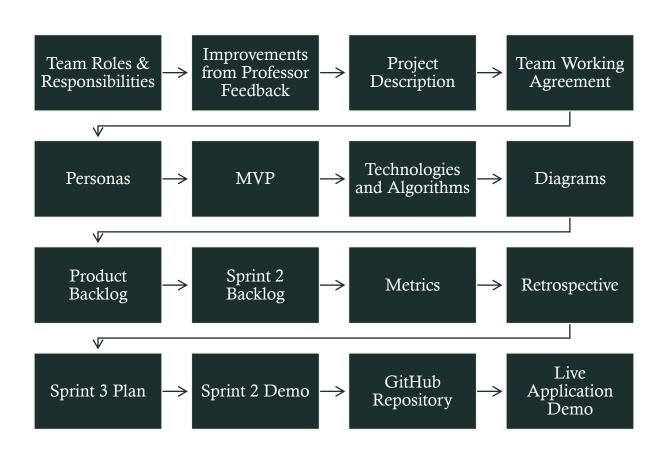
IMAGEMEDIX

By Team 5 The Minions

Sprint 2

AGENDA



TEAM MEMBERS – MACHINE LEARNING

Vaishnavi Chandrasekar



Christiana Heden Kothuru



Deepika Mothkuri



Greeshma Kenche



TEAM MEMBERS - BACKEND

Yucong Hu



Lingyi Luan



TEAM MEMBERS – FRONTEND

Yash Bhanubhai Panchani



Rameez Ahmed Shaik



IMPROVEMENTS

- Change in the state diagram
- Change in the acceptance criteria



PROBLEM STATEMENT

Many healthcare facilities face challenges in diagnosing pneumonia and brain tumors quickly and accurately, often due to limited access to specialists and high workloads. Current solutions typically require separate systems to analyze different types of medical images. This leads to inefficiencies in diagnosis and delays in providing critical care. There is a need for an automated system that can efficiently classify medical images and provide preliminary diagnoses to support healthcare professionals in making timely decisions.



PROJECT DESCRIPTI ON



Project Name:	ImageMedix	
Team:	The Minions	
Project Description:	For healthcare professionals who need to diagnose pneumonia and brain tumors efficiently, the Dual-Stage Medical Image Classification System is a two-step image analysis tool that automatically classifies medical images as lung X-rays or brain MRIs and provides a diagnosis. Unlike separate diagnostic systems that handle only one type of image, our application streamlines diagnosis by analyzing both image types within a single system, saving time and improving diagnostic accuracy.	
Benefit Outcomes:	 Faster Diagnosis: Automates image classification and diagnosis, reducing the time needed for manual analysis. Improved Accuracy: Provides consistent and reliable preliminary diagnoses, minimizing human errors. Resource Optimization: Assists medical facilities with limited access to specialists, enabling quicker and more informed decisions. 	
Github Link:	https://github.com/htmw/2025S-The-Minions/wiki	

Team Working Agreement - The Minions

1. Responsibilities:

- Each member is responsible for completing their tasks on time and maintaining the quality of their work.
- Members must inform the group if they encounter any blockers that could delay the project.

2. Communication:

- We will use common platforms like WhatsApp, Discord, or email for quick communication and updates.
- Weekly meetings will be scheduled to review progress and discuss tasks.

3. Meeting Attendance:

- All members are expected to attend scheduled meetings unless there are unavoidable circumstances.
- Absentees should catch up on meeting notes to stay informed.

4. Collaboration:

- All members are expected to contribute to their assigned roles (frontend, backend, machine learning).
- Teamwork will be encouraged by helping each other when someone faces challenges or needs feedback.

5. Deliverables:

- Each sprint will include presentations and documentation updates as required.
- Work will be reviewed by peers to ensure quality before submission.

6. Code and Documentation:

- Code should follow basic best practices for readability and functionality.
- Documentation (tech papers, wikis) will be updated regularly by the respective team members.

7. Decision-Making:

- Major decisions will be made collectively during meetings.
- In case of disagreements, majority voting will determine the final decision.

8. Conflict Resolution:

- Conflicts will be discussed openly during meetings, with all members encouraged to share their views.
- If unresolved, the issue will be escalated to the professor for guidance.

Team Members

Chandrasekar Vaishnavi Hu Yucong Kenche Greeshma Kothuru Christiana Heden Luan Lingyi Mothkuri Deepika Panchani Yash Bhanubhai Shaik Rameez Ahmed

TEAM WORKING AGREEMENT

PERSONAS

Dr. James Patel (Radiologist)

- Age: 45
- Occupation: Senior Radiologist at a metropolitan hospital
- **Background:** Over 20 years of experience in diagnostic imaging, specializing in lung and brain disorders. Known for mentoring junior doctors in radiology.
- **Goals:** To reduce the time spent analyzing large volumes of medical images while maintaining high diagnostic accuracy.
- **Challenges:** Overloaded with image analysis requests and administrative duties, leading to delays in diagnosis and increased stress.
- **How the System Helps:** Automates initial image classification and diagnosis, allowing Dr. Patel to prioritize critical and complex cases efficiently.



PERSONAS

Dr. Suzen Chen (General Practitioner)

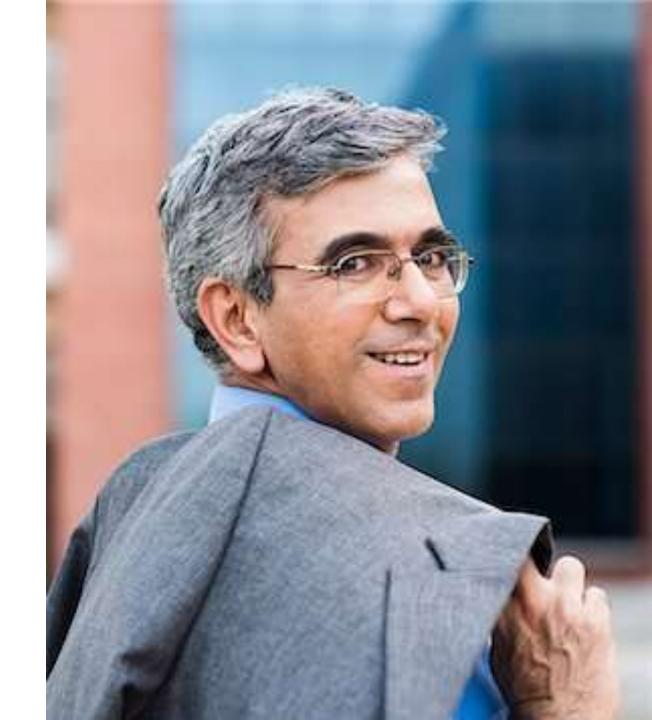
- **Age:** 38
- Occupation: General Practitioner at a rural healthcare clinic
- **Background:** Has served in underserved regions for over a decade, often working without the immediate support of medical specialists. Committed to improving healthcare access in remote areas.
- **Goals:** To provide fast, accurate diagnoses for patients despite limited access to specialists.
- **Challenges:** She m ust handle a wide variety of cases on her own, making it difficult to diagnose complex conditions such as brain tumors and pneumonia accurately.
- **How the System Helps:** The AI system offers reliable preliminary diagnoses for brain and lung conditions, helping Dr. Chen make timely and informed treatment decisions.



PERSONAS

Dr. Raj Aryan (Healthcare Director)

- **Age:** 50
- Occupation: Director of a large hospital chain in India
- **Background:** A visionary healthcare leader who has overseen the expansion of multiple hospitals across the country. Inspired by challenges faced in rural and semi-urban healthcare delivery.
- **Goals:** To improve diagnostic efficiency, reduce patient wait times, and implement AI-based healthcare solutions across all branches.
- **Challenges:** Delays in diagnosis caused by a shortage of skilled radiologists, leading to overcrowded hospitals and slow patient care.
- **How the System Helps:** The automated system accelerates diagnosis processes across multiple hospitals, enabling faster and more efficient patient care, particularly in resource-constrained facilities.



MVP

Core Features

Two-Step Image	Classifies medical images as either lung X-rays or brain MRIs.
Analysis	Provides automated diagnosis for pneumonia and brain tumors.
Automated Diagnosis	Uses machine learning models to detect abnormalities.
System	Outputs a diagnostic result with confidence scores.
Unified Platform	Supports both lung X-rays and brain MRIs in a single system.
-	Eliminates the need for separate diagnostic tools.
User-Friendly Interface	Simple image upload functionality for healthcare professionals.
	Displays classification results and diagnosis in an intuitive format.
Performance Metrics	Ensures accuracy through AI-driven predictions.
	Optimized for faster diagnosis to reduce manual analysis time.
Basic Report	Generates a preliminary diagnostic report.
Generation	Includes confidence levels and possible next steps for further medical review.
-	

TECHNOLOGIES

Frontend: React.js

• Used to create a user-friendly interface that allows healthcare professionals to upload and view medical images easily.

Backend: Node.js (API), Flask (Model Inference), MongoDB

- **Node.js:** Handles API requests and manages communication between the frontend and backend services.
- **Flask:** Supports model inference by running machine learning models for image classification and diagnosis.
- **MongoDB:** Stores user data, images, and diagnostic results, enabling secure and scalable data management.

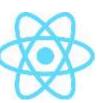
Machine Learning:

• Built using **PyTorch** and trained on datasets for lung X-rays and brain MRIs.

Cloud Infrastructure:

• Deployed using **AWS**.









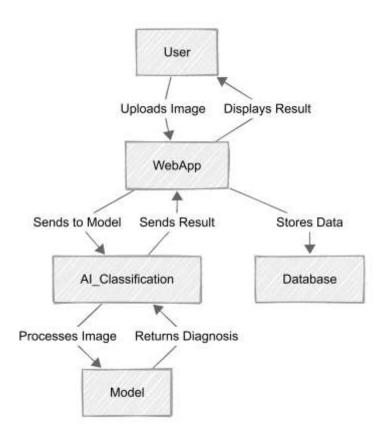




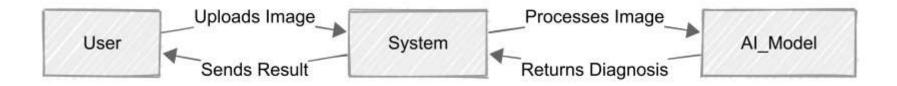
ALGORITHMS

The system uses two core algorithms based on pre-trained deep learning models. A **ResNet** model, fine-tuned on a dataset of medical images, is used to classify whether the uploaded image is a lung X-ray or a brain MRI. Depending on the classification result, the system proceeds to a second stage. For lung X-rays, a **fine-tuned EfficientNet** model detects and classifies pneumonia into normal, viral, or bacterial categories by analyzing lung patterns. For brain MRIs, the same EfficientNet model is used to detect and classify brain tumors into glioma, meningioma, or no tumor by identifying abnormalities in brain structures. These models provide high accuracy and efficiency, ensuring reliable diagnoses for both image types.

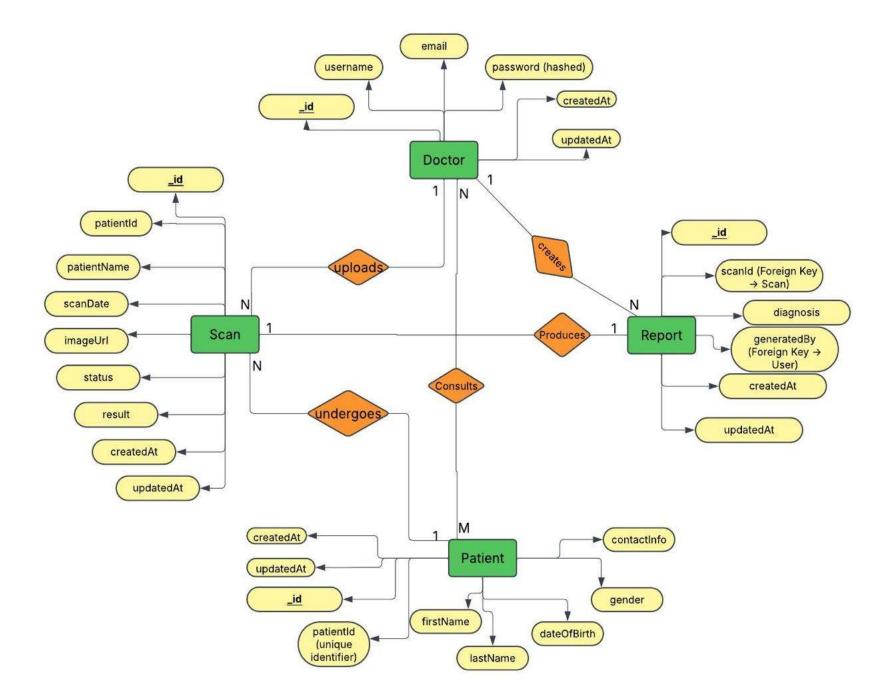
ARCHITECTURE DIAGRAM



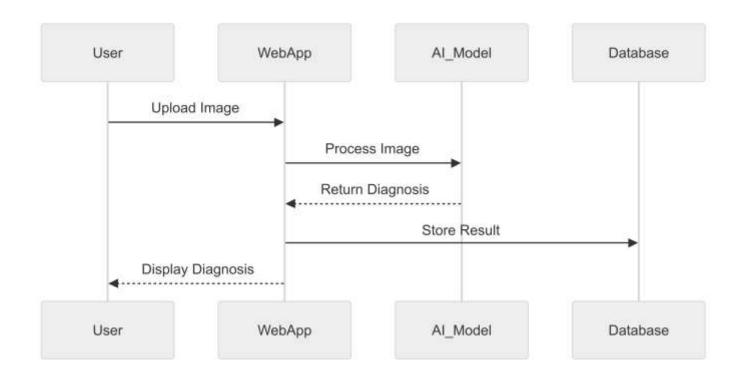
CONTEXT DIAGRAM

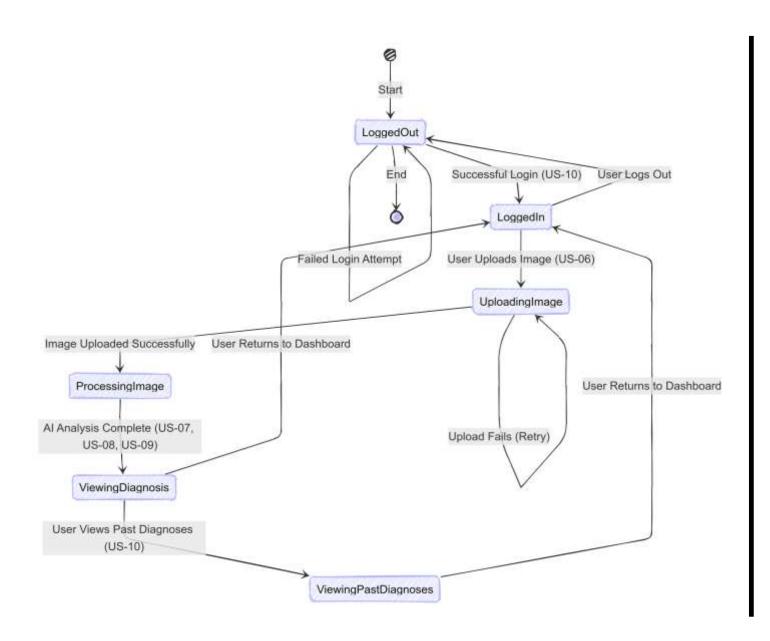


ER DIAGRAM



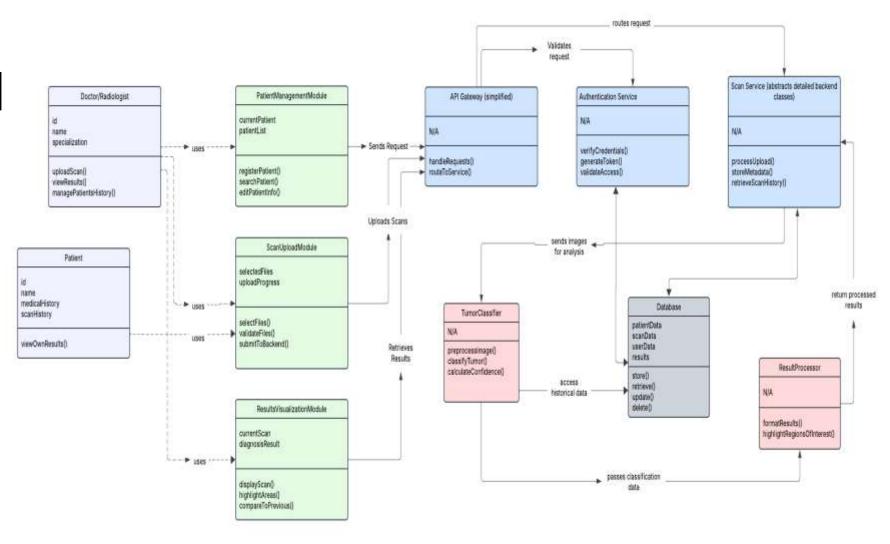
SEQUENCE DIAGRAM





STATE DIAGRAM

CLASS DIAGRAM



ID	Sprint	User Story / Technical Story (TS)	Acceptance Criteria	Story Points (SP)
			- Page includes: header, project description, call-to-action button, and demo preview	
		As a visitor, I want a visually appealing landing	section.Styling is consistent and visually engaging.Page renders correctly on desktop and mobile	
US-01	Sprint 1	page so I can understand the system at a glance.	browsers.	3
US-02	Sprint 1	As a doctor/patient, I want an intuitive navigation menu so I can easily access different sections of the website.	 Navbar includes working links to: Home, Upload, Results, and About. Navbar is fixed and responsive on all devices. 	2
	op.	As a patient, I want a simple image upload	Upload button allows file selection.Image preview shown after selection.Frontend only; no backend submission	
US-03	Sprint 1	interface so I can easily upload my medical images.	required.	3
<u>US-04</u>	Sprint 1	As a mobile user, I want a responsive design so I can access the site on mobile devices.	All pages adjust layout for screen sizes (mobile, tablet, desktop).No overlapping or broken UI components.	2

ID	Sprint	User Story / Technical Story (TS)	Acceptance Criteria	Story Points (SP)
US-05	Sprint 1	As a patient, I want to see a static results page so I understand how the diagnosis will be displayed.	Results page includes placeholders for image, diagnosis summary, and doctor notes.Static dummy data is displayed correctly.	2
TS-01	Sprint 1	As a developer, I want to set up the frontend framework and project structure so that the development is scalable.	React project is initialized.Routing for all planned pages is configured.Folder structure follows best practices.	2
TS-02	Sprint 1	As a developer, I want to implement UI components for buttons, inputs, and cards.	Reusable styled components (Button, Input, Card) are created.Components are tested and documented.	3
US-06	Sprint 2	As a doctor, I want to upload an image and get it processed so I can receive a diagnosis.	User can select and upload images.Image is stored in the backend database.Upload confirmation shown.	5

ID	Sprint	User Story / Technical Story (TS)	Acceptance Criteria	Story Points (SP)
US-07	Sprint 2	As a doctor, I want my medical image to be analyzed automatically so I can receive a diagnosis.	 - Uploaded image is sent to AI model. - Model returns a classification (e.g., Normal, Pneumonia, Tumor). - Backend handles processing. 	8
US-08	Sprint 2	As a patient, I want to see my diagnosis displayed clearly so I can understand the results.	Diagnosis result is shown on a result page.Diagnosis includes label and confidence score.UI is readable and visually clean.	3
US-09	Sprint 2	As a patient, I want my diagnosis results to be stored so I can access them later.	Diagnosis results and images are saved in the database.Patient ID is linked to diagnosis entries.	5
US-10	Sprint 2	As a patient, I want basic account authentication so I can securely log in and access my past diagnoses.	Users can register and log in.Passwords are encrypted.Auth token/session is implemented.Authenticated users can access their data.	5

ID	Sprint	User Story / Technical Story (TS)	Acceptance Criteria	Story Points (SP)
TS-03	Sprint 2	As a developer, I want to set up a backend API for image processing so that the system can analyze uploaded images efficiently.	Flask/Django API accepts image uploads.Routes for upload and prediction exist.Image is processed and response returned.	8
TS-04	Sprint 2	As a developer, I want to connect the frontend with the backend API so that data flows seamlessly between the client and server.	Frontend sends requests to backend API.Data from API is shown on the frontend.Error states are handled.	5
US-11	Sprint 3	As a patient, I want my diagnosis report to be downloadable so I can share it with doctors.	Diagnosis results can be exported as a downloadable PDF.PDF includes patient info, image, diagnosis, and date.	5
US-12	Sprint 3	As a patient, I want a faster processing time so I don't have to wait long for results.	AI model processes images in under 2 seconds.Response time tested on at least 10 different inputs.	8

ID	Sprint	User Story / Technical Story (TS)	Acceptance Criteria	Story Points (SP)
US-13	Sprint 3	As a doctor, patient, or admin, I want role-based access (doctor, patient, admin) so I can have personalized features.	Users have roles (doctor, patient, admin).Role-based dashboards and permissions implemented.Unauthorized access blocked.	5
US-14	Sprint 3	As a patient, I want the system to be highly accurate so I can trust the diagnosis.	 AI model reaches ≥90% accuracy on validation set. Accuracy is documented and verified through testing. 	8
US-15	Sprint 3	As a patient, I want to access the system online so I can use it from anywhere.	Web app is deployed to a public server (e.g., Vercel, Heroku, AWS).Site is accessible from any device.	5
TS-05	Sprint 3	As a developer, I want to implement logging and error handling so that system failures can be monitored and resolved efficiently.	 System logs backend/frontend errors. Admin receives error notifications or logs are stored for debugging. Critical failures are caught and don't crash the app. 	3

SPRINT 2 BACKLOG

ID	User Story / Task (TS)	Acceptance Criteria (AC)	Story Points (SP)
US-06	As a doctor, I want to upload an image and get it processed so I can receive a diagnosis.	User can select and upload images.Image is stored in the backend database.Upload confirmation shown.	5
US-07	As a doctor, I want my medical image to be analyzed automatically so I can receive a diagnosis.	 Uploaded image is sent to AI model. Model returns a classification (e.g., Normal, Pneumonia, Tumor). Backend handles processing. 	8
US-08	As a doctor, I want to see my diagnosis displayed clearly so I can understand the results.	Diagnosis result is shown on a result page.Diagnosis includes label and confidence score.UI is readable and visually clean.	3
US-09	As a patient, I want my diagnosis results to be stored so I can access them later.	Diagnosis results and images are saved in the database.Patient ID is linked to diagnosis entries.	5
US-10	As a admin, I want basic account authentication so I can securely log in and access my past diagnoses.	Users can register and log in.Passwords are encrypted.Auth token/session is implemented.Authenticated users can access their data.	5

SPRINT 2 BACKLOG

ID	User Story / Task (TS)	Acceptance Criteria (AC)	Story Points (SP)
US-03	(Carried from Sprint 1) As a patient, I want a simple image upload interface so I can easily upload my medical images.	 Upload button allows file selection. Image preview shown after selection. Frontend only; no backend submission required.	3
US-05	(Carried from Sprint 1) As a doctor, I want to see a static results page so I understand how the diagnosis will be displayed.	 Results page includes placeholders for image, diagnosis summary, and doctor notes. Static dummy data is displayed correctly. 	2
TS-03	As a developer, I want to set up a backend API for image processing so that the system can analyze uploaded images efficiently.	Flask/Django API accepts image uploads.Routes for upload and prediction exist.Image is processed and response returned.	8
TS-04	As a developer, I want to connect the frontend with the backend API so that data flows seamlessly between the client and server.	Frontend sends requests to backend API.Data from API is shown on the frontend.Error states are handled.	5

SPRINT 2 TEST CASES

ID	Test Case Description	Expected Result	Actual Result	Pass/Fail
US-06- TC01	Verify that a user can upload an image via the interface	User selects an image file, clicks upload, and the image is successfully stored in the database with a preview displayed.	Image uploaded and stored in the database; preview displayed correctly.	Pass
US-03- TC01	Verify image preview displays correctly after upload	After selecting an image, a preview of the image appears on the interface before submission.	Preview of the selected image appeared correctly on the interface.	Pass
US-07- TC01	Verify that an uploaded lung X-ray is analyzed by the AI model	User uploads a lung X-ray, and the system returns a classification (e.g., "Normal" or "Pneumonia").	Lung X-ray uploaded; system returned "Normal" classification.	Pass
US-07- TC02	Verify that an uploaded brain MRI is analyzed by the AI model	User uploads a brain MRI, and the system returns a classification (e.g., "Normal" or "Tumor").	Brain MRI uploaded; system returned "Normal" classification.	Pass
US-08- TC01	Verify that mock diagnosis results are displayed clearly on the frontend	After analysis, the diagnosis (e.g., "Normal" or "Disease Detected") is shown in a readable format on the UI.	Diagnosis "Normal" displayed clearly in a readable format on the UI.	Pass
US-09-	Ž V	After analysis, the diagnosis and image metadata are retrievable from the database.	Diagnosis and metadata stored and retrievable from the database.	Pass
	Verify that a user can sign up for an account	User enters valid credentials (e.g., email, password), submits, and receives a success message; account is created.	User signed up with valid credentials; success message received.	Pass

SPRINT 2 TEST CASES

ID	Test Case Description	Expected Result	Actual Result	Pass/Fail
US-10- TC02	Verify that a user can log in with valid credentials	User enters correct email/password, clicks login, and is redirected to their dashboard with past diagnoses.	User logged in and redirected to dashboard; past diagnoses visible.	Pass
US-10- TC03	Verify that a user cannot log in with invalid credentials	User enters incorrect email/password, clicks login, and receives an error message (e.g., "Invalid credentials").	Login failed with incorrect credentials; "Invalid credentials" error shown.	Pass
US-10- TC04	Verify that past diagnoses are accessible after login	After logging in, the user sees a list of previously stored diagnoses linked to their account.	User logged in; list of past diagnoses displayed correctly.	Pass
US-05- TC01	Verify static results page UI styling is correct	The static results page displays with proper alignment, fonts, and colors as per design specs.	Static results page displayed with correct alignment, fonts, and colors.	Pass
TS-03- TC01	Verify backend API accepts and processes an image upload	Developer sends a POST request with an image to the API, and the API returns a 200 status with analysis results.	API returned 200 status with analysis results for the uploaded image.	Pass
TS-04- TC01	Verify frontend sends image data to backend API successfully	User uploads an image via the frontend, and the backend API receives and processes it without errors.	Frontend sent image data; backend processed it without errors.	Pass
US-06- TC02	Verify end-to-end flow: upload, analysis, and display	User uploads an image, the backend processes it, and the frontend displays the diagnosis seamlessly.	Image uploaded, processed by backend, and diagnosis displayed seamlessly.	Pass

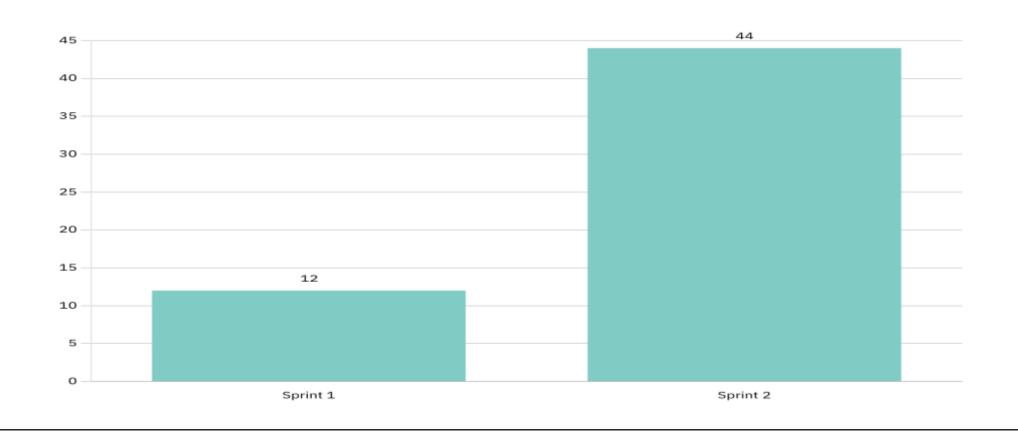
ID	User Story / Task (TS)	Story Points (SP)
US-03	(Carried from Sprint 1) As a doctor/patient, I want a simple image upload interface so I can easily upload my medical images.	3
US-05	(Carried from Sprint 1) As a doctor/patient, I want to see a static results page so I understand how the diagnosis will be displayed.	2
US-06	As a doctor, I want to upload an image and get it processed so I can receive a diagnosis.	5
US-07	As a doctor, I want my medical image to be analyzed automatically so I can receive a diagnosis.	8
US-08	As a patient, I want to see my diagnosis displayed clearly so I can understand the results.	3
US-09	As a patient, I want my diagnosis results to be stored so I can access them later.	5
US-10	As a doctor/patient, I want basic account authentication so I can securely log in and access my past diagnoses.	5
TS-03	As a developer, I want to set up a backend API for image processing so that the system can analyze uploaded images efficiently.	8
TS-04	As a developer, I want to connect the frontend with the backend API so that data flows seamlessly between the client and server.	5

SPRINT 2 STORIES COMPLETED

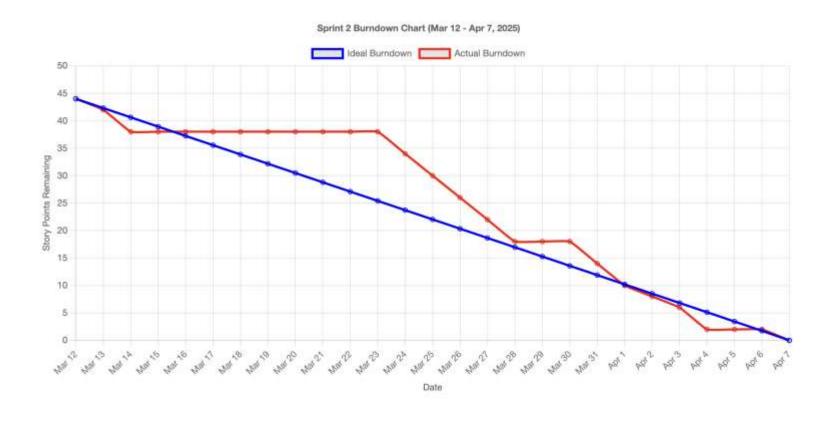
METRICS

- Team Velocity
 - Total Story Points Completed: 44 SP
 - Team Velocity: 44 SP
- Completed/Committed Ratio
 - Total Story Points Committed: 44 SP
 - Total Story Points Completed: 44 SP
 - Completed/Committed Ratio: (44/44) = 100%
- Average Completed/Committed Ratio: Sprint 1: 70.59%
 - Sprint 2: 100%
 - Average = (70.59 + 100) / 2 = 85.29%

HISTORICAL TEAM VELOCITY



BURNDOWN CHART



RETROSPECTIVE

The-Minions

What went well 🗘

+0

+0

1.Better understanding of the

requirements of project

3. Good collaboration

5. Everyone contributed on the core featutes

+0

2. Teamwork become better 4. Planning and contribution on the work

What can be improved \\

1.More frequent testing 2. Breakdown tasks +0 3.Start to do documentation +0

Action Items 0

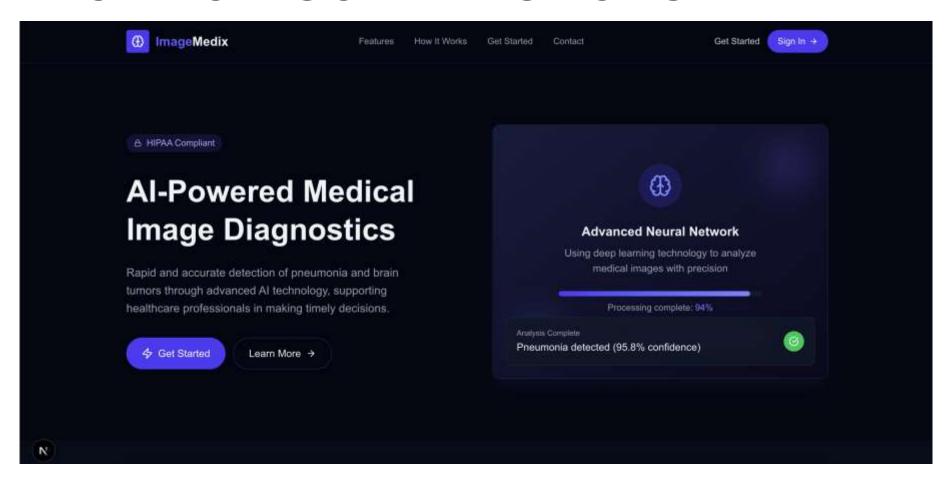


1. Meet more frequently + 0	2.Time managemnet, everyone need to be aware of the schedule, and keep updating + 0
3. Code reviews through github + 0	4.Need to complete all the core features before a strict deadline + 0

SPRINT 3 PLANNING

ID	Sprint	User Story / Technical Story (TS)	Acceptance Criteria	Story Points (SP)
US-11	Sprint 3	As a patient, I want my diagnosis report to be downloadable so I can share it with doctors.	 Diagnosis results can be exported as a downloadable PDF. PDF includes patient info, image, diagnosis, and date. 	5
03-11	Sprint 3	share it with doctors.	uaic.	3
US-12	Sprint 3	As a researcher, I want a faster processing time so I don't have to wait long for results.	AI model processes images in under 2 seconds.Response time tested on at least 10 different inputs.	8
US-13	Sprint 3	As a system admin, I want role-based access (doctor, patient, admin) so I can have personalized features.	Users have roles (doctor, patient, admin).Role-based dashboards and permissions implemented.Unauthorized access blocked.	5
US-14	Sprint 3	As a doctor, I want the system to be highly accurate so I can trust the diagnosis.	 AI model reaches ≥90% accuracy on validation set. Accuracy is documented and verified through testing. 	8
US-15	Sprint 3	As a patient, I want to access the system online so I can use it from anywhere.	Web app is deployed to a public server (e.g., Vercel, Heroku, AWS).Site is accessible from any device.	5
TS-05	Sprint 3	As a developer, I want to implement logging and error handling so that system failures can be monitored and resolved efficiently.	System logs backend/frontend errors.Admin receives error notifications or logs are stored for debugging.Critical failures are caught and don't crash the app.	3

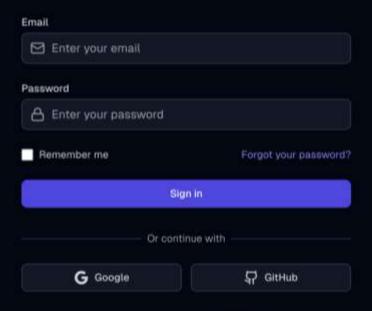
APPLICATION SCREENSHOTS



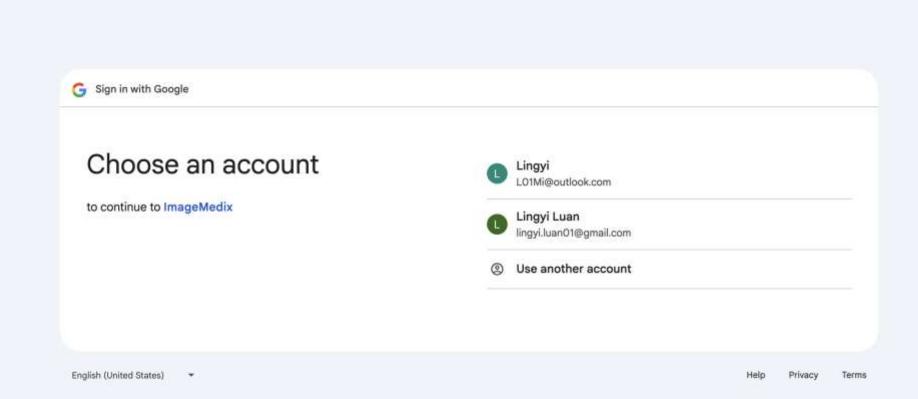


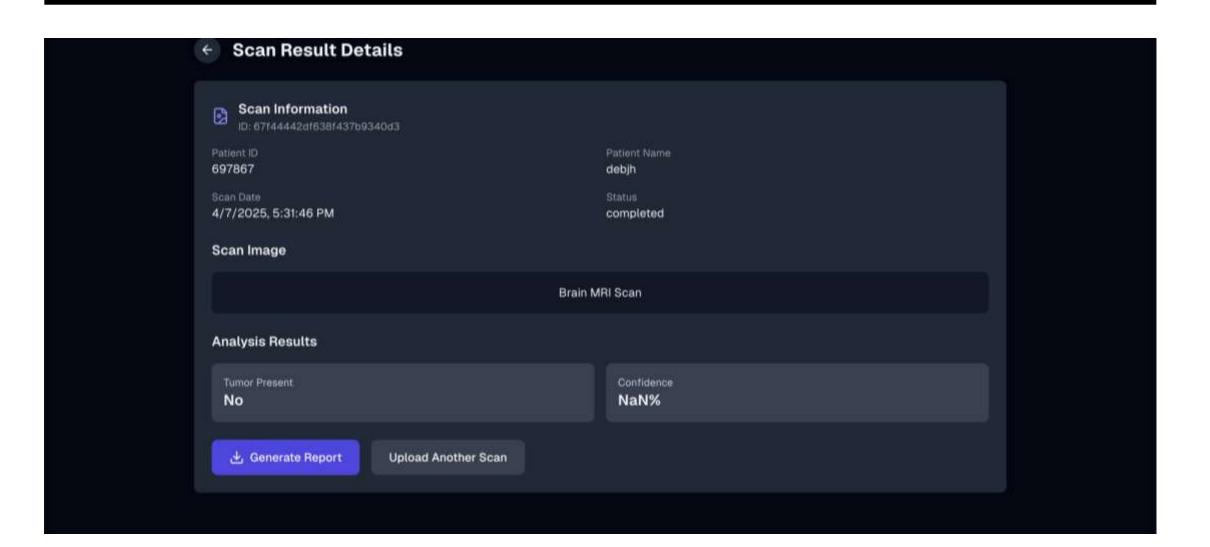
Welcome back

Sign in to your account



Don't have an account? Sign up





Brain Tumor Classification Report

Generated on: 4/7/2025

Report ID: 67f44442df638f437b9340d3

Patient Information

Name: debjh ID: 697867

Date of Birth: 4/7/2025 Gender: unknown

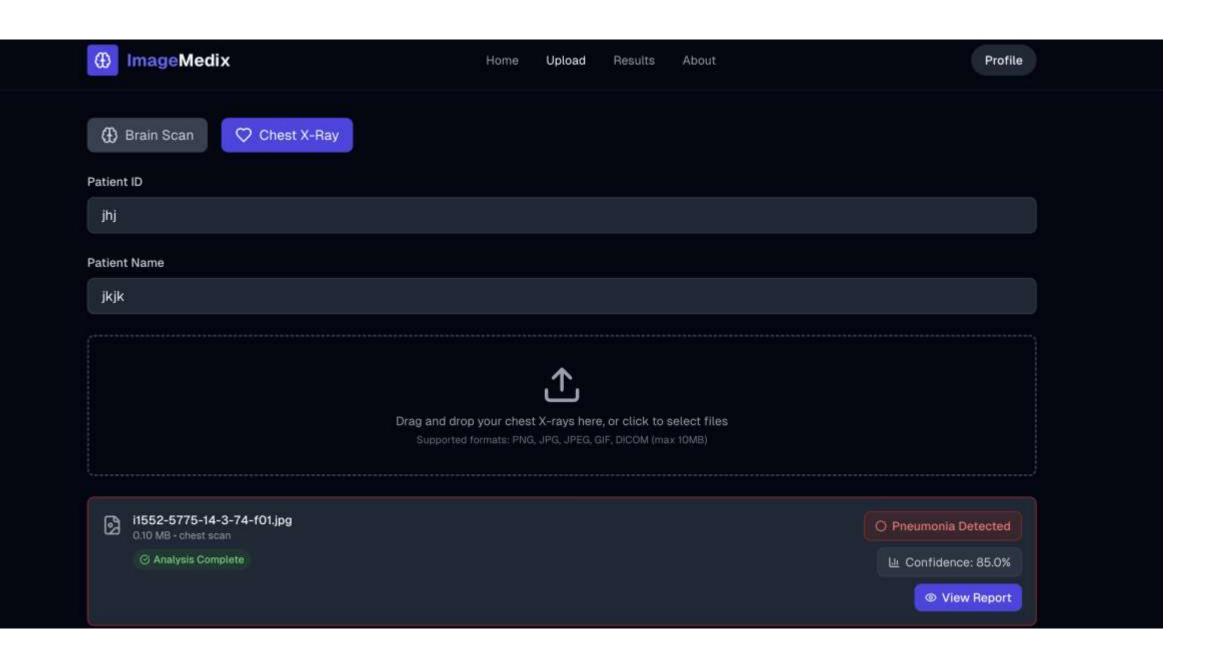
Age: N/A

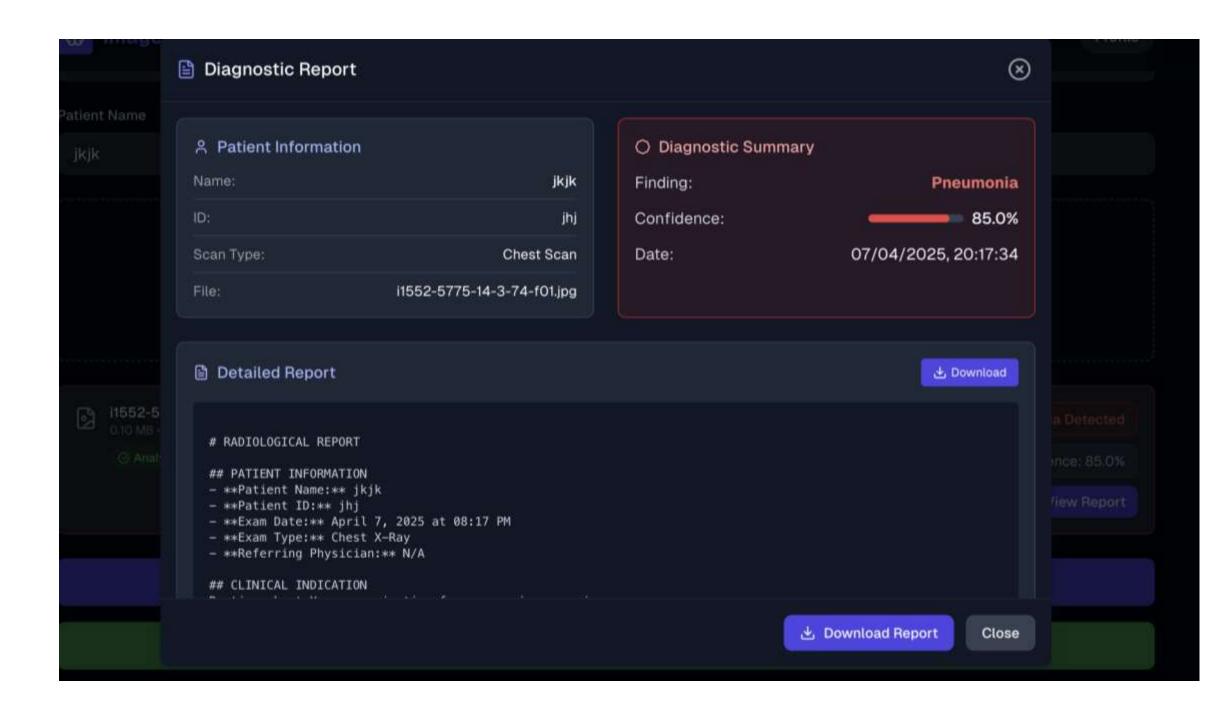
Contact Information:

Email: N/A Phone: N/A Address: N/A

Scan Information

Scan Date: 4/7/2025 Status: completed Doctor: Lingyi





WIKIPAGE LINK

https://github.com/htmw/2025S-The-Minions/wiki

APPLICATION DEMO

THANK YOU