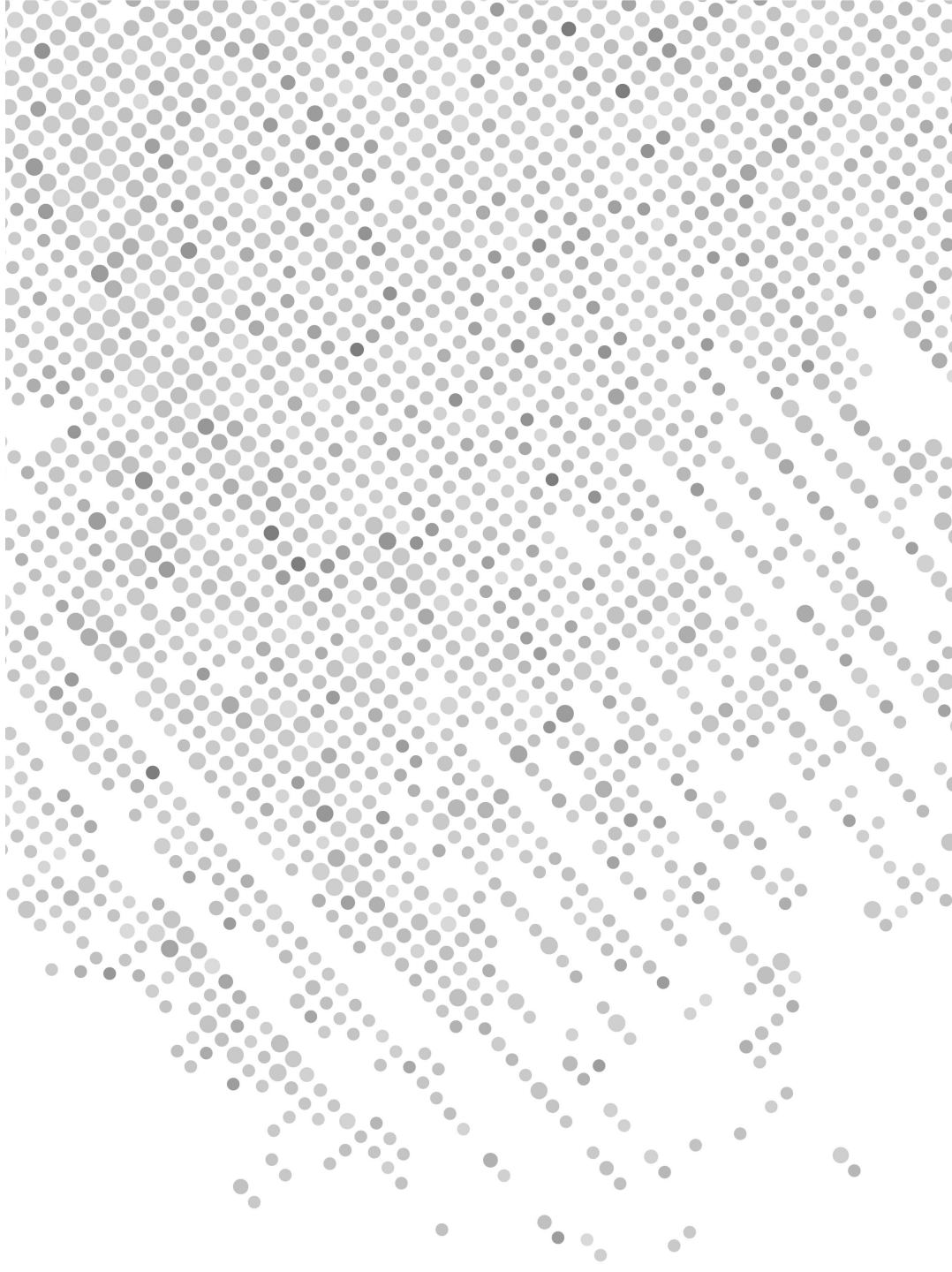
SpotCheckAI: Sprint 1 Presentation

Rafferty Leung

Agenda

- Team Member Roles and Responsibilities
- Problem Statement/Description
- Team Working Agreement
- Personas
- Minimum Viable Product
- Technologies Implemented
- Algorithms Employed
- Diagrams
- Product Backlog
- Sprint 1 Backlog
- Metrics
- Retrospective
- Sprint 2
- MVP Demo



Team Roles and Responsibilities

Rafferty Leung
Software Engineer,
Product Manager

Responsibilities:

- Write and test code to ensure high-quality software that meets requirements.
- Troubleshoot and debug code to identify and fix issues.
- Ensure software scalability, performance, and security.
- Work with project managers to estimate development efforts and deliver on time.
- Define and prioritize the product roadmap and features based on user needs and market trends.
- Gather and analyze user feedback and market research to inform product decisions.
- Create and manage product requirements and specifications.

Problem Statement

The average wait time to see a physician is currently 26 days, and the process of diagnosing skin cancer can cause delays in treatment due to the need for a dermatology appointment, visual inspection, and pathology review. To address this issue, a proposed solution involves using machine learning algorithms to triage patients based on skin lesion images. This approach has the potential to identify cases with a higher certainty of being cancerous, allowing those patients to be prioritized for earlier appointments and reducing wait times while improving patient outcomes.

Project Description

For individuals concerned about the potential malignancy of skin lesions,

who want a faster and more convenient alternative to traditional diagnostic methods,

the SpotCheckAI progressive web application (PWA)

is a solution

that allows users to upload an image and receive a response that predicts the likelihood of the lesion being cancerous or benign, providing preliminary responses to the end-user and streamlining a physician's practice

unlike existing solutions that may have limited accuracy or accessibility,

our application's machine learning model provides a highly accurate and user-friendly experience with the added benefit of being open source, allowing for further development and improvement of the machine learning model.

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Team Working Agreement

- Participation
  - It is expected of all members of the team to arrive promptly for meetings and actively participate during the meeting.
  - Daily participation in the sprint cycles is required.
- Communication
  - The team will utilize Slack, LinkedIn Messaging, or Email for communication, ensure codebase maintenance, and uphold transparency by openly addressing any obstacles or concerns they encounter.
- Work Division
  - The distribution of work and project responsibilities will be fair and equal, and each sprint will reflect this approach.

Persona 1

Name: David Kim

Age: 42

Occupation: Construction Project Manager

Education: Bachelor's degree in Civil Engineering

Personality: David is a hard-working and responsible individual who takes pride in his work. He is a detail-oriented person who pays close attention to his surroundings and is always looking for ways to improve processes. He is also health-conscious and enjoys staying active by jogging and playing basketball with his friends.

Interests: David is interested in technology and enjoys exploring new apps and software. He is also an advocate for sun safety and spends a lot of time outdoors due to his job, which has increased his risk of skin cancer. He enjoys learning about new ways to protect his skin and stay healthy.

Goals: David's main goal is to excel in his career and take on larger construction projects. He also wants to continue leading an active and healthy lifestyle, which includes monitoring his skin for signs of skin cancer. He hopes to use technology to help him achieve his health goals and stay informed about the latest developments in sun protection.

Challenges: David faces challenges in balancing his demanding job with his personal life. He also struggles with keeping track of his skin health, as it can be difficult to remember to check his skin for changes regularly. He hopes to use a skin cancer detection app to help him monitor his skin and catch any potential issues early on. However, he is also concerned about the accuracy of such apps and wants to ensure that he is using a reliable and trustworthy tool.

Persona 2

Name: Emily Rodriguez

Age: 29

Occupation: Outdoor Recreation Guide

Education: Associate's degree in Outdoor Recreation

Personality: Emily is a nature enthusiast who is passionate about sharing her love of the outdoors with others. She is outgoing and adventurous, and enjoys exploring new trails and camping sites. She is also conscientious and takes her responsibility for the safety of her clients seriously.

Interests: Emily enjoys hiking, backpacking, and rock climbing in her free time. She is also interested in technology and is always looking for ways to use it to enhance her clients' experiences. She is particularly interested in skin cancer prevention and is looking for ways to incorporate sun safety into her job.

Goals: Emily's main goal is to help her clients have a safe and enjoyable experience in the great outdoors. She also hopes to use technology to help her monitor her own skin health and catch any potential issues early on. Additionally, she wants to continue exploring new outdoor adventures and sharing them with others.

Challenges: Emily faces challenges in keeping track of her skin health while spending long hours outdoors. She hopes to use a skin cancer detection app to help her monitor any changes in her skin but is concerned about the reliability of such tools. She also struggles with work-life balance at times, as her job requires her to spend long hours in the outdoors.

Persona 3

Name: Thomas Lee

Age: 45

Occupation: Sales Manager

Education: Bachelor's degree in Marketing

Personality: Thomas is a confident and charismatic person who enjoys interacting with people. He is skilled at building relationships and is always looking for ways to improve his sales numbers. He is also health-conscious and takes his sun safety seriously.

Interests: Thomas enjoys playing golf and is a member of a local golf club. He also enjoys traveling with his family and experiencing new cultures. He is interested in technology and is always looking for ways to use it to improve his work and personal life.

Goals: Thomas's main goal is to increase his sales and advance in his career. He also hopes to use technology to help him monitor his skin health and catch any potential issues early on. Additionally, he wants to continue playing golf and spending time with his family.

Challenges: Thomas faces challenges in keeping track of his skin health while spending long hours outdoors meeting with clients. He hopes to use a skin cancer detection app to help him monitor any changes in his skin but is concerned about the accuracy of such tools. He also struggles with work-life balance at times, as his job requires him to travel frequently and spend long hours working.

Minimum Viable Product

- A website that allows for simple input and output with a predicted degree of certainty.
- Implementation of a Machine Learning Model with sufficient testing and training sample size.
- A cross-platform website that is responsive and device agnostic.

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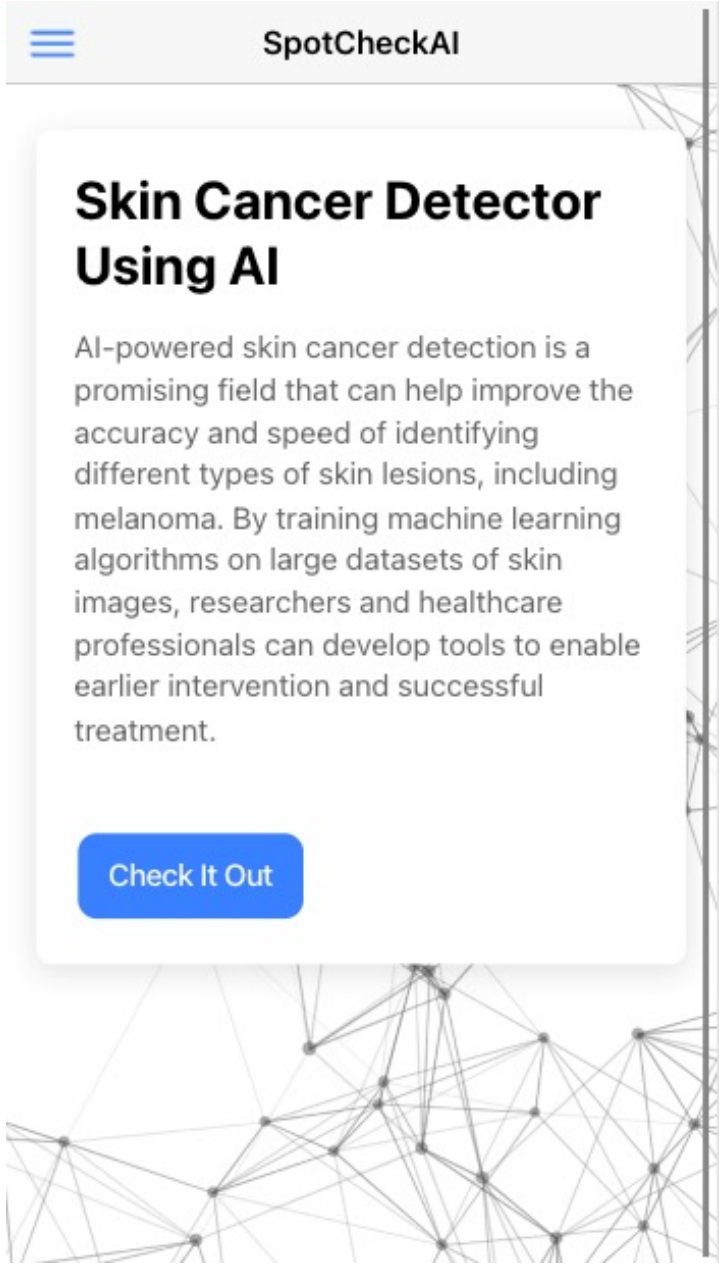
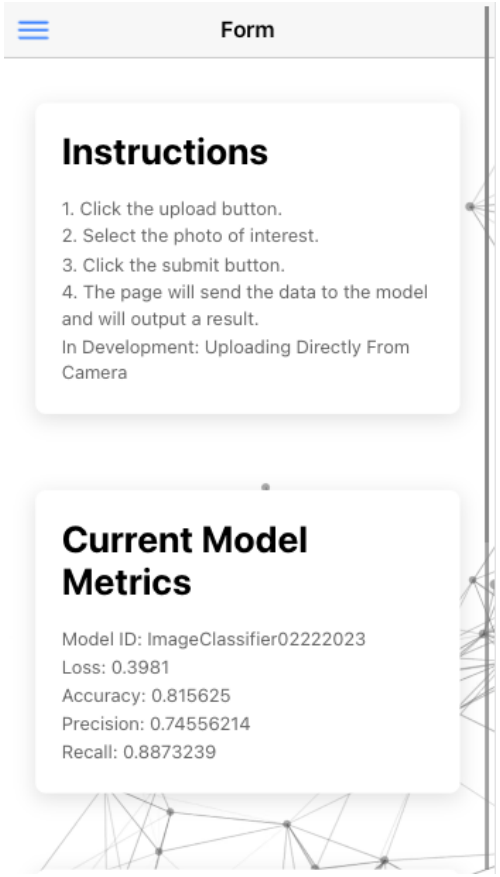
MVP: Home Page

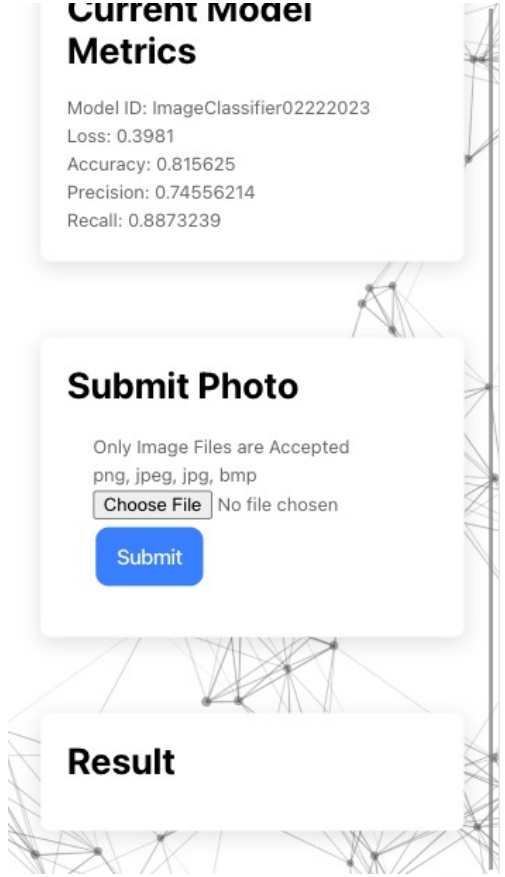
- Overview of what application's functionality
- Prediction form accessibility



MVP: Prediction Form

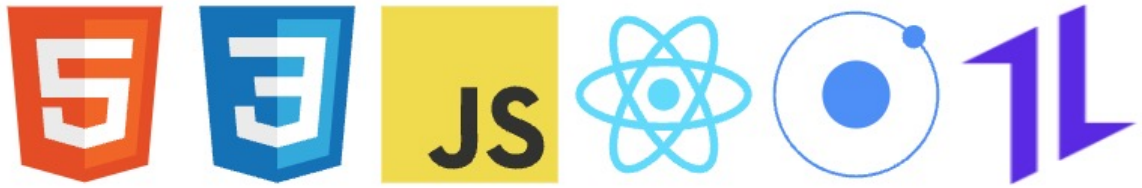
- Instructions
- Current Model Metrics
- Submit Photo
  - Specified image type criteria
- Result
  - Will return result with prediction or HTTP Error Message





Current Technologies Utilized

Client Side



Server Side

Other Technologies Used

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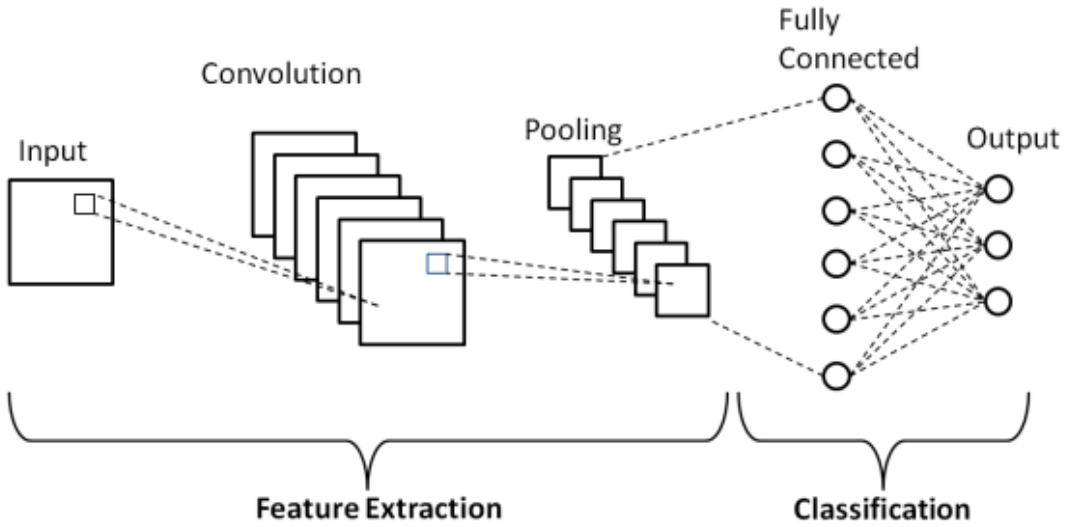
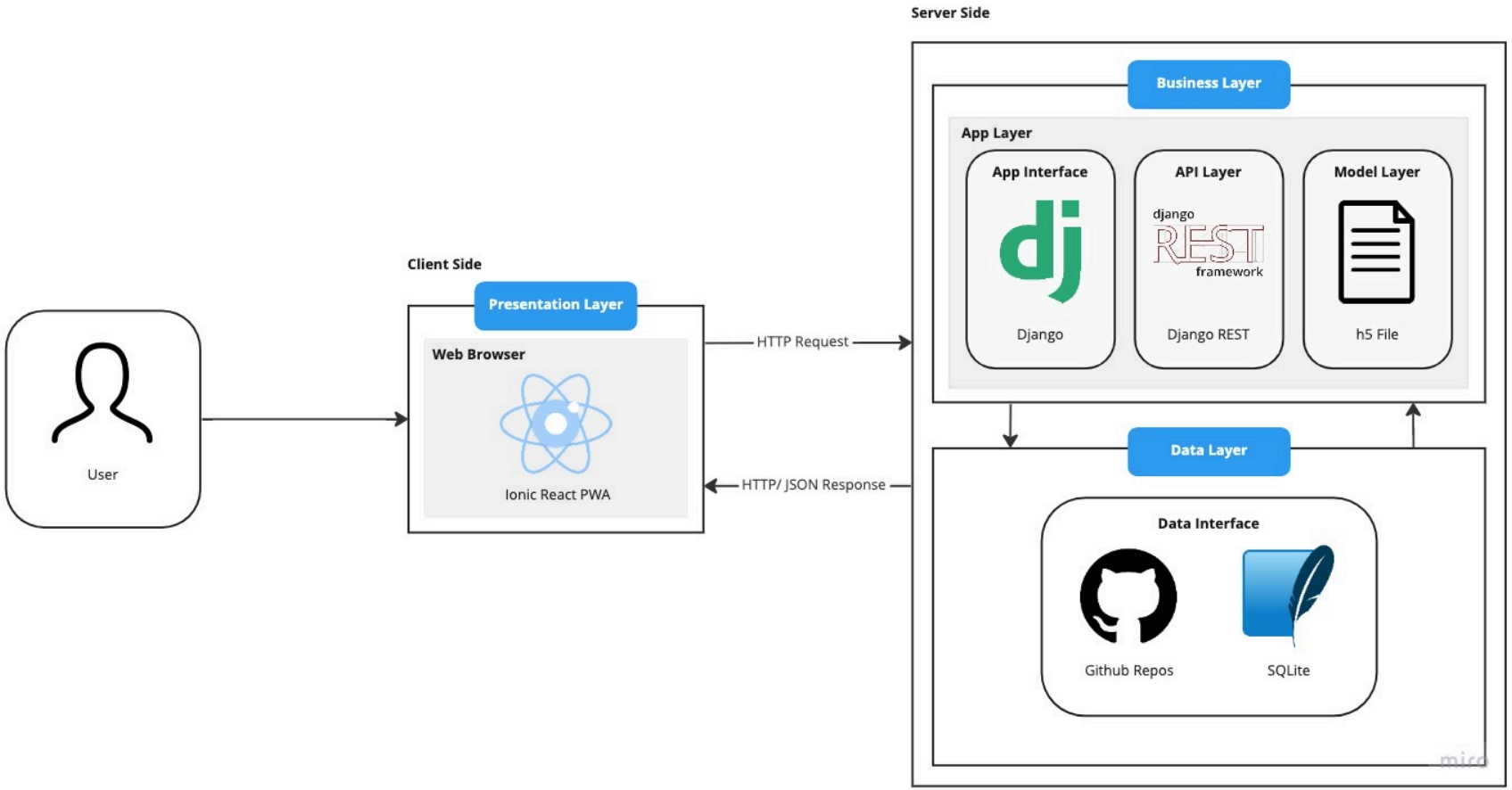
Algorithm: CNN

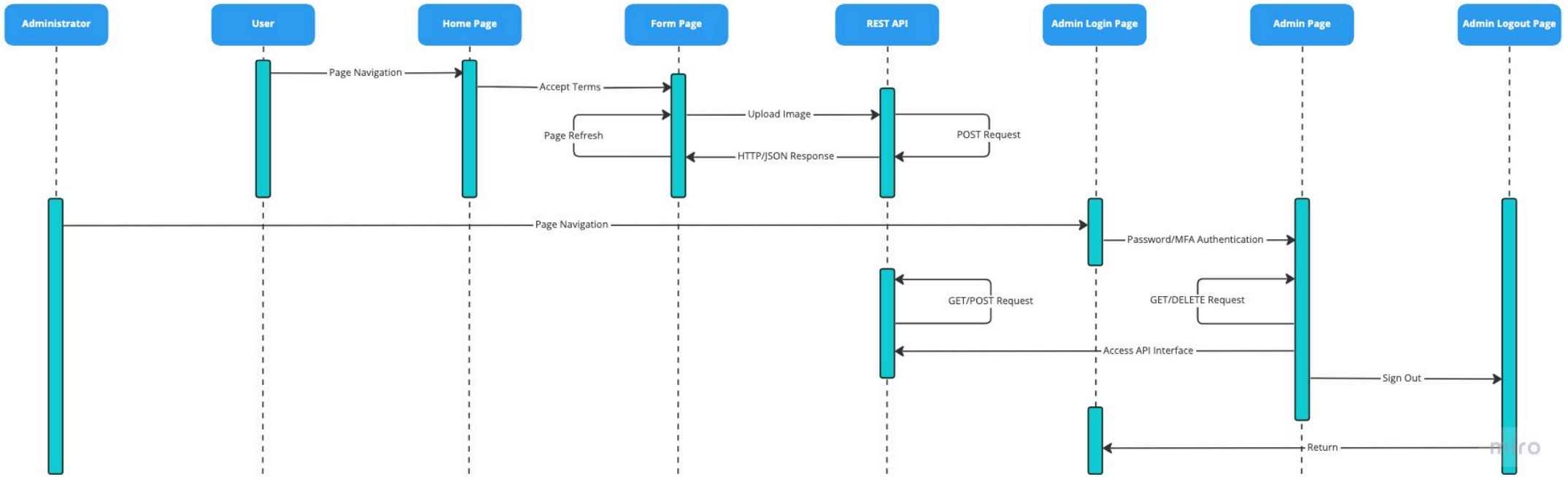
- Image Recognition → Convolution Neural Network
- Three separate "stacks" of 2D layers:
  - Convolution Layer with ReLU activation
  - Max Pooling Layer
  - Drop Out Layer
- Flatten Layer
- Dense Layer



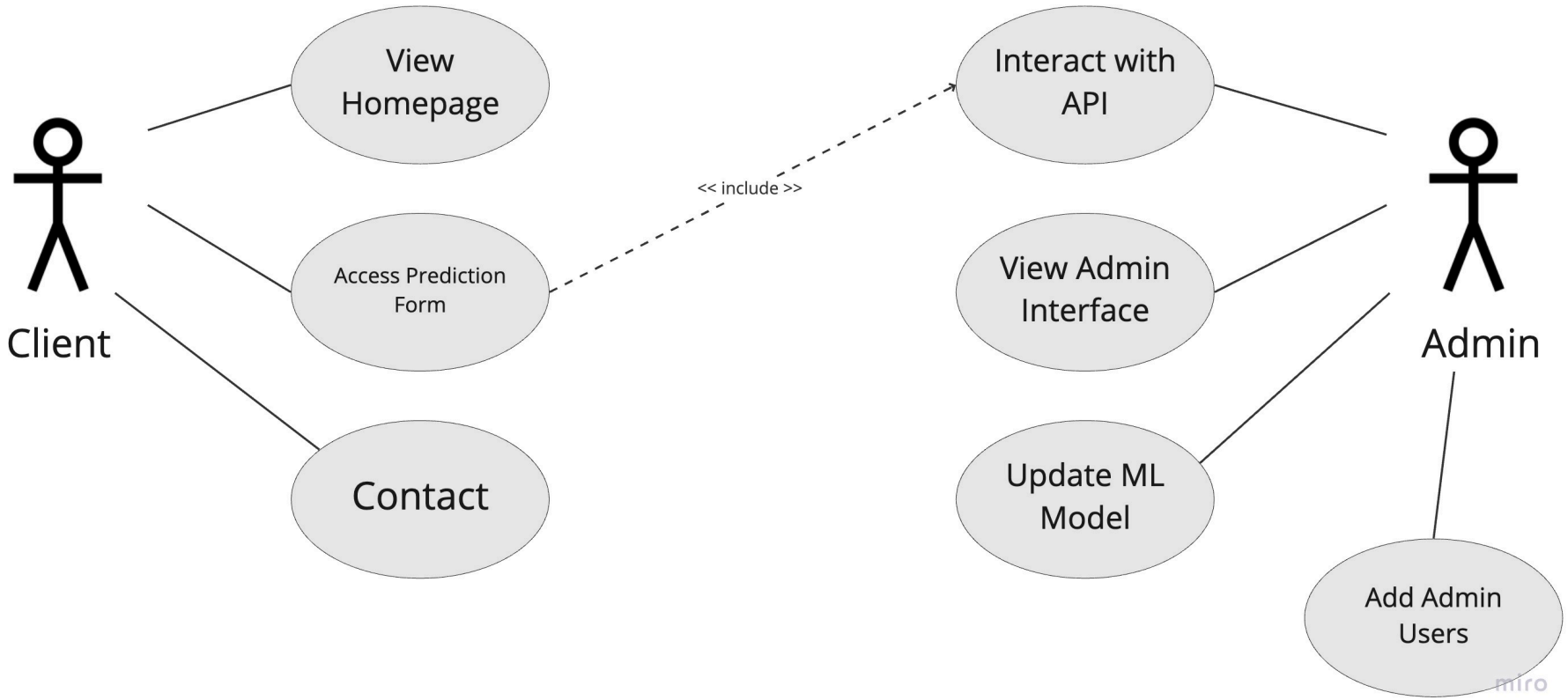
Diagrams: Architecture



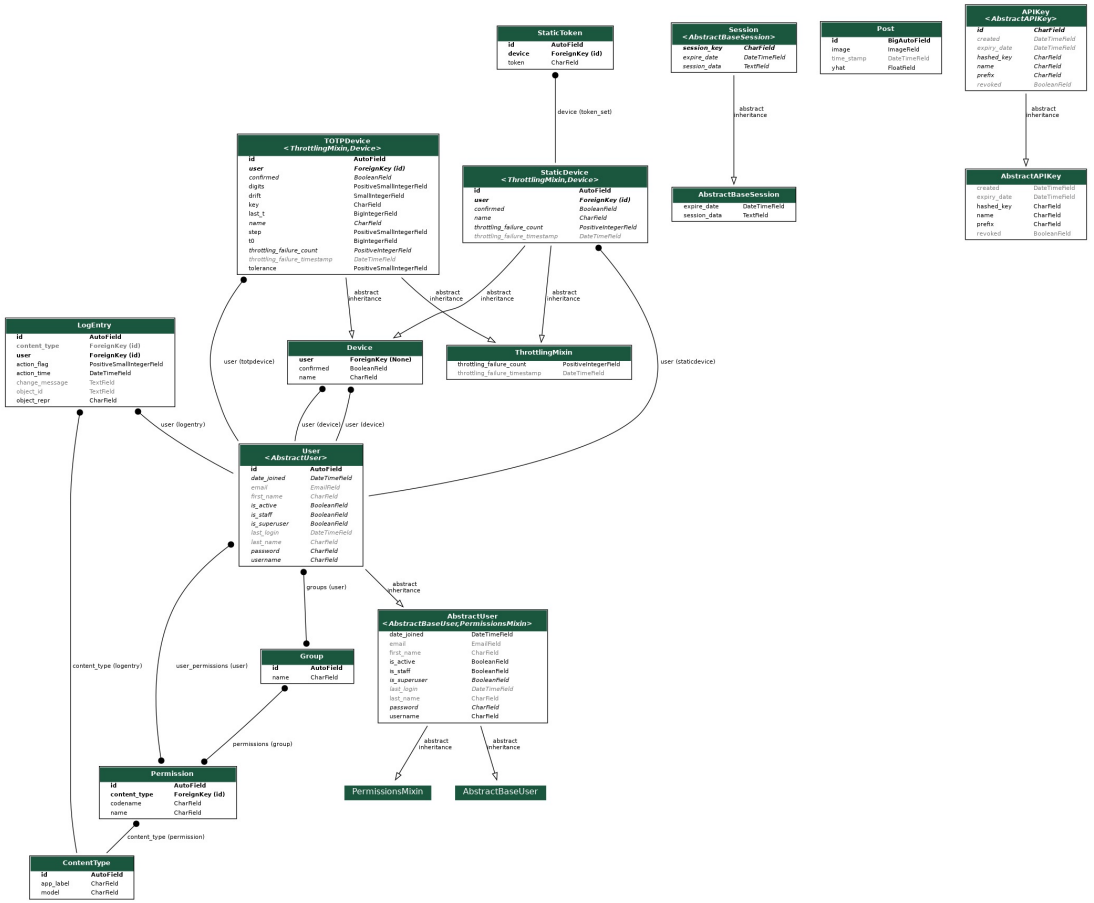
Diagrams: User Sequence



Diagrams: Use Case Diagram



Diagrams: Class Diagram



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Product Backlog

Issue Type	Key	Description
Task	CAP-1	Add Django to Keras model
Task	CAP-2	Add DRF to Keras model
Task	CAP-3	Add a new model to optimize
Task	CAP-4	Add more training data
Task	CAP-5	Determine if celery is needed
Task	CAP-6	Confirm if from front end to back end image bit path can be passed
Task	CAP-7	Determine front end architecture
Task	CAP-8	Determine backend web hosting
Task	CAP-9	Implement Back End Web Hosting
Task	CAP-10	Implement Front End Web Hosting
Task	CAP-12	Image resizing from DRF interface to Keras model
Task	CAP-13	Initial documentation within code
Task	CAP-14	Enforce consistent coding style
Task	CAP-15	Unit testing: Back End
Task	CAP-16	End-to-End testing: Front End
Task	CAP-17	End-to-End testing: Back End
Task	CAP-22	Create intial ML model
Task	CAP-23	Redo DRF backend
Task	CAP-24	Token authentication on Django Admin
Task	CAP-25	Combine DRF applications together
Task	CAP-27	Capacitor/Cordova Implementation
Task	CAP-28	Add API Key
Task	CAP-29	Develop front end from wireframe
Task	CAP-30	Implement Ion Loading
Task	CAP-31	Add menu functionality
Task	CAP-32	Presentation
Task	CAP-33	Technical paper
Task	CAP-34	Create Wiki Page
Task	CAP-35	AWS S3 Buckets
Story	CAP-37	As a user I want to be able to use this on any device so that it is convenient to use.
Story	CAP-38	As a user I want to chat with someone or find out more information regarding the website so that I could find the answers I need.
Story	CAP-39	As a user I want to have instant feedback as well as detailed feedback so that all data is presented to me in a transparent manner.
Story	CAP-40	As a user I want this to have reliable and provide information about the data so that I can walk into a doctor's appointment prepared and have a meaningful conversation.
Story	CAP-41	As a user I want to be warned that this does not replace a physician and that I should know that before using it so that I know the limitations of this software.
Story	CAP-42	As a user I want to interface to be easy to understand so that I don't have to Google more information about what information I am looking at.
Story	CAP-43	As a user I want my data to be protected so that my data and information is private.
Story	CAP-44	As a user I want to take a photo and send it without having the photo save to my phone first so that it is easier to use than taking a photo first on my end.

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Catalyst 1 Backlog

Issue Type	Key	Description
Task	CAP-1	Add Django to Keras model
Task	CAP-2	Add DRF to Keras model
Task	CAP-5	Determine if celery is needed
Task	CAP-6	Confirm if from front end to back end image bit path can be passed
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Story	CAP-41	As a user I want to be warned that this does not replace a physician and that I should know that before using it so that I know the limitations of this software.
Story	CAP-42	As a user I want to interface to be easy to understand so that I don't have to Google more information about what information I am looking at.
Story	CAP-43	As a user I want my data to be protected so that my data and information is private.

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User Stories and Acceptance Criteria

User Story ID	Summary	Status	Place
CAP-37	As a user I want to be able to use this on any device so that it is convenient to use. **Scenario:** User visiting website for the first time **Given** I am a role of a user **When** I visit this website **Then** I want this page to adapt to what device I am using.	Done	Platform
CAP-41	As a user I want to be warned that this does not replace a physician and that I should know that before using it so that I know the limitations of this software. **Scenario:** Anxious user who is health conscious **Given** I am a role of a user **When** I am about to upload an image for prediction **Then** I want this page to warn me about its limitation	Done	Webpage
CAP-42	As a user I want to interface to be easy to understand so that I don't have to Google more information about what information I am looking at. **Scenario:** First time user **Given** I am a role of a user **When** I visit this webpage **Then** I want this page have clear information **And** easy to digest information for a non-medical professional	Done	Webpage
CAP-43	As a user I want my data to be protected so that my data and information is private. **Scenario:** A concerned user about their data **Given** I am a role of a user **When** using this webpage **Then** I want my data I send into the website to be deidentified and unlabeled with my information.	Done	Platform

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Test Cases

User Story ID	Unit to Test	Assumption	Test Data	Steps to be Executed	Expected Results
CAP-12	Backend	NumPy array will be the same as input from ML model development	Same image from model development	Backend --> Import Image --> Print output on views.py	Same NumPy Array
CAP-24	MFA Authentication	Two factor authentication will be successfully integrated	Admin account	Backend --> Register MFA Device --> Login	Successful authentication
CAP-22	ML Model	ML model will output binary confidence level	Image not seen by model before	Ipynb --> Add Image --> Check Result	Result is between 0 - 1
CAP-29	Form	Successful communication from front end to back end, otherwise error message will show	Any image	Form --> Upload Image --> Check Response	Result is between 0 - 1
CAP-37	Platform	Webpage is device agnostic	Computer, Mobile Phone	Navigate to website	Hamburger menu on mobile, "cards" sized to screen width
CAP-43	REST API	GET Requests will not show	Any image	Backend --> Navigate to Post Model	Message: "GET Requests not allowed"
CAP-43	REST API	DELETE Requests for individual instances will succeed		Backend --> Admin Interface --> DELETE Instance	Deletion of a Post Model Instance

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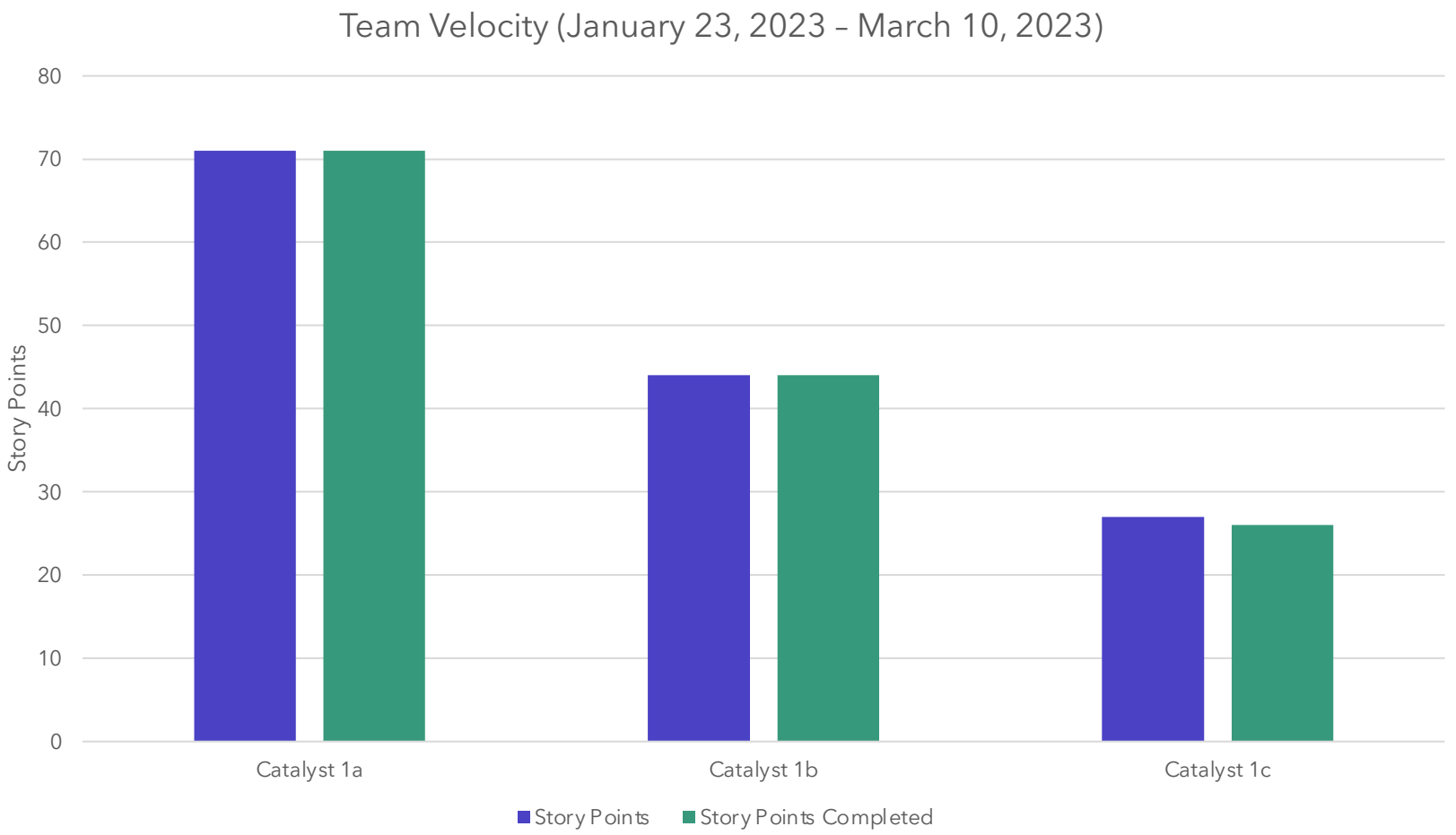
Stories Completed

Issue Type	Key	Description
Story	CAP-37	As a user I want to be able to use this on any device so that it is convenient to use.
Story	CAP-41	As a user I want to be warned that this does not replace a physician and that I should know that before using it so that I know the limitations of this software.
Story	CAP-42	As a user I want to interface to be easy to understand so that I don't have to Google more information about what information I am looking at.
Story	CAP-43	As a user I want my data to be protected so that my data and information is private.

All stories for Catalyst 1 are completed.

Team Velocity



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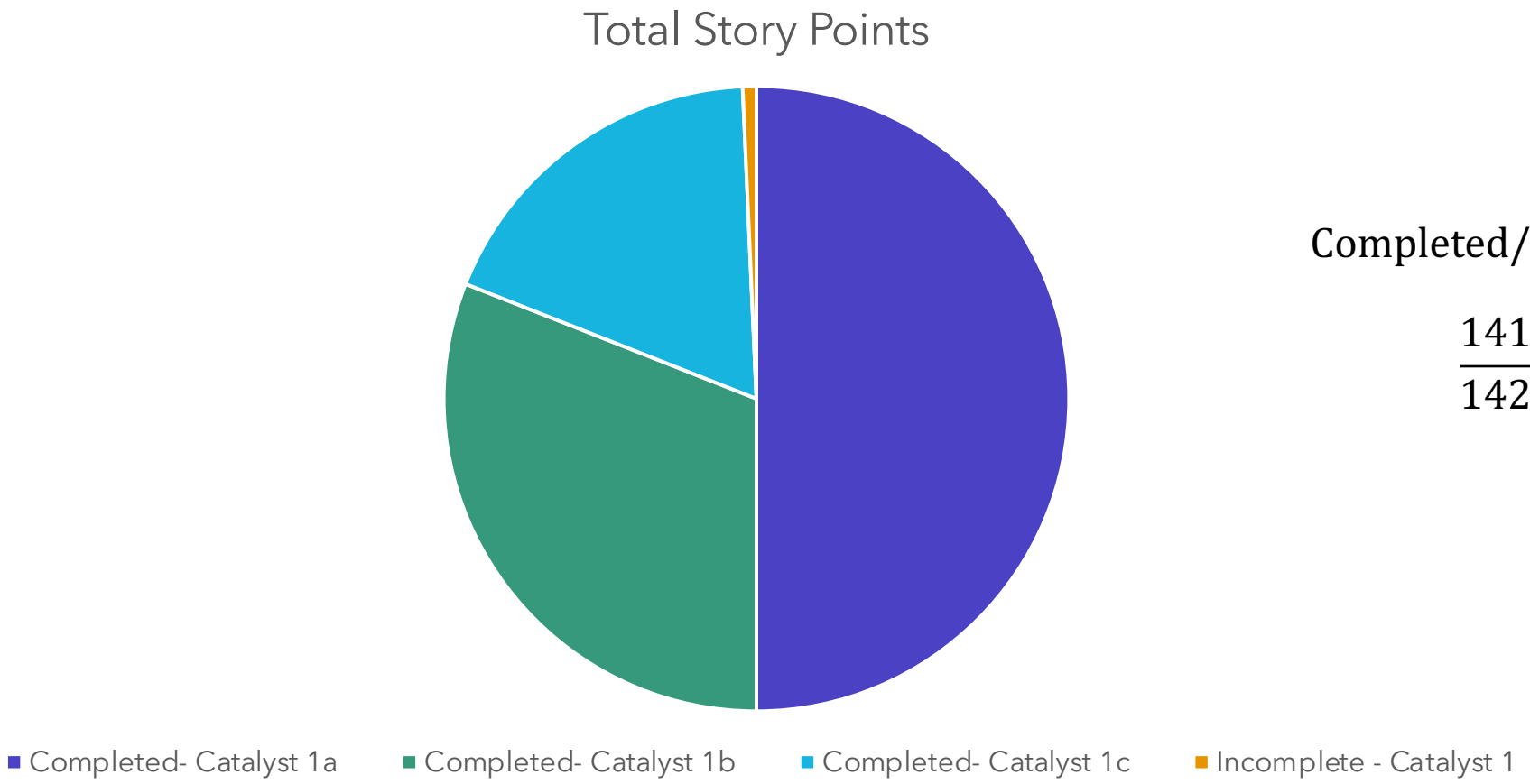
Completed/Committed Ratio



Completed/Committed Ratio

$$\frac{141}{142} = 0.993$$

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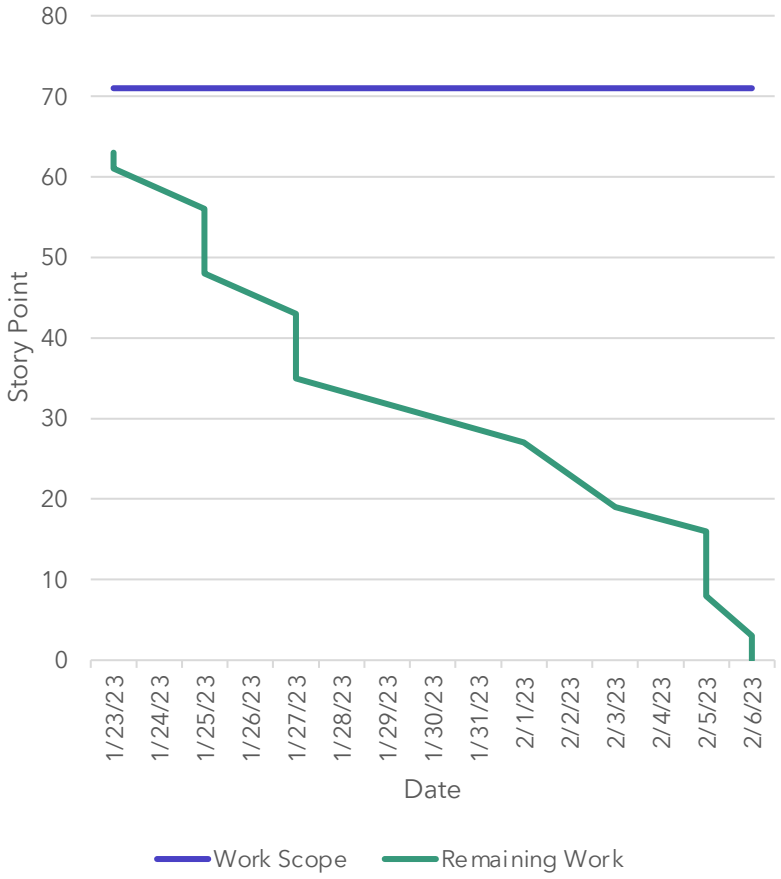
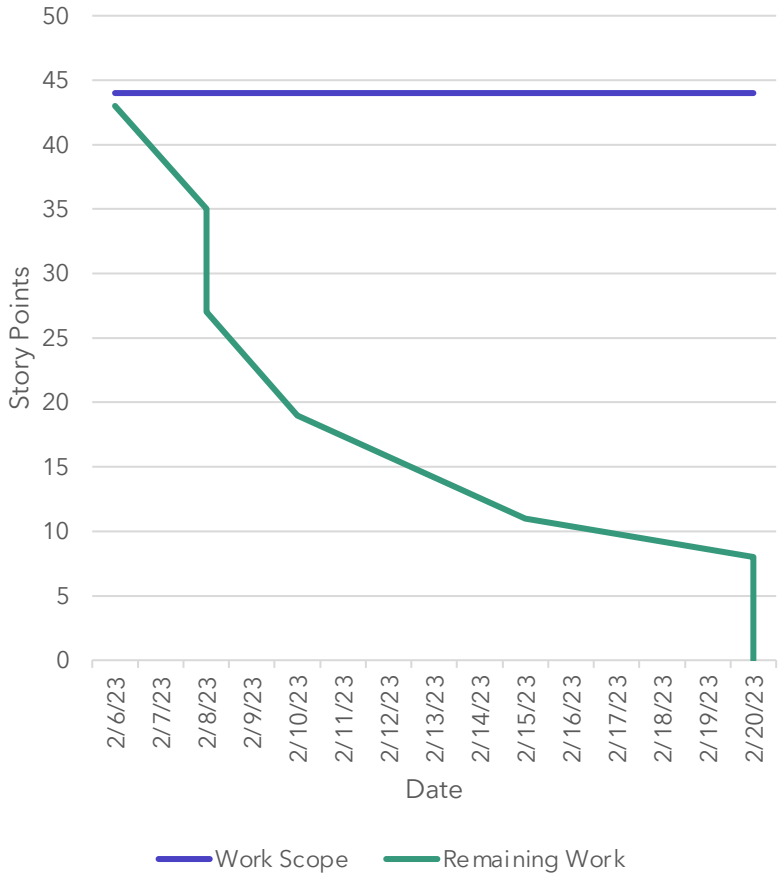
Burndown Charts

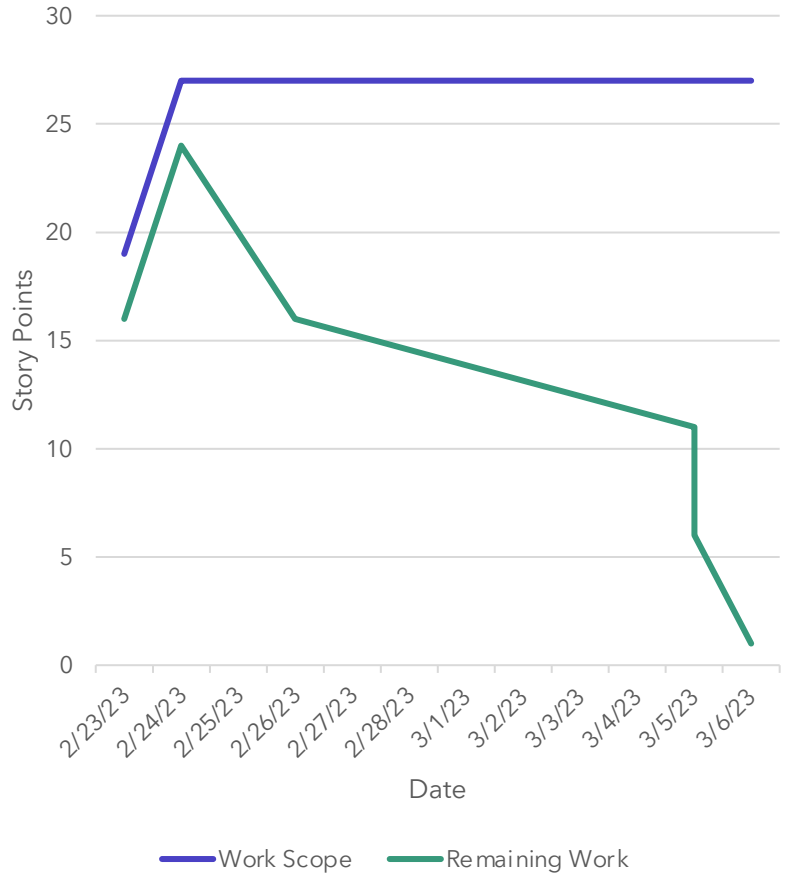
Catalyst 1a (January 23, 2023 - February 6, 2023): Burn Down Chart



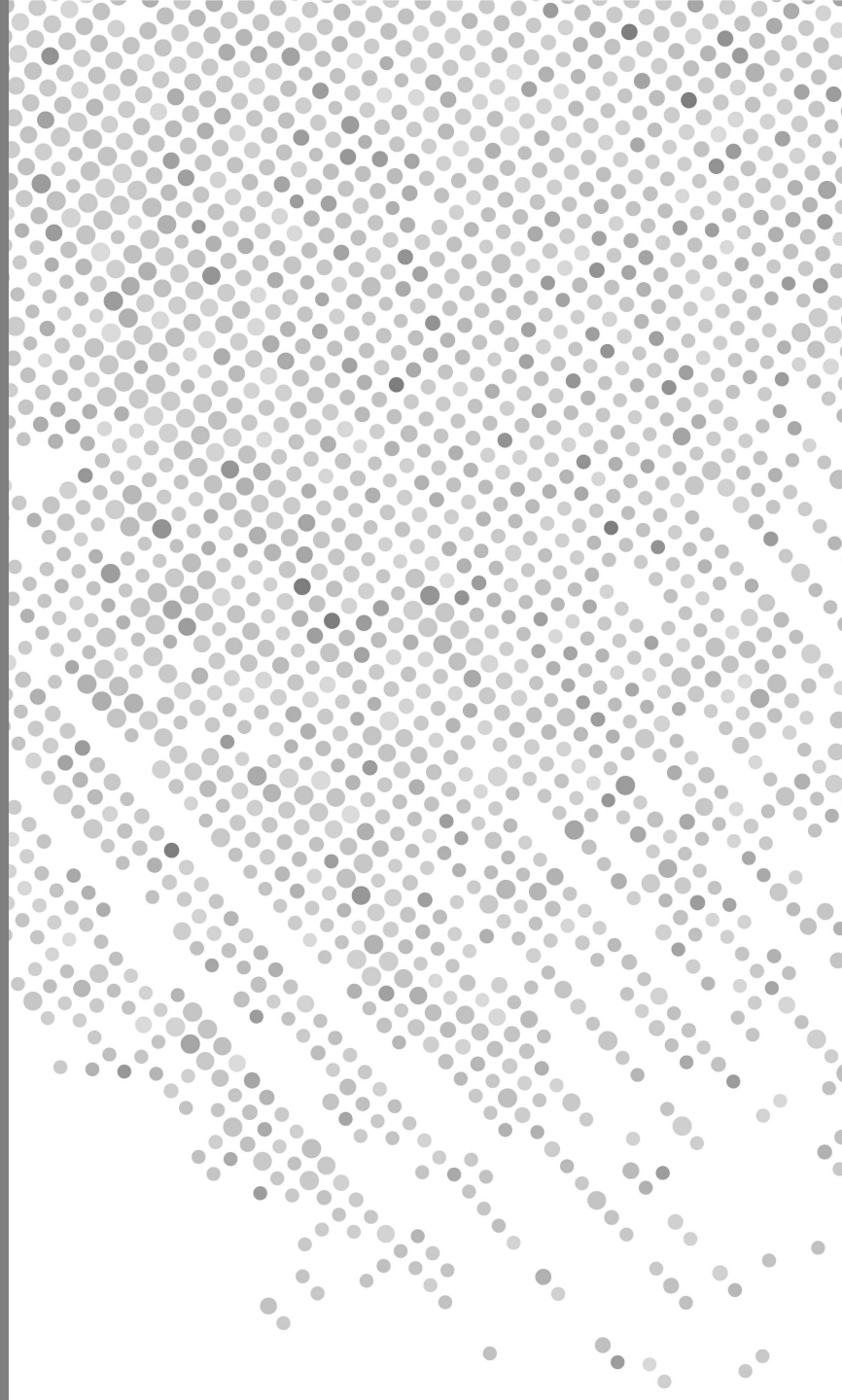
Catalyst 1b (February 6, 2023 - February 20, 2023): Burn Down Chart



Catalyst 1c (February 20, 2023 - March 10, 2023): Burn Down Chart



Retrospective



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What Went Well

01 By utilizing Agile methodologies, every sprint was completed efficiently.

02 The tasks for every sprint were carefully considered and executed with precision.

03 Version control was managed through the use of Github and Git.

04 Despite a tight schedule, the work was completed on time and the minimum viable product (MVP) was successfully implemented.

What Needs Improvement

01 More time needs to be devoted to planning sprint cycles.

02 Ensure planning process is thorough before starting a sprint so that changes to sprint's scope are minimized.

03 Detailed documentation within codebase for easier recall.

04 User story integration into sprints.

Next Steps

01 Spend an extra day or two for sprint planning.

02 Enforce documentation when utilizing Pylint/Eslint.

Catalyst 2 Backlog

Issue Type	Key	Description
Story	CAP-44	As a user I want to take a photo and send it without having the photo save to my phone first
Story	CAP-40	As a user I want this to have reliable and provide information about the data
Story	CAP-39	As a user I want to have instant feedback as well as detailed feedback
Story	CAP-38	As a user I want to chat with someone or find out more information regarding the website
Task	CAP-30	Implement Ion Loading
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Task	CAP-28	Add API Key
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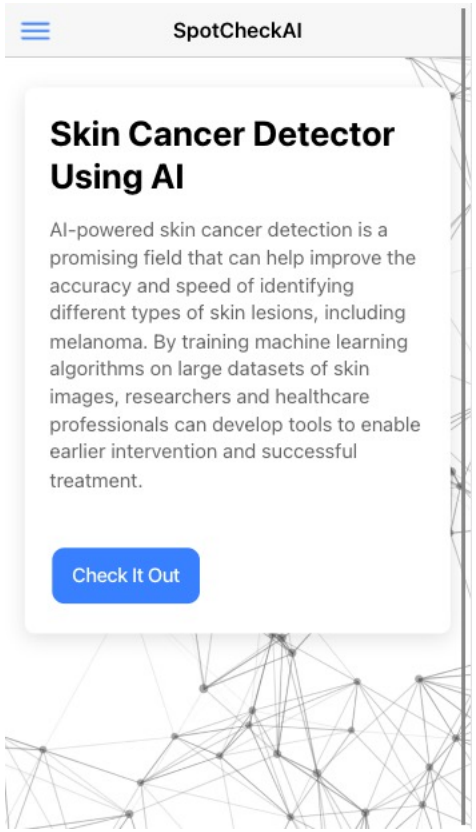
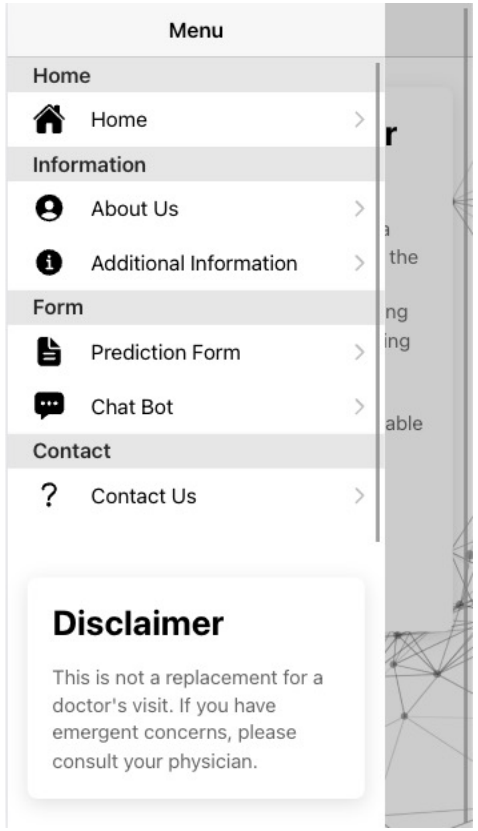
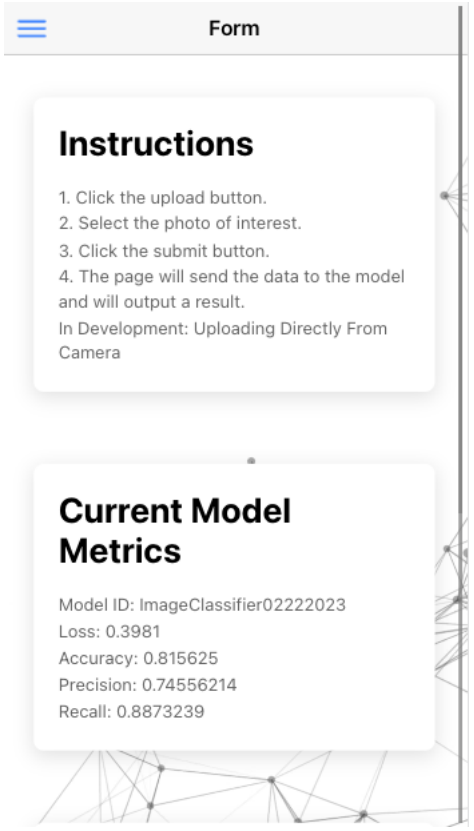
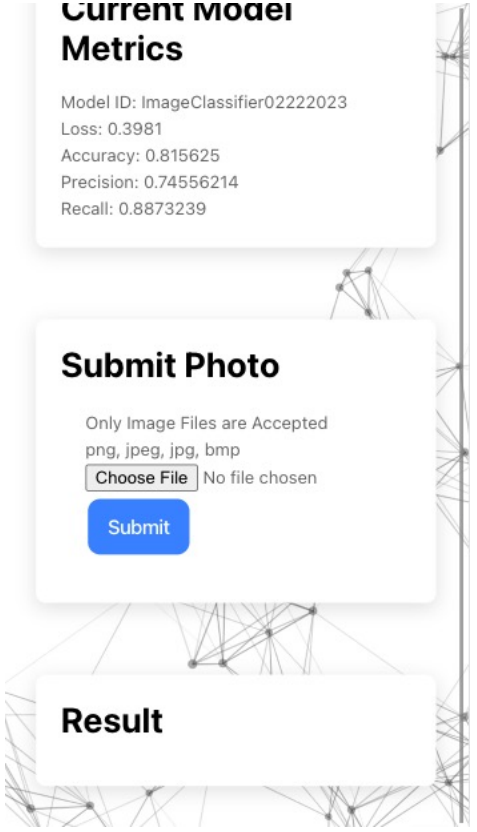
MVP Application Screenshots

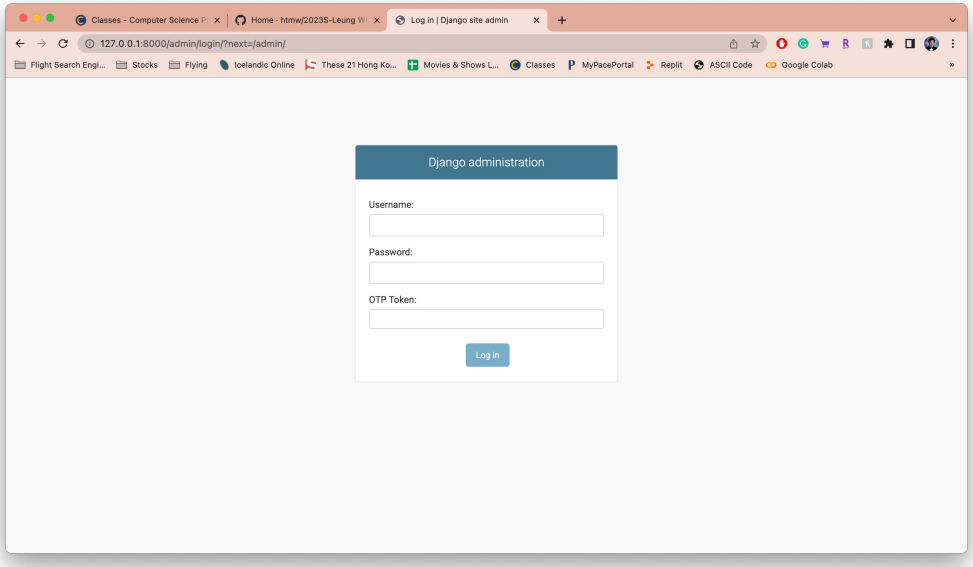


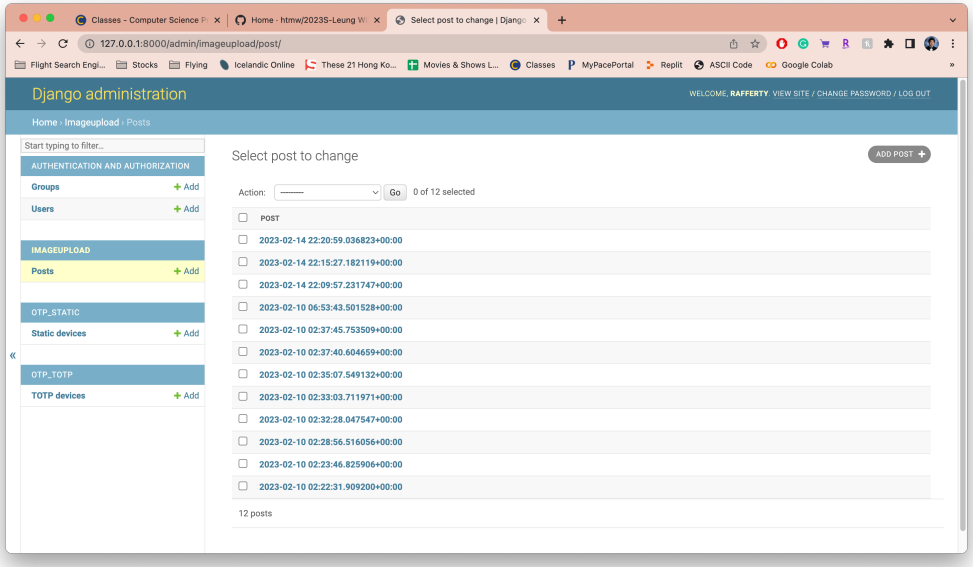


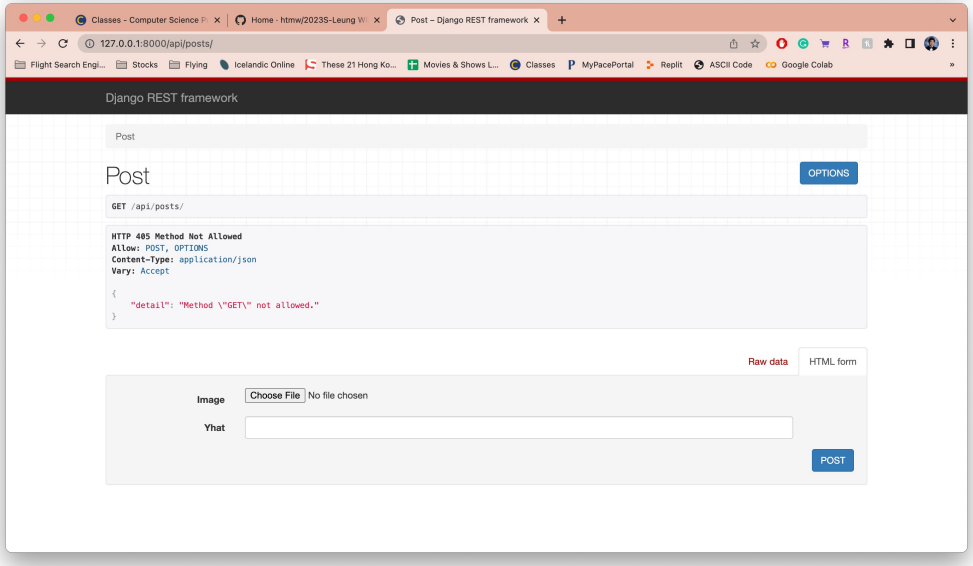


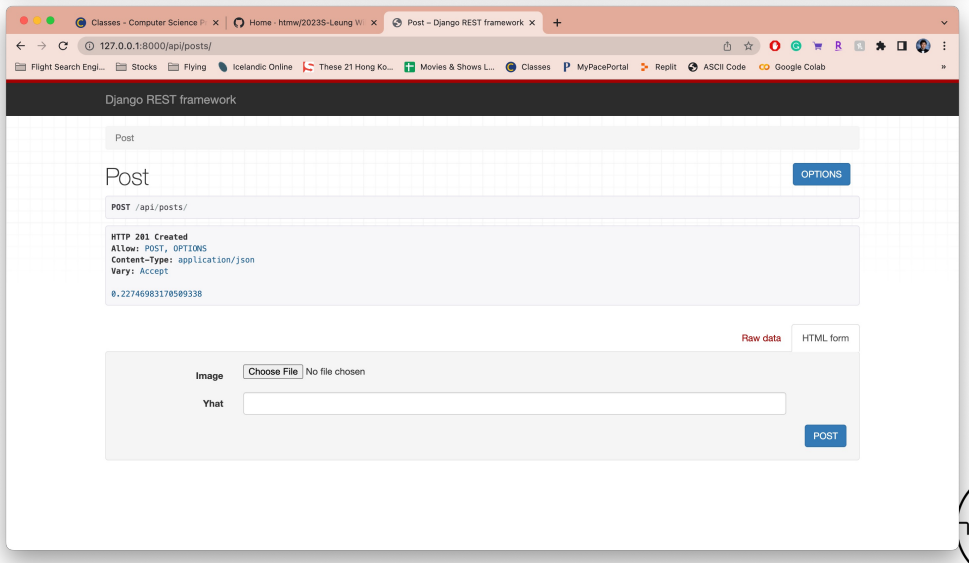


MVP API Screenshots









Links

- GitHub: https://github.com/htmw/SpotCheckAI/wiki
- MVP Video: https://youtu.be/LEKiQF-oiPE

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