

# SARS COVID-19 Detection Through AI

Fall 23 - CS692 - Capstone Project Pace University

*Subject: CS691*

*Prof. Henry Wong*





# Agenda

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AI has been used to develop diagnostic tools for COVID-19, such as image recognition algorithms that can identify COVID-19-related patterns in medical imaging, like chest X-rays or CT scans. These tools can help healthcare professionals make more accurate diagnoses. AI algorithms can handle massive datasets related to COVID-19. This capacity is essential for analyzing and understanding the virus's behavior and its impact.

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SARS-CoV-2 detection AI models require access to a large and diverse dataset for training. Personal and sensitive information must be properly anonymized to protect patient privacy. COVID-19 data can be noisy and inconsistent. Preprocessing should include data cleaning and normalization to remove outliers, errors, and duplicates. When collecting patient data, ensure proper informed consent and transparent data usage policies.

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The ongoing COVID-19 pandemic has highlighted the potential of AI to transform our approach to infectious disease response. AI can analyze patient data to tailor treatment plans, optimizing care for individual patients and potentially reducing adverse effects. AI systems can monitor and analyze adverse events related to drugs or treatments, enhancing patient safety.

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AI-driven image analysis techniques have been used for COVID-19 detection. AI has played a crucial role in addressing various aspects of the COVID-19 pandemic. Deep learning models can analyze medical images, like X-rays or CT scans, to identify COVID-19-related patterns in lung tissue. This aids in quicker and more accurate diagnosis.

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It can record and display a user's past interactions and actions within the system. This helps users track their history and understand what they've done. User history can be used for security and auditing purposes, providing a record of who accessed what information and when. Associating X-ray images with patient names or identifiers is crucial for proper patient identification. It ensures that the right images are linked to the right individuals' medical records.

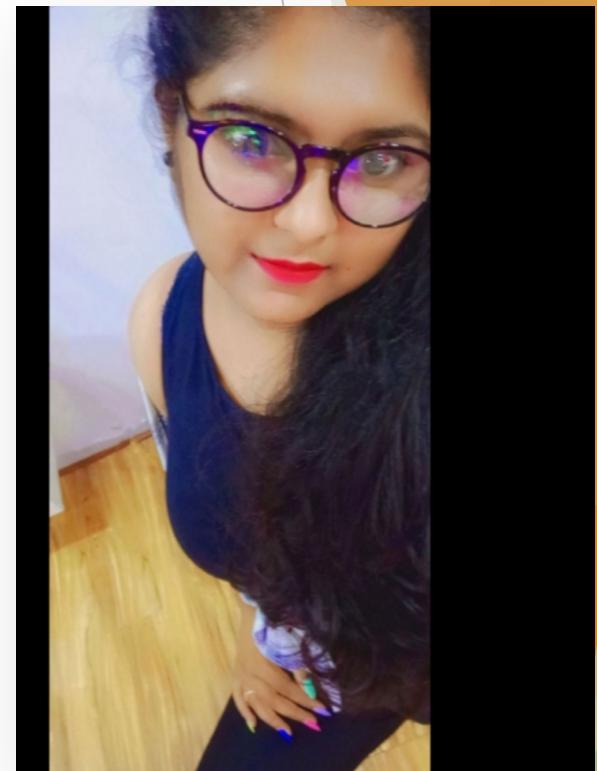
# Team Members Roles and Responsibilities



Anusha Nunna  
(Developer)



Venkatesh  
(Quality Analyst)



Reshma Gonu  
(Developer)

# Team Members Roles and Responsibilities



Vamshi  
(Product manager)



Alekhya  
(Facilitator)



Hanith Atluri  
(Tester)

# Improvements made from Professor Feedback

- **Need to correct the role name in team member's slide.**  
→ In response to the professor's feedback, we've made the necessary adjustments to the role name this time.
- **Need to provide a verbal explanation while demonstrating the functionality of an MVP application.**  
→ During the previous sprint, our MVP demo lacked audio. However, this time, we've rectified this issue by including both audio and a functional video.
- **Need to present good team velocity chart and burndown chart, required to explain about velocity report and burndown chart in the video presentation.**  
→ We have addressed the professor's feedback by providing an explanation of the velocity report and burndown chart.
- **It is necessary to include the story point estimate and note that the acceptance criteria is not presented on a separate slide rather, it's integrated into the user story itself.**  
→ This time we have mentioned the story point estimate. Also, we mentioned the acceptance criteria in user story.
- **Require improved diagrams.**  
→ We have furnished explicit diagrams.

# Project Description



# Project Description

Project Name:	SARS Covid-19 detection through AI
Team:	Mission Possible
Project description:	<p>For users Who want to know their feedback on covid-19 reports the let it free Is a web app That checks users reports and provides the accurate result Unlike if users not able to go hospitals in the covid-19 situation Our application will help them to submit their reports and they can get their accurate result. Based on their result they can order the medical kit and they can make an appointment to the doctors as well.</p>
Benefits outcomes:	It the users can use our application they can easily get their covid-19 accurate feedback. Based on that they can order the tool kit and they can take the precautions s well.
github link:	<a href="https://github.com/htmw/2023S-Team4/wiki">https://github.com/htmw/2023S-Team4/wiki</a>

# Team working agreement

- ❖ Every week, the team members discuss the project's status, obstacles, and next steps. The tasks are split up during the meeting.
- ❖ Team members discuss any challenges they face and give status updates on their tasks in our WhatsApp group chat.
- ❖ We rely on every team member to be accountable for their tasks and deliverables within the established timeframes.
- ❖ To ensure that every team member is aware of their responsibilities and feels comfortable carrying them out, we place a high importance on openness and communication.
- ❖ My team and I have been engaging in discussions where we acknowledge our errors and work collaboratively to address and correct them.



## Personas (at least 3)



# Persona-1

- ▶ Name: MAYA
- ▶ AGE: 34 YEARS
- ▶ GENDER: FEMALE
  
- ▶ Working professional Maya is concerned about her health and wants to know her current COVID-19 status. She has been undergoing routine COVID-19 testing because of the safety procedures at her job.
- ▶ To maintain her safety and compliance with workplace regulations, Maya must maintain a record of her past and current COVID-19 test results. Also, she wants to receive the results promptly. For her peace of mind, having easy access to her test findings is essential, through this personal data form feature she can have that access.



# Persona-2

- ▶ **Name:** DAN
- ▶ **AGE:** 41 YEARS
- ▶ **GENDER:** MALE
- ▶ Dan works for a software development company as a project manager. Owing to his hectic work schedule and sporadic stress, he is dedicated to keeping himself healthy and routinely gets checked out for a variety of conditions, such as blood pressure and cholesterol. He wishes to monitor his health parameters closely.
- ▶ For some months, Dan has been gathering health reports to keep an eye on his general health. In order to give him a clear image of how his health has been trending, he would want to obtain an average analysis of his numerous reports. With this knowledge, he will be able to make well-informed judgments regarding his lifestyle and possibly pinpoint any areas that need more attention and through this analysis feature he can achieve it.

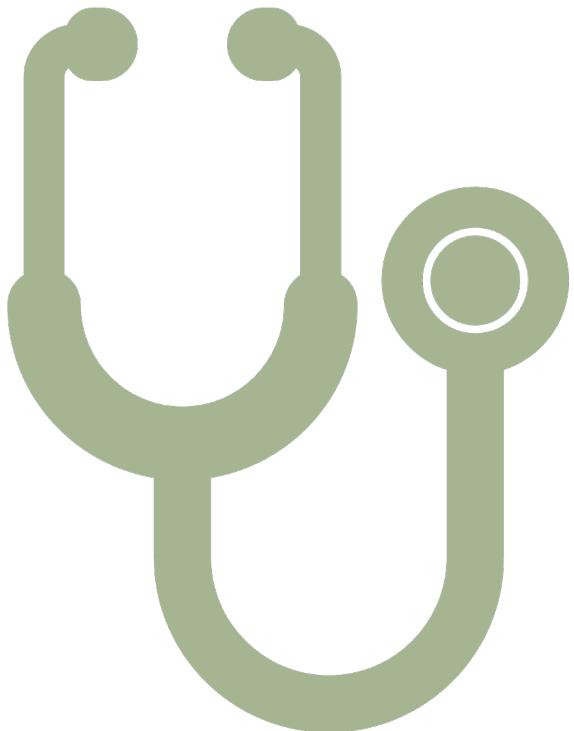


# Persona-3

- ▶ **Name:** SNEHA
- ▶ **AGE:** 37 YEARS
- ▶ **GENDER:** FEMALE
  
- ▶ A busy marketing manager, Sneha manages her personal, professional, and family lives. She frequently finds it difficult to arrange and keep in-person doctor appointments because of her rigorous work schedule and her family obligations. When it comes to medical services, she prioritizes effectiveness and convenience.
- ▶ Sneha needs to be able to easily schedule doctor's appointments, particularly when she or her family members need medical advice. In order to save time and avoid making in-person trips to the doctor, she chooses to utilize her app to book doctor appointments and conduct the consultations via Zoom or Google Meet. This strategy protects her health and the health of her loved ones while enabling her to successfully manage her career and family responsibilities. Through this doctor appointment scheduling feature, she can achieve it.



# MVP



- ▶ The minimal viable product (MVP) of this project will enable us to upload a CT-scan document from a patient with chronic obstructive pulmonary disease and check the current state of the report.
- ▶ To keep track of a user's information, such as their symptoms and any relevant travel history, so that doctors may get a better picture of their patients more quickly.
- ▶ a dedicated scheduling section where patients can request appointments with their preferred doctors within 30 minutes of the doctor's preferred time and availability.

Covid Predictor

Welcome, hanith9695 Upload History Personal data Analysis Page Logout

**Upload Xray to Predict**

Name\*

Image\*  No file chosen

**Support Bot**  Send Clear

**Upload**

Personal Details and COVID-19 Form

**Personal Information**

First Name:

Last Name:

Date of Birth:  mm/dd/yyyy

Phone Number:  Please fill out this field.

Email:

**COVID-19 Questions**

Have you traveled recently?   
Do you have COVID-19 symptoms?   
Have you been in close contact with a COVID-19 positive person?   
Are you vaccinated for COVID-19?

**Additional Information**

If you've traveled, please provide details:

Welcome to Our Doctor Appointment Service

**Choose a Doctor:**

**Dr. Smith**  
Specialty: Cardiologist **Book an Appointment**

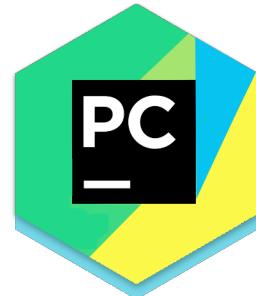
**Dr. Johnson**  
Specialty: Pediatrician **Book an Appointment**

**Dr. Brown**  
Specialty: Dermatologist **Book an Appointment**

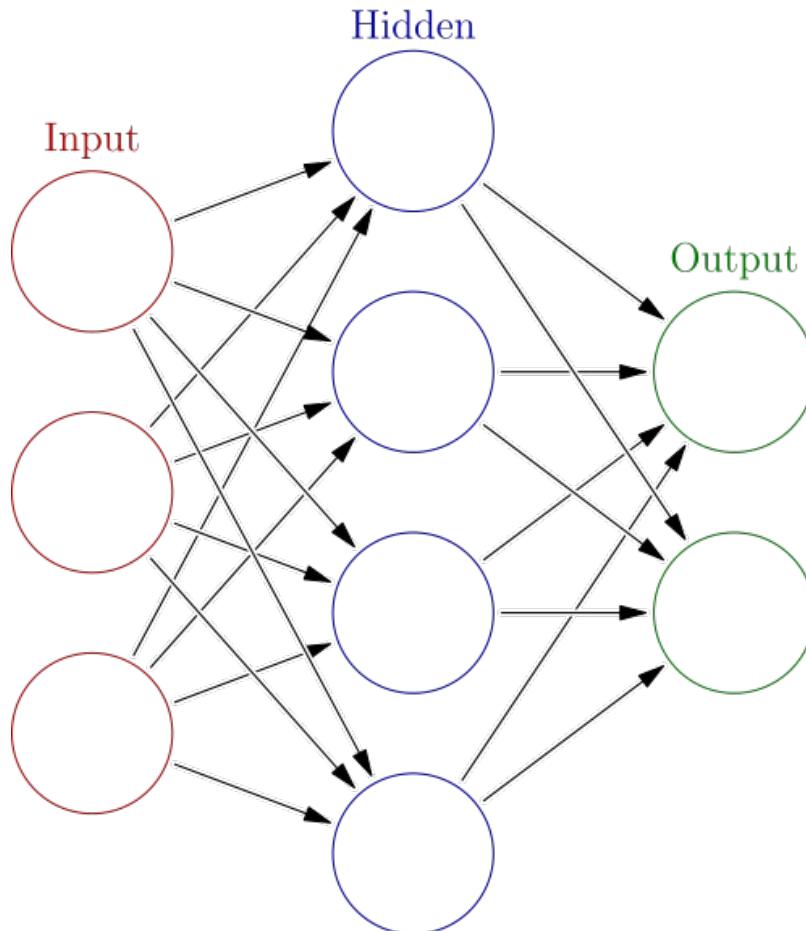
with other doctors. COVID-19 Safety

# Screenshots

# Algorithms & Technologies



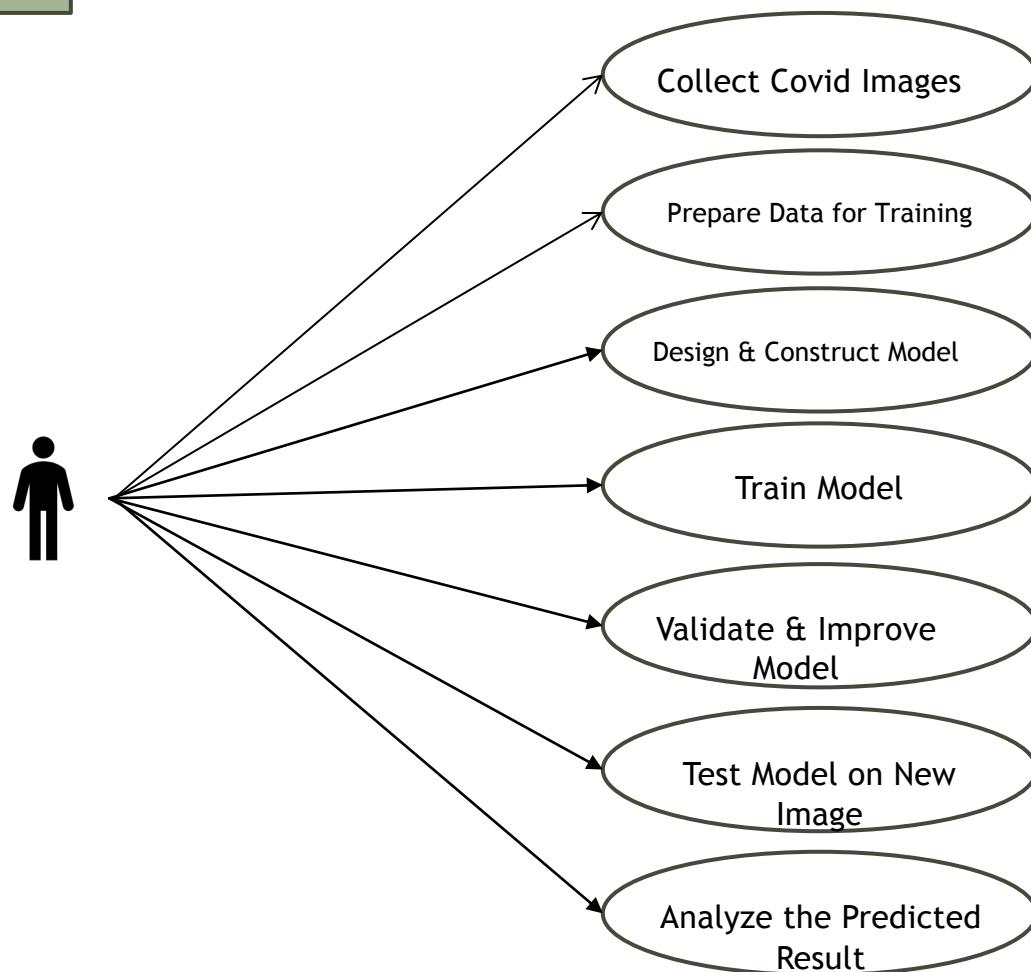
# Convolutional Neural Networks (CNNs):



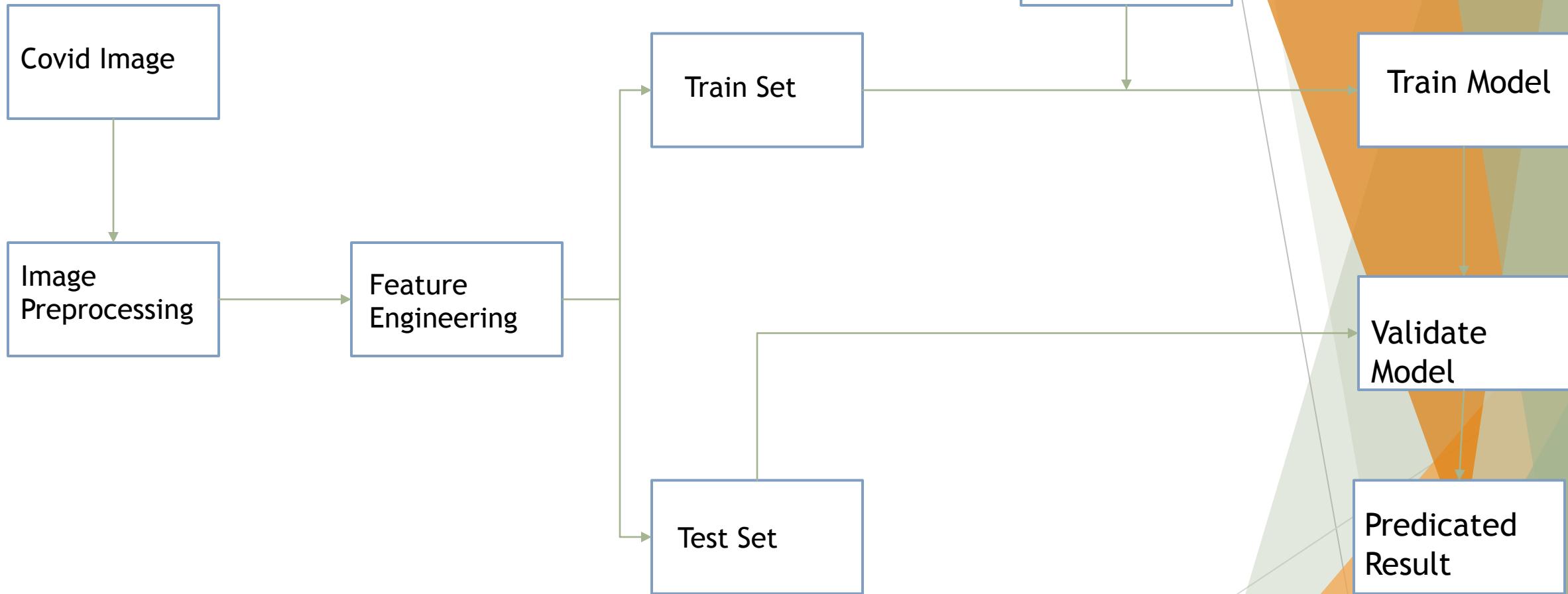
# Diagrams



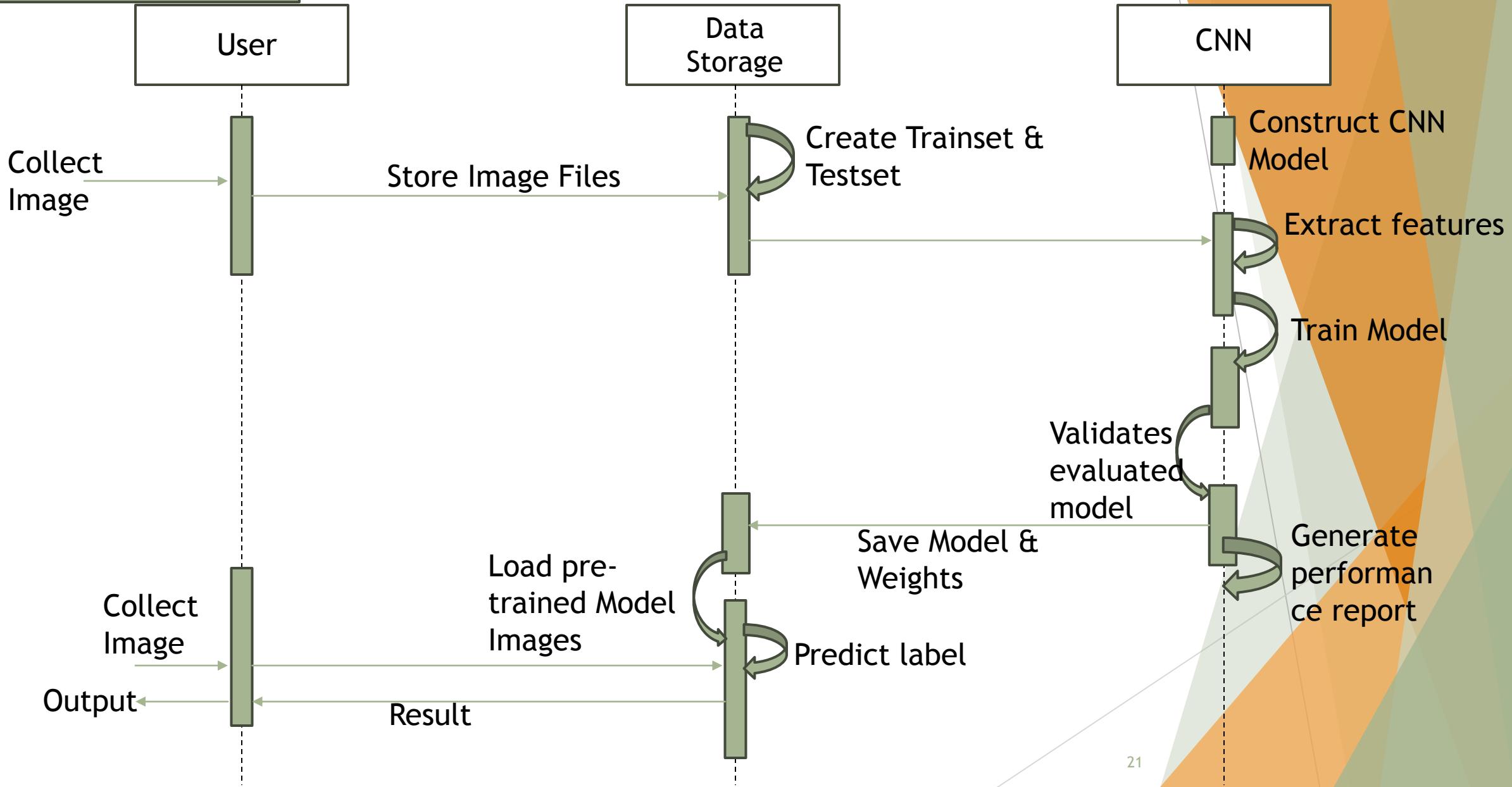
## User's use case Diagram



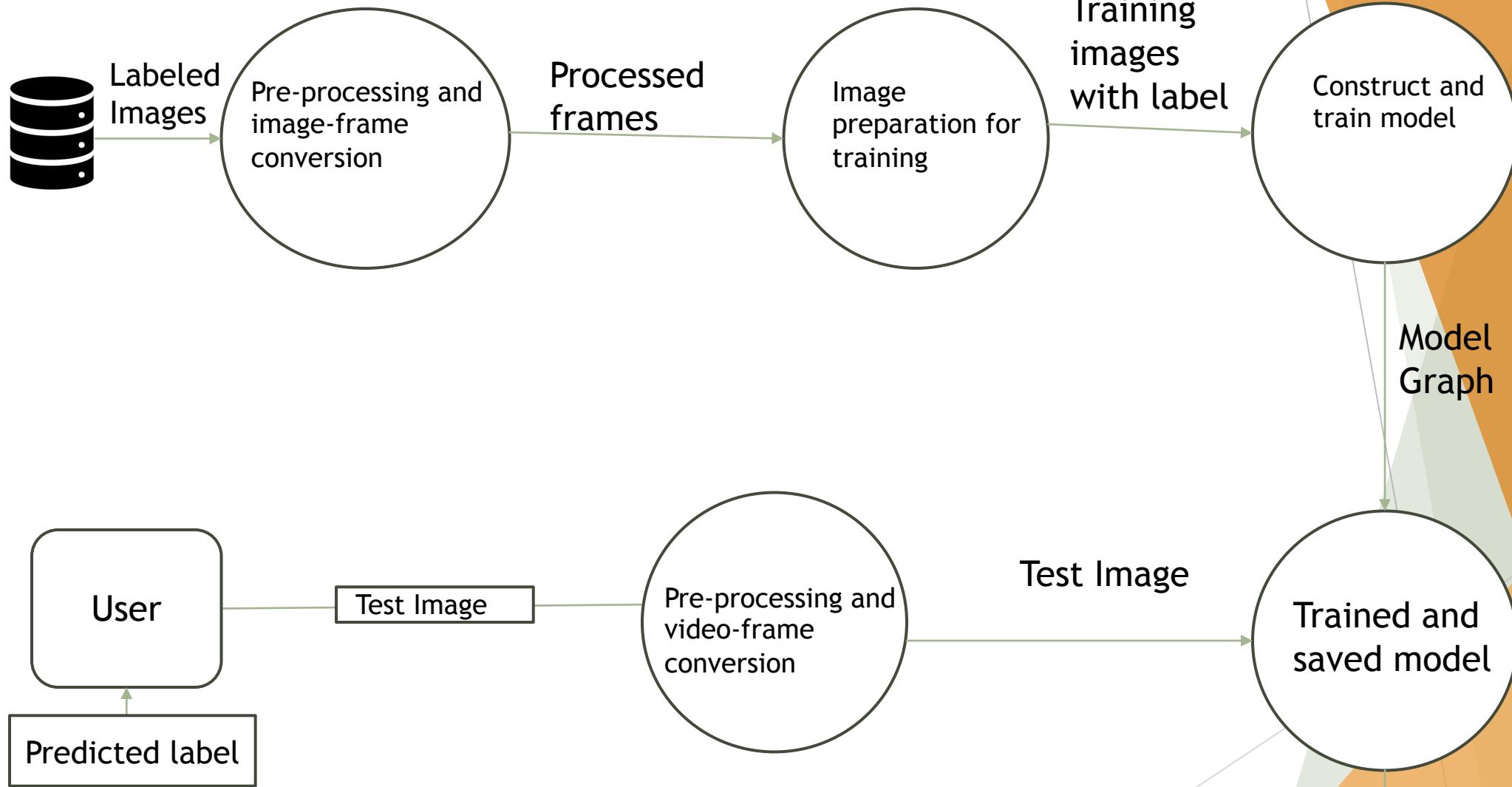
# System Architecture



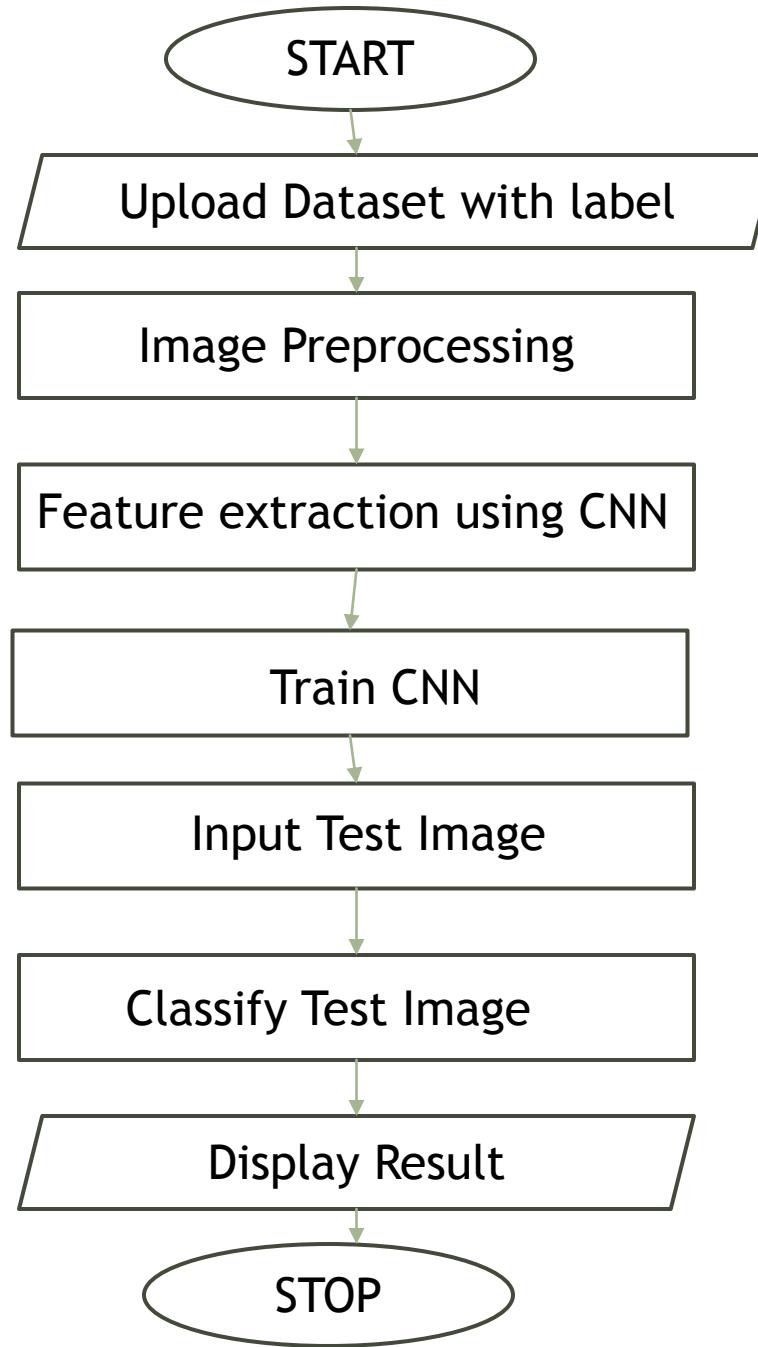
# Sequence Diagram



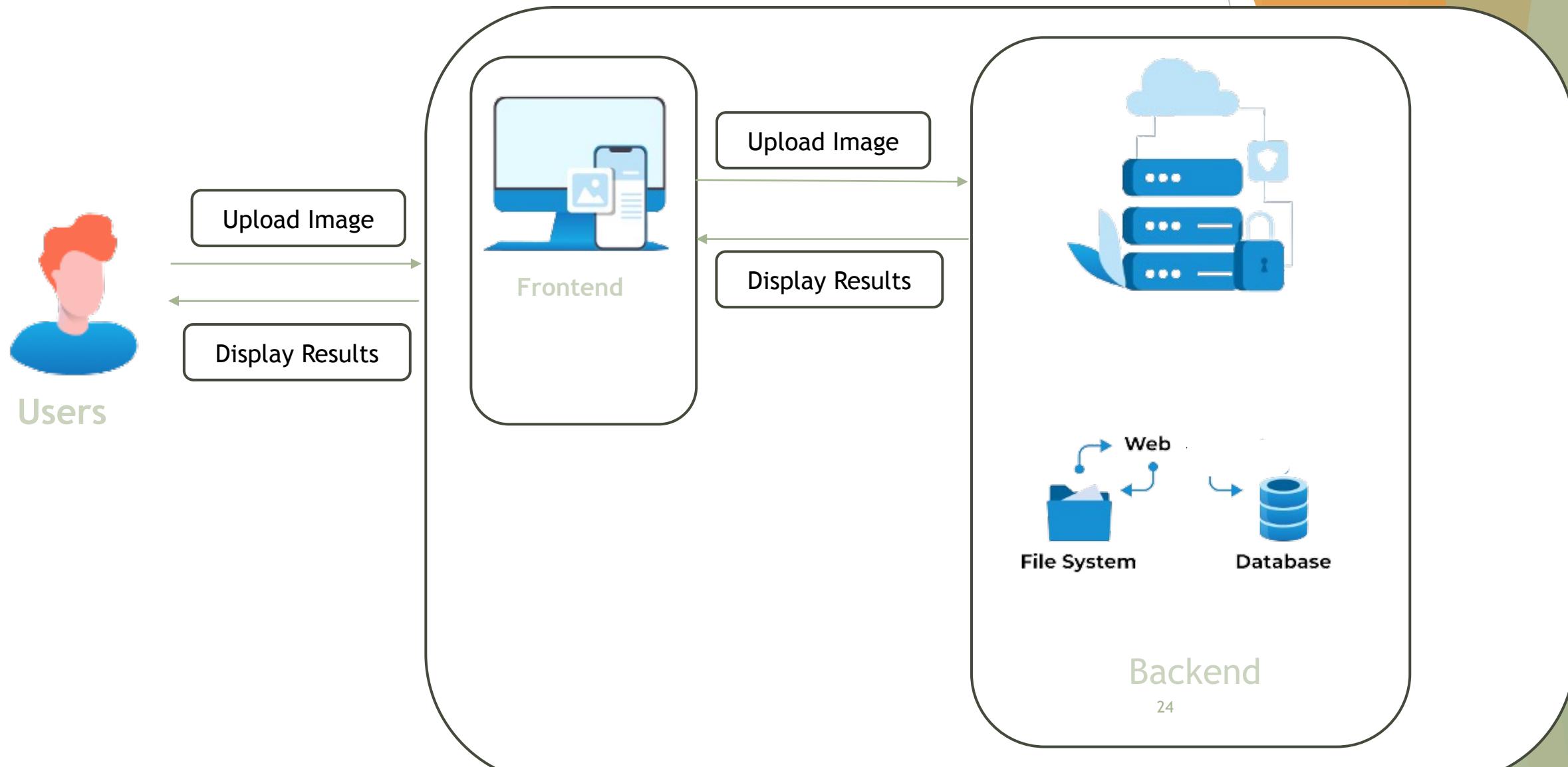
# Dataflow Diagram



## Flow-chart Diagram



## Conceptual Architecture Diagram



# Recap of sprint-5

- ▶ In the previous session we have discussions about the remaining features to be developed.
- ▶ We have discussed about the MVP features and options and initiated developing the MVP core features.
- ▶ Provided team performance metrics and pertinent Key Performance Indicators.
- ▶ Highlighted pending tasks and described strategies for addressing them.
- ▶ Reported the proportion of completed test cases in the current sprint.
- ▶ Summarized significant insights and actionable steps identified during the retrospective meeting.

# User stories

Key	User Stories Summary	Place
SC1DTA-204	As a user, I want to register myself to the portal . So that I can keep updating my medical health condition	Portal page
SC1DTA-207	As a user , I want to login into the portal . So that I can keep updating all my personal information	Portal page
SC1DTA-212	As a user , I want to upload my reports in the portal so that to get more accurate medication	Upload
SC1DTA-316	As a user, I want to view my reports through portal and their result	History
SC1DTA-312	As a system, I need to compare current lab results to previous results to detect potential issues	History
SC1DTA-318	As a user , I want appointment reminders, So I don't forget about upcoming visits	Appointment
SC1DTA-280	As a user, I need to upload the basic information regarding the travel history/symptoms of current day	Recommendation

# User stories

Key	Summary	Place
SC1DTA-316	As a user, I want to know the symptoms of disease and risk factors of the disease	appointment
SC1DTA-223	As a user, I want to be able to edit my personal details	Personal
SC1DTA-225	As a user, I need to see the appointment details through mail	appointment
SC1DTA-220	As a user, I want to know the risk of disease about me after I upload my reports from doctor	appointment
SC1DTA-222	As a user, I want to know the see the percentage of factor in which uploaded files	upload

# STORIES AND ACCEPTANCE CRITERIA

Scenario	Summary	Status
<p>1. Customer want to enter personal details <b>Given</b> I'm in the role of customer <b>When</b> I open the portal signup page <b>Then</b> I click on to personal details And I can see all the details of the clinic</p>	<p><b>As a customer</b> <b>I want to enter my demographics like name, date of birth, address, contact information so that clinic the clinic has my details on file</b></p>	Done
<p>2. Customer want to check the medical history <b>Given</b> I'm in the role of the customer <b>When</b> I open the history page <b>Then</b> I want to see the medical track which I took before <b>And</b> I click on the medical results Then I can track the disease upto date</p>	<p><b>As a customer</b> <b>I want to view my health trends over time so that I can track my progress</b></p>	Done

# STORIES AND ACCEPTANCE CRITERIA

Scenario	Summary	Status
<p>3. Customer want to the schedule appointments with healthcare providers</p> <p><b>Given</b> I am in the role of customer</p> <p><b>When</b> I open the calendar page</p> <p><b>Then</b> I want to see the schedule appointment date I took before</p> <p>And I see all the appointment details through healthcare website</p>	<p>As a customer I want to easily schedule appointments online. So that I don't have to call the clinic</p>	done
<p>4. Customer want to see the medical history</p> <p><b>Given</b> I am in the role of the customer</p> <p><b>When</b> I open the medical history</p> <p><b>Then</b> I want to see the medication which I took before</p> <p>And I see all the surgery details and medications details</p>	<p>As a customer I want to provide my medical history like conditions, medications, surgeries. So that the clinic can identify any potential risk factors</p>	done

# TEST CASES

Test case for	Key	Test data	Expected results	Actual results	Pass/fail
User portal	SC1DTA-309	User details (login details)	Users should be able to upload the CT-scan in the portal	Login->upload	p
User portal	SC1DTA-309	User details (login details) Update message	User should be able to update the details	Login->personal->send	p
History page	SC1DTA-311	User logged into the portal	User should be able to send the updates via portal	Login ->dashboard	P
History page	SC1DTA-311	User logged into the portal	User can check the past result	login->history	P
Schedule appointment	SC1DTA- 313	User logged into the calendar	User can schedule the appointments	Login->appointment	P

# SPRINT-6 BACKLOG

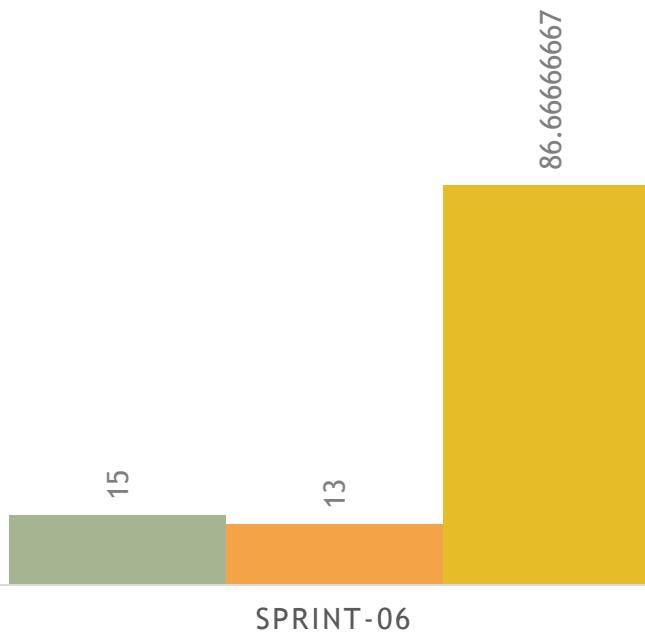
Issue type	key	Name	Story Estimated Points
story	SC1DTA-309	As a user , I want to enter my current medications and dosage, So my medication list is up to date	2
story	SC1DTA-310	As a user, I want to add my medical history so potential risk factors are documented	3
story	SC1DTA-312	As a system , I need to compare current lab results to previous results to detect potential issues	2
story	SC1DTA-313	As a user, I want to receive email reminders 30-mins before my scheduled appointments	3
story	SC1DTA-314	As a user, I need to select the required doctor so, I can get to know the doctor who is specialized in certain organ.	5

# COMPLETED AND NOT COMPLETED STORIES

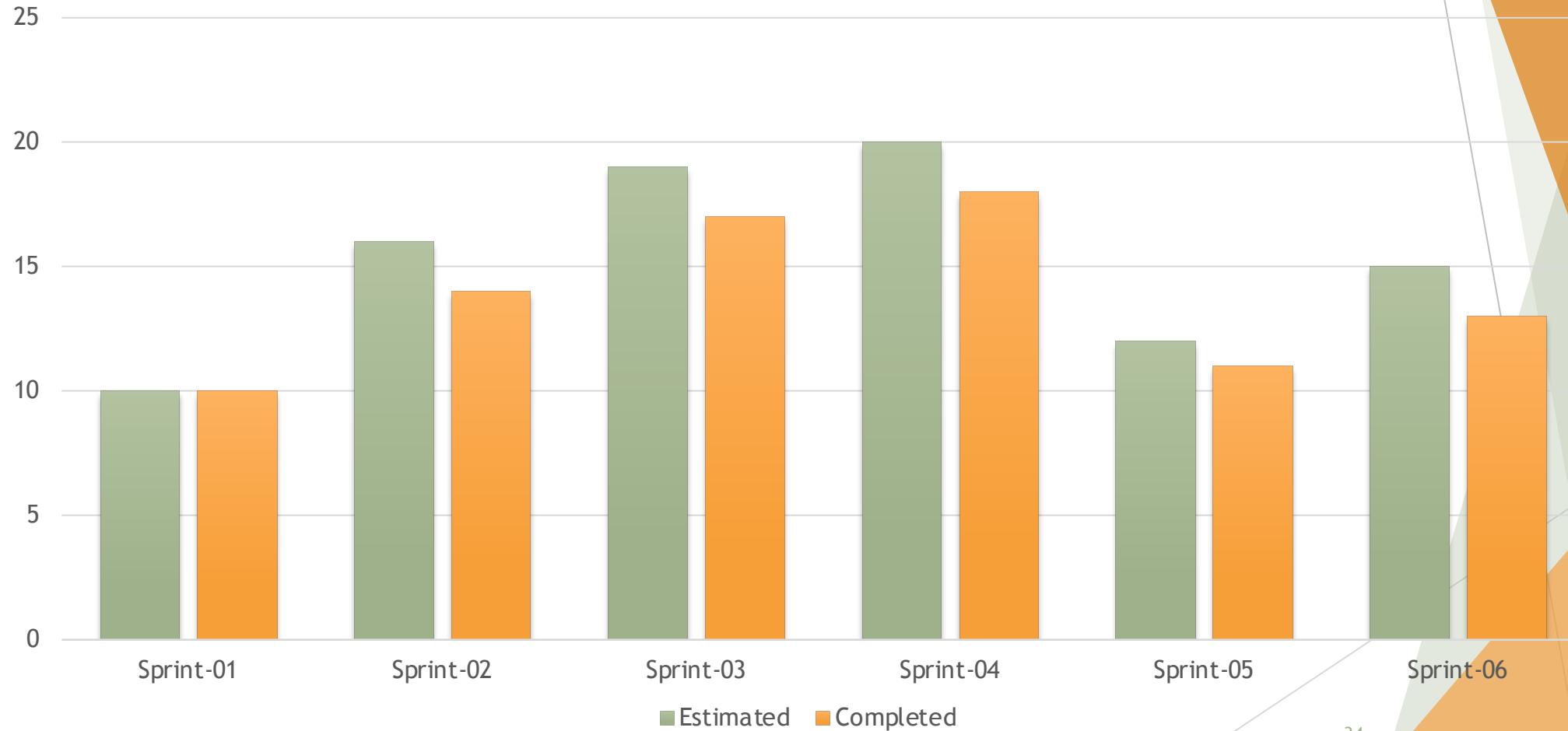
KEY	Name	status
SC1DTA-299	As a user , I want the ability to view my past and present covid-19 results	done
SC1DTA-302	As a user, I would like to receive the results of my COVID -19 test	done
SC1DTA-304	As a As a user, I want the ability to book an appointment with a doctor via my app and conduct the consultation through a Zoom call or Google Meet.	done
SC1DTA-304	As a user, I want to view and edit my personal details like address , phone number and name	done
SC1DTA-305	As a user, I would like to be informed of the necessary precautions to take after receiving my test results	In progress

# Sprint-06 velocity

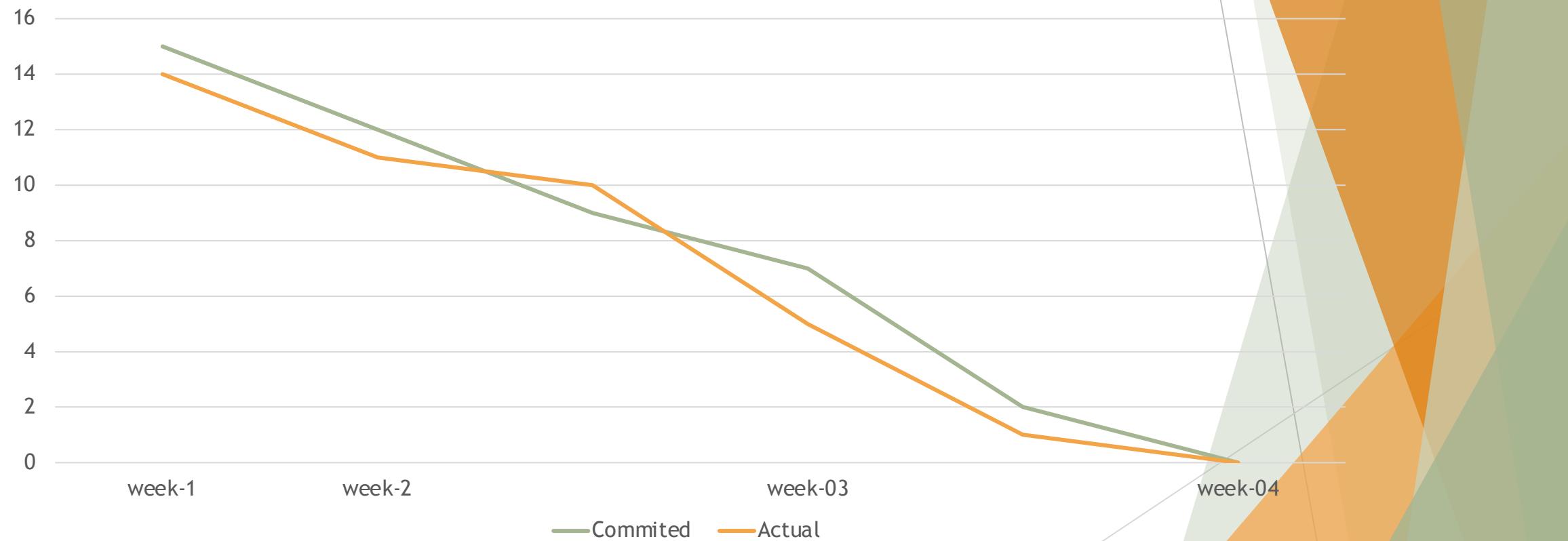
■ Committed ■ Completed ■ Average Percentage



# Team's Historical velocity(average)

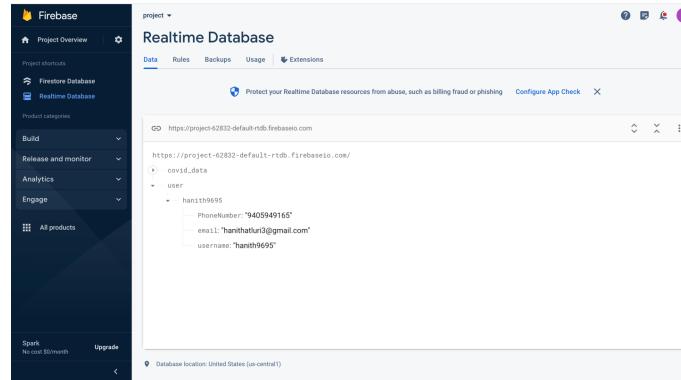


# Burn down chart

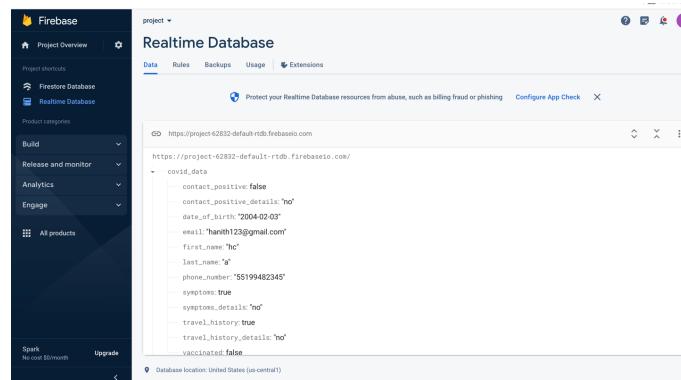


# Firebase Authentication

- When a new user establishes an account with Firebase Authentication, the server will generate data of a unique user ID (UID), both of which will be safely kept in the Firebase Authentication database.

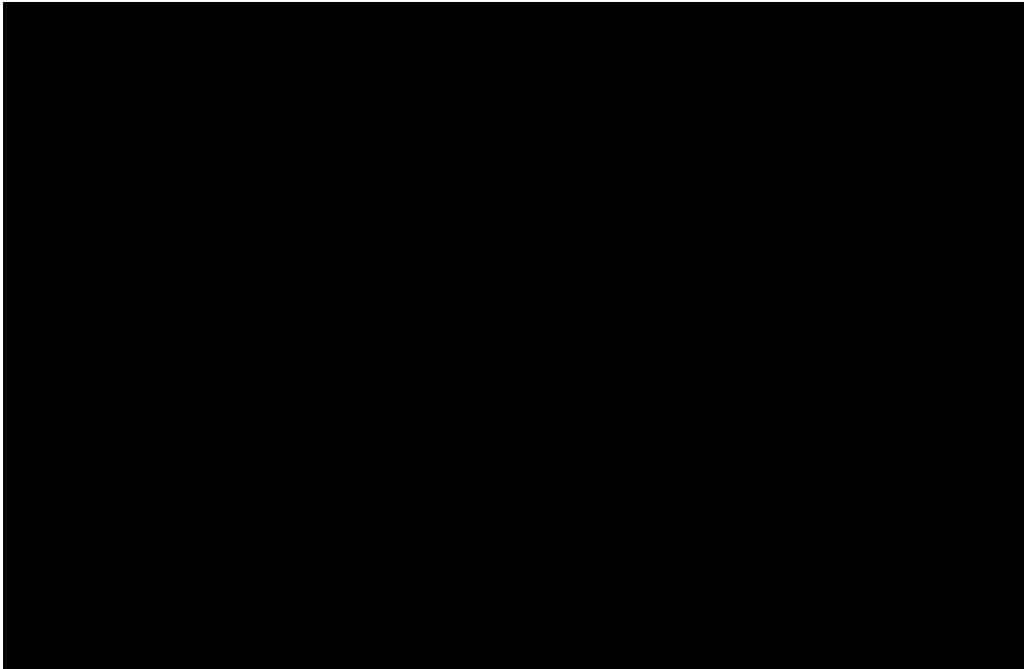


The screenshot shows the Firebase Realtime Database console. On the left, the navigation sidebar includes 'Project Overview', 'Realtime Database' (selected), and 'Data'. The main area displays a tree view of database nodes under 'https://project-62832-default.firebaseio.com/'. A single node named 'user/hanith9695' is expanded, showing its child properties: 'PhoneNumber' ('+9405949165'), 'email' ('hanithaturq@gmail.com'), and 'username' ('hanith9695'). A note at the bottom states 'Database location: United States (us-central1)'.



The screenshot shows the Firebase Realtime Database console. The navigation sidebar is identical to the previous screenshot. The main area displays a tree view of database nodes under 'https://project-62832-default.firebaseio.com/'. A node named 'covid\_data' is expanded, showing its child properties: 'contact\_positive' (false), 'contact\_positive\_details' ('no'), 'date\_of\_birth' ('2004-02-03'), 'email' ('hanith123@gmail.com'), 'first\_name' ('Hanith'), 'last\_name' ('A'), 'phone\_number' ('+55199482345'), 'symptomatic' (true), 'symptomatic\_details' ('no'), 'travel\_history' (true), 'travel\_history\_details' ('no'), and 'vaccinated' (false).

demo



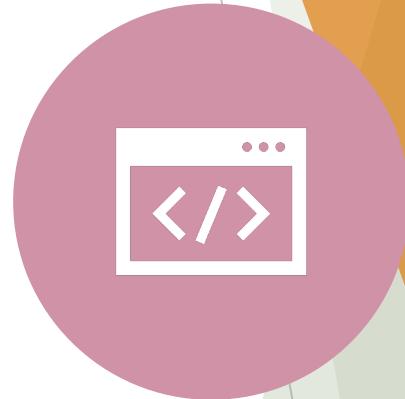
# Retrospective



**WHAT WENT WELL:** EFFECTIVE TEAMWORK WAS DEMONSTRATED BY THE MEMBERS. OUR TEAM WAS ABLE TO SOLVE THE API PROBLEMS WE WERE HAVING WITH OUR APPLICATION, EVEN THOUGH THE SPRINT WAS SHORT. EVERY MODIFICATION WAS MADE ON SCHEDULE, ENABLING TEAM MEMBERS TO REVIEW EACH OTHER'S WORK.

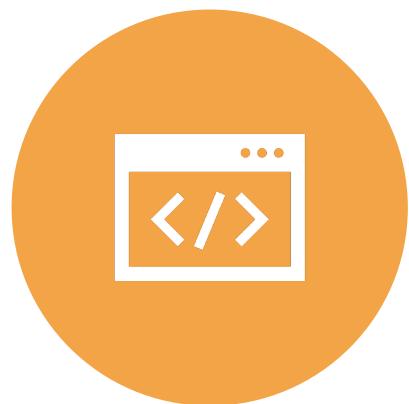


**WHAT HAS TO BE IMPROVED:** WE HAVE ADDRESSED EVERY LAST DETAIL OF THE VIDEO UPLOAD PROCESS, INCLUDING THE DURATION AND APPROPRIATE PLACEMENT OF EACH AND EVERY MODULE, IN RESPONSE TO THE INPUT FROM THE PROFESSORS.



**UPCOMING ACTIONS:** WE INTEND TO MODIFY THE APPLICATION'S FRONT-END INTERFACE IN ORDER TO ENHANCE USER EXPERIENCE AND PERCEPTION.

# Thank you



CS-692



TEAM 4 - MISSION  
POSSIBLE



GITHUB-LINK