient Health Record Management and Pharmaceutical Diagnosis.

Main Objective

Solving healthcare issues during COVID-19 by providing a healthcare framework for automatically storing patients' records protecting users' privacy while providing healthcare services like a virtual assistant for pharmaceutical diagnosis for people staying at home conducting social distancing.

Main Research Questions

No Healthcare institution in Sri Lanka has a registered population, and the patient's medical records are kept by the health service or doctor who is treating the patient for a specific disease, as it is in most care settings. As a result, many caregivers are unable to communicate effectively, resulting in poor care coordination. Many research institutes are working on finding solutions for healthcare issues that occur during a pandemic and EHR (Electronic Health Record) systems are becoming more popular. Accessing scattered patient data across several EHRs, however, remains a challenge. In most countries, it is very difficult for individuals to access electronic health records since most of the medical documents such as lab test reports, prescriptions from hospitals are in printed format and it's time-consuming and error-prone when manually entering data and converting them to EHR. Therefore, the practical approach to extracting structured data from printed medical records remains a challenge. Not only that the third most common cause of death is not the disease, but medical error therefore, there should be a solution for the patient to get all the information about the tablets, their usage, side effects, etc. while staying at home. The Healthcare domain is in a need of a conversational agent to give reminders to take medication on time. No such distributed health care service providing framework has yet been implemented to provide healthcare solutions during the COVID-19 while securely storing patient data across several EHRs.

Individual Research question

IT19004778: EHR (Electronic Health Record) systems are becoming more popular to share patient details between hospitals but accessing scattered data across several EHRs while safeguarding patient privacy remains a challenge

IT19006994: Most of these medical records and documents are in printed format and manually entering those into EHR systems is time-consuming and error-prone.

IT19111766: Pharmaceutical error is a critical healthcare problem, but it is even riskier to visit doctors for pharmaceutical diagnosis during a pandemic.

IT19043388: The Healthcare domain is in a need of a conversational agent to give reminders to take medication on time.

Individual Objectives

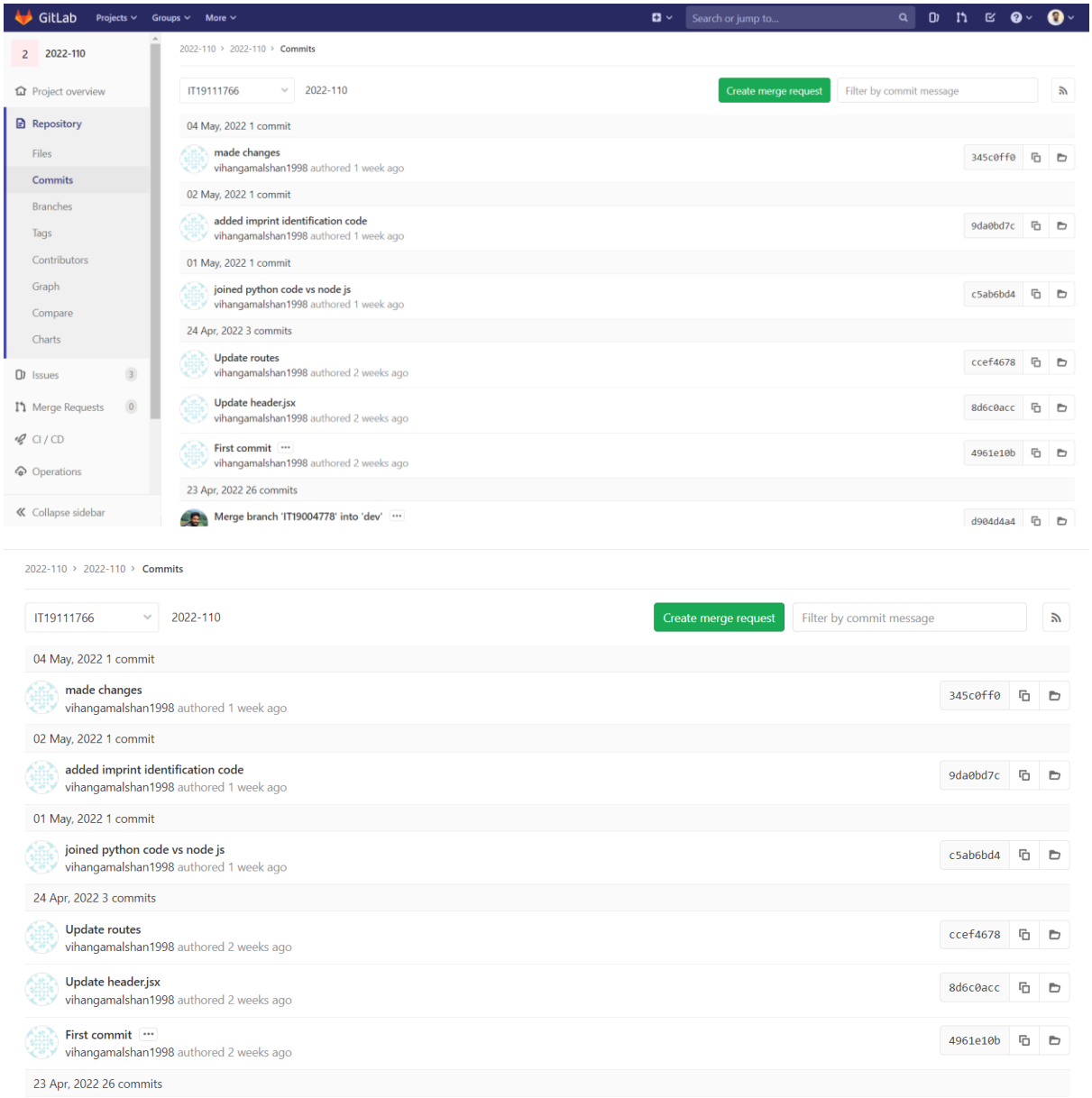
IT19004778: To protect patients' data privacy while tracking/sharing healthcare records with healthcare professionals.

IT19006994: To scan and extract relevant data from Patient Medical Documents using Deep Learning while preventing human errors that cause when manually entering data.

IT19111766: To identify Drugs using Image Processing and extracting pharmaceutical data such as its side effects, dosage, etc.

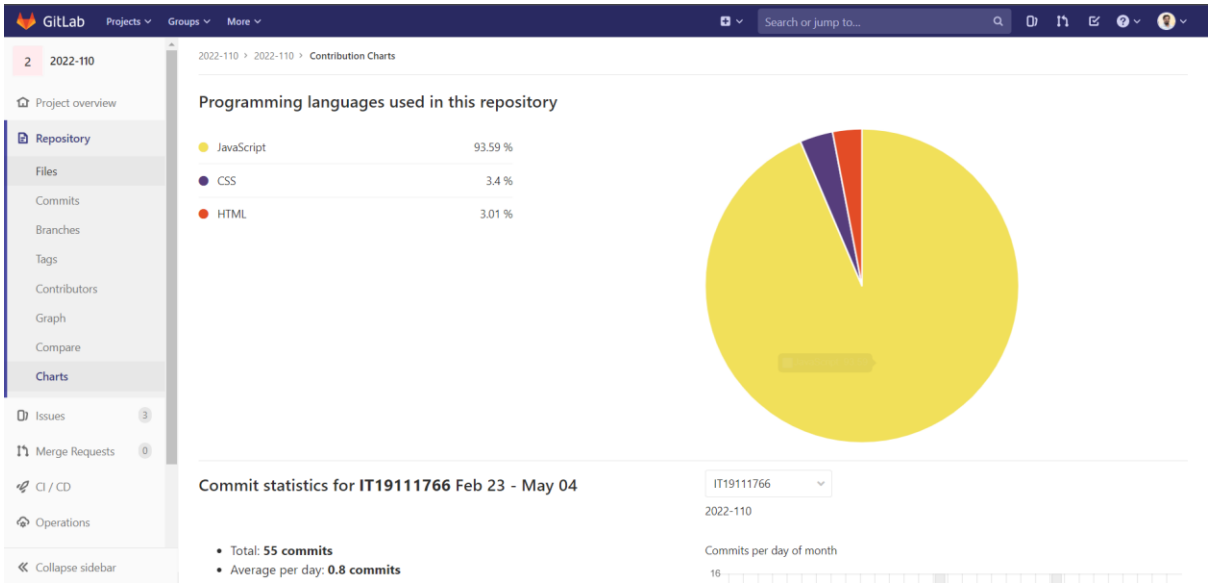
IT19043388: The Healthcare domain is in a need of a conversational agent to give reminders to take medication on time and give appropriate responses according to prescription.

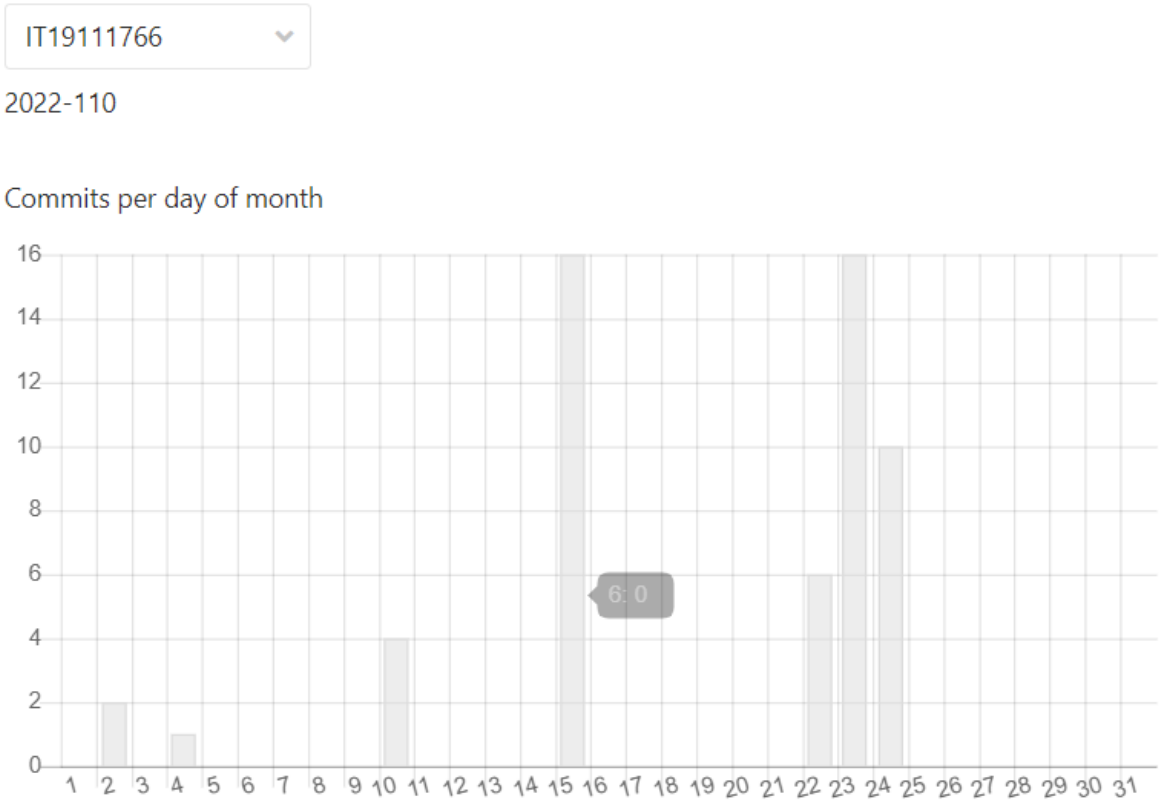
5.4 Git Commits



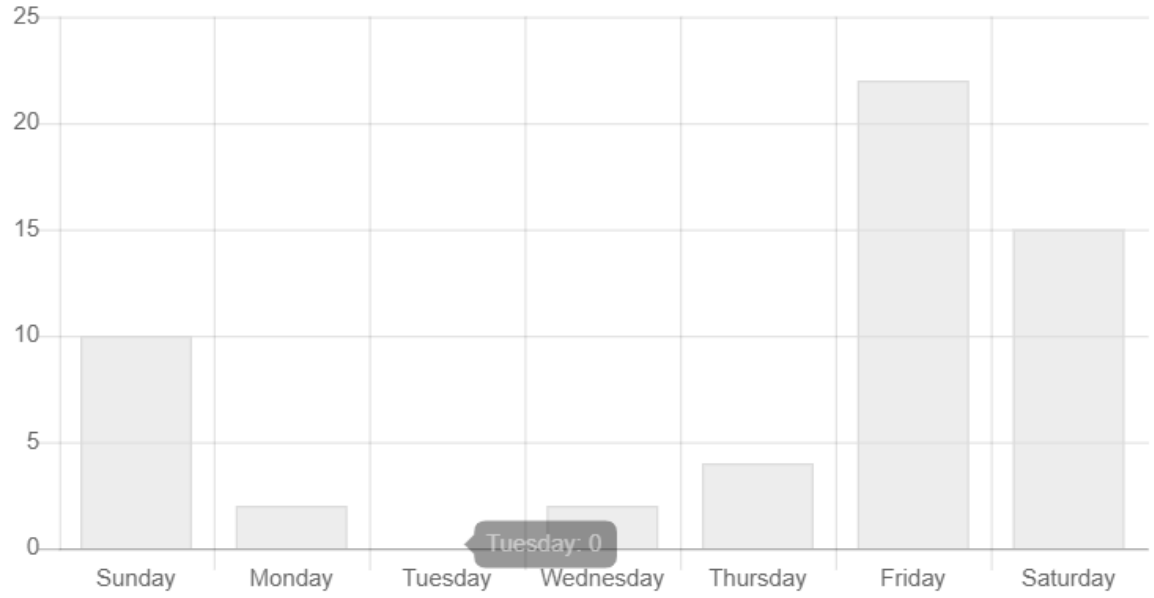
2022-110 › 2022-110 › Commits
IT19111766
2022-110
Create merge request
Filter by commit message
04 May, 2022 1 commit
made changes
vihangamalshan1998 authored 1 week ago
345c0ff0
02 May, 2022 1 commit
added imprint identification code
vihangamalshan1998 authored 1 week ago
9da0bd7c
01 May, 2022 1 commit
joined python code vs node js
vihangamalshan1998 authored 1 week ago
c5ab6bd4
24 Apr, 2022 3 commits
Update routes
vihangamalshan1998 authored 2 weeks ago
ccef4678
Update header.jsx
vihangamalshan1998 authored 2 weeks ago
8d6c0acc
First commit
vihangamalshan1998 authored 2 weeks ago
4961e10b
23 Apr, 2022 26 commits

5.5 Git Charts

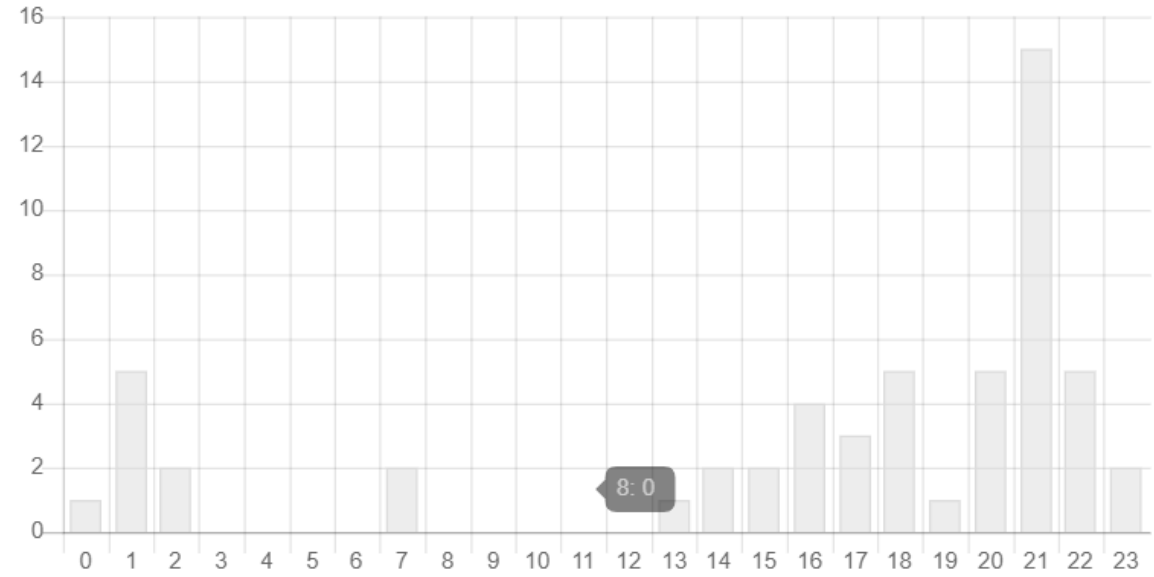




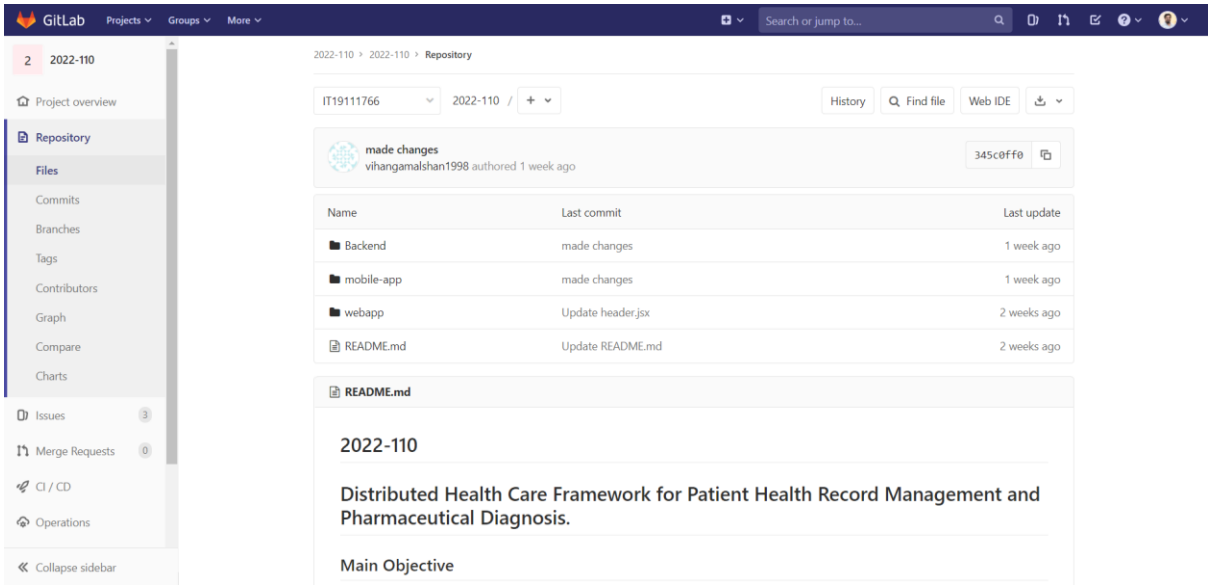
Commits per weekday



Commits per day hour (UTC)



5.6 Folder Structure



6. Task Output / Progress – 50%

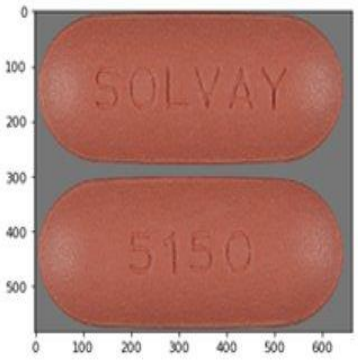
- Install required software
- Data set gathering
- Load Drug image and extract the imprint

```
response=client.detect_text(Image={'S3Object':{'Bucket':'drugidentification','Name':photo}})

textDetections=response['TextDetections']
print ('Detected text\n----------')
text2 = ""
for text in textDetections:
    if text['DetectedText'] not in text2:
        text2 = text2 + text['DetectedText']
text2 = ''.join(text2.split())
print(text2)
```

```
Detected text
----------
L403
```


```
response=client.detect_text(Image={'S3Object':{'Bucket':'drugidentification','Name':phot

textDetections=response['TextDetections']
print ('Detected text\n----------')
text2 = ""
for text in textDetections:
    if text['DetectedText'] not in text2:
        text2 = text2 + text['DetectedText']
text2 = ''.join(text2.split())
print(text2)
```

```
Detected text
----------
SOLVAY5150
```



- Extract Color of the drug

```
Detected text
----------
L403
```

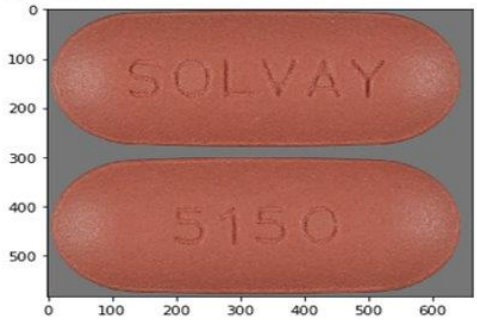

```
requested_colour = color(photo)
print(requested_colour)
```

```
Rgb(r=208, g=201, b=203)
```

```
closest_name = get_colour_name(requested_colour)
print(closest_name)
```

```
lightgray
```

```
Detected text
----------
SOLVAY5150
```




```
requested_colour = color(photo)
print(requested_colour)
```

```
Rgb(r=178, g=102, b=86)
```

```
closest_name = get_colour_name(requested_colour)
print(closest_name)
```

```
indianred
```

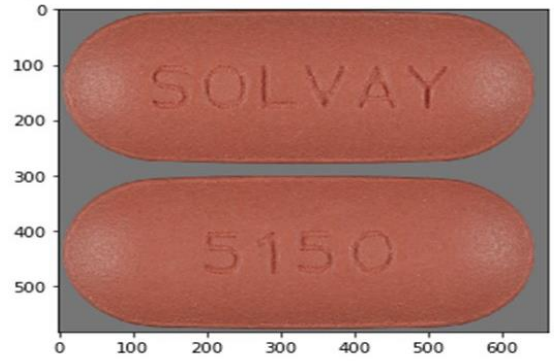
- Extract the shape of drug

```
imshow(photo)
print(shape)
```

```
CIRCLE
```


```
imshow(photo)
print(shape)
```

```
OVAL
```



- Extract all the data from REST API

POST http://localhost:8070/drug/identify

Params Authorization Headers (8) Body Pre-request Script Tests Settings

none form-data x-www-form-urlencoded raw binary GraphQL

KEY	VALUE
drug_image	acetaminophen.jpg
Key	Value

Body Cookies Headers (8) Test Results

Pretty Raw Preview Visualize JSON

```
{
    "Imprint": "L403",
    "color": "WHITE",
    "shape": "CIRCLE"
}
```

POST http://localhost:8070/drug/identify

Params Authorization Headers (8) Body Pre-request Script Tests Settings

none form-data x-www-form-urlencoded raw binary GraphQL

KEY	VALUE
drug_image	15.jpg
Key	Value

Body Cookies Headers (8) Test Results

Pretty Raw Preview Visualize JSON

```
{
    "Imprint": "SOLVAY5150",
    "color": "RED",
    "shape": "OVAL"
}
```

- Code

[12]:
```
from flask import Flask, jsonify, render_template, request
import boto3
import os
import colorgram
import webcolors
import numpy as np
import cv2
import statistics
import pandas as pd
from json2table import convert
from werkzeug.utils import secure_filename
from skimage.io import imread, imsave, imshow, show, imread_collection, imshow_collection

os.environ['AWS_DEFAULT_REGION'] = 'us-east-2'
```

[13]:
```
def color(file):
    colors = colorgram.extract(file, 2)
    first_color = colors[1]
    rgb = first_color.rgb
    return (rgb)
```

[14]:
```
def closest_colour(requested_colour):
    min_colours = {}
    for key, name in webcolors.CSS3_HEX_TO_NAMES.items():
        r_c, g_c, b_c = webcolors.hex_to_rgb(key)
        rd = (r_c - requested_colour[0]) ** 2
        gd = (g_c - requested_colour[1]) ** 2
        bd = (b_c - requested_colour[2]) ** 2
        min_colours[(rd + gd + bd)] = name
    return min_colours[min(min_colours.keys())]
```

[15]:
```
def get_colour_name(requested_colour):
    try:
        closest_name = webcolors.rgb_to_name(requested_colour)
    except ValueError:
        closest_name = closest_colour(requested_colour)
    return closest_name
```

*[22]:
```
photo = 'acetaminophen.jpg'
shape=""
imshow(photo)

s3 = boto3.client('s3',
    aws_access_key_id="111",
    aws_secret_access_key="111",
    region_name="us-east-2")

bucket = 'drugidentification'
s3.upload_file(photo, bucket, photo)

client = boto3.client(
    "rekognition",
    aws_access_key_id="1111",
    aws_secret_access_key="1111",
    region_name="us-east-2"
)

response=client.detect_text(Image={'S3Object':{'Bucket':'drugidentification','Name':photo}})

textDetections=response['TextDetections']
print ('Detected text\n----------')
text2 = ""
for text in textDetections:
    if text['DetectedText'] not in text2:
        text2 = text2 + text['DetectedText']
text2 = ''.join(text2.split())
print(text2)
```

[23]:
```
requested_colour = color(photo)
print(requested_colour)
```

```
Rgb(r-208, g-201, b-203)
```

[24]:
```
closest_name = get_colour_name(requested_colour)
print(closest_name)
```

```
lightgray
```

[25]:
```
if "gray" in closest_name:
    closest_name = "WHITE"
if "thistle" in closest_name:
    closest_name = "PURPLE"
if "green" in closest_name:
    closest_name = "GREEN"
if "linen" in closest_name:
    closest_name = "ORANGE"
if "darksalmon" in closest_name:
    closest_name = "ORANGE"
if "orange" in closest_name:
    closest_name = "ORANGE"
if "gold" in closest_name:
    closest_name = "YELLOW"
if "darkkhaki" in closest_name:
    closest_name = "YELLOW"
if "chocolate" in closest_name:
    closest_name = "YELLOW"
if "brown" in closest_name:
    closest_name = "YELLOW"
if "pink" in closest_name:
    closest_name = "PINK"
if "rose" in closest_name:
    closest_name = "PINK"
if "red" in closest_name:
    closest_name = "RED"
if "yellow" in closest_name:
    closest_name = "YELLOW"
if "blue" in closest_name:
    closest_name = "BLUE"

print(closest_name)
```

```
WHITE
```

[26]:
```
img = cv2.imread(photo)
gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
gray = cv2.Canny(np.asarray(gray), 50, 250)

hehehh = cv2.findContours(gray, 1, 2)
avgArray = []
for cnt in hehehh[0]:
    approx = cv2.approxPolyDP(cnt, 0.01 * cv2.arcLength(cnt, True), True)
    avgArray.append(len(approx))

edges = statistics.median(avgArray)
print(avgArray)
print(edges)
```

```
[2, 2, 2, 2, 2, 1, 4, 4, 17, 8, 14, 15, 9, 17]
4.0
```

[28]:
```
if edges <= 12 or edges > 5:
    shape = "OVAL"
if edges == 3:
    shape = "TRIANGLE"
if edges == 4:
    shape = "SQUARE"
if edges == 9:
    shape = "HALF-CIRCLE"
if edges > 12 or edges <= 4:
    shape = "CIRCLE"
imshow(photo)
print(shape)
```

[73]:
```
data = {"uploadName":photo,"color":closest_name,"shape":shape}

print(data)
```