

SpotCheckAI: Sprint 2 Presentation

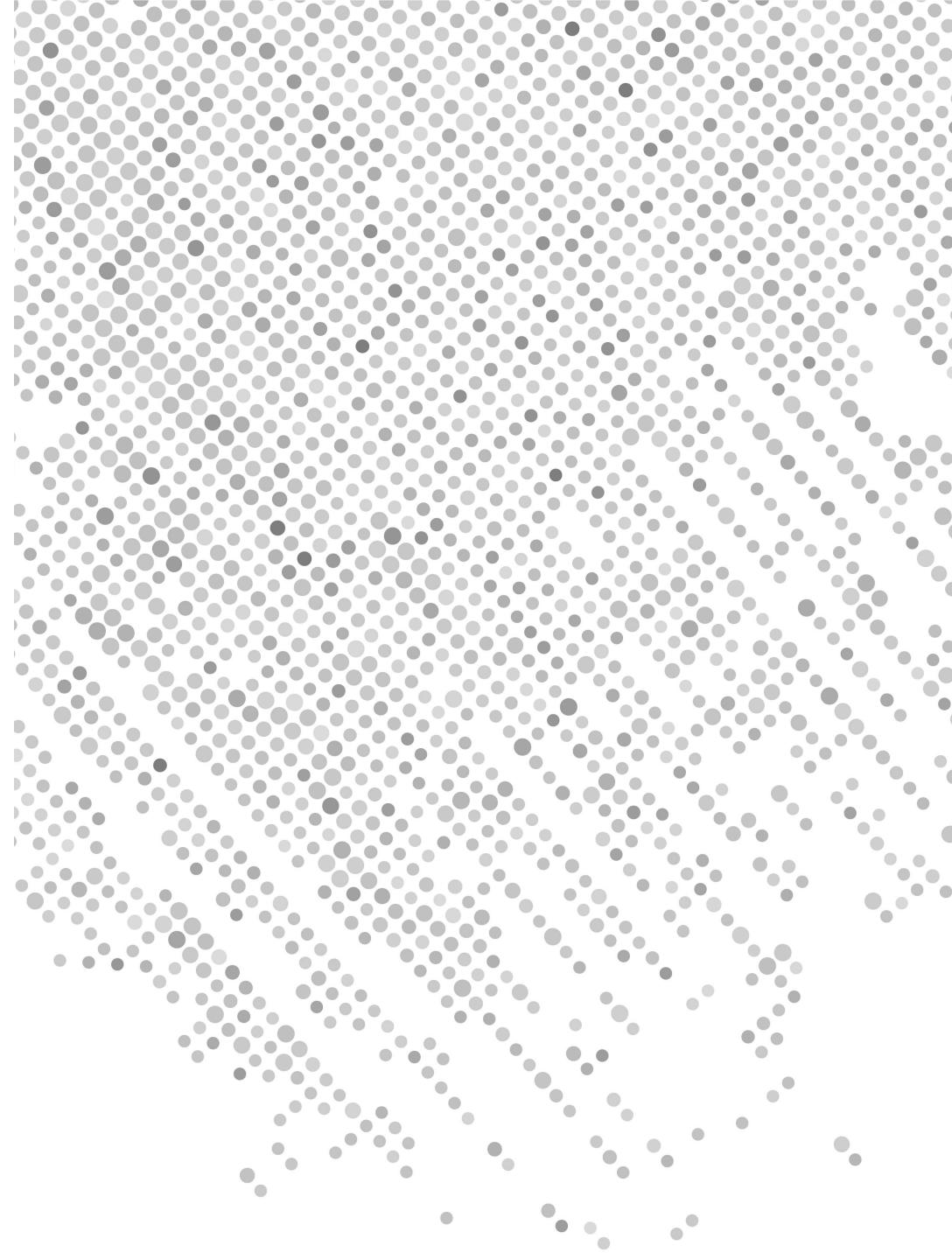
Rafferty Leung

Improvements made from feedback

- API Slide Inclusion- Slide 38

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.

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.

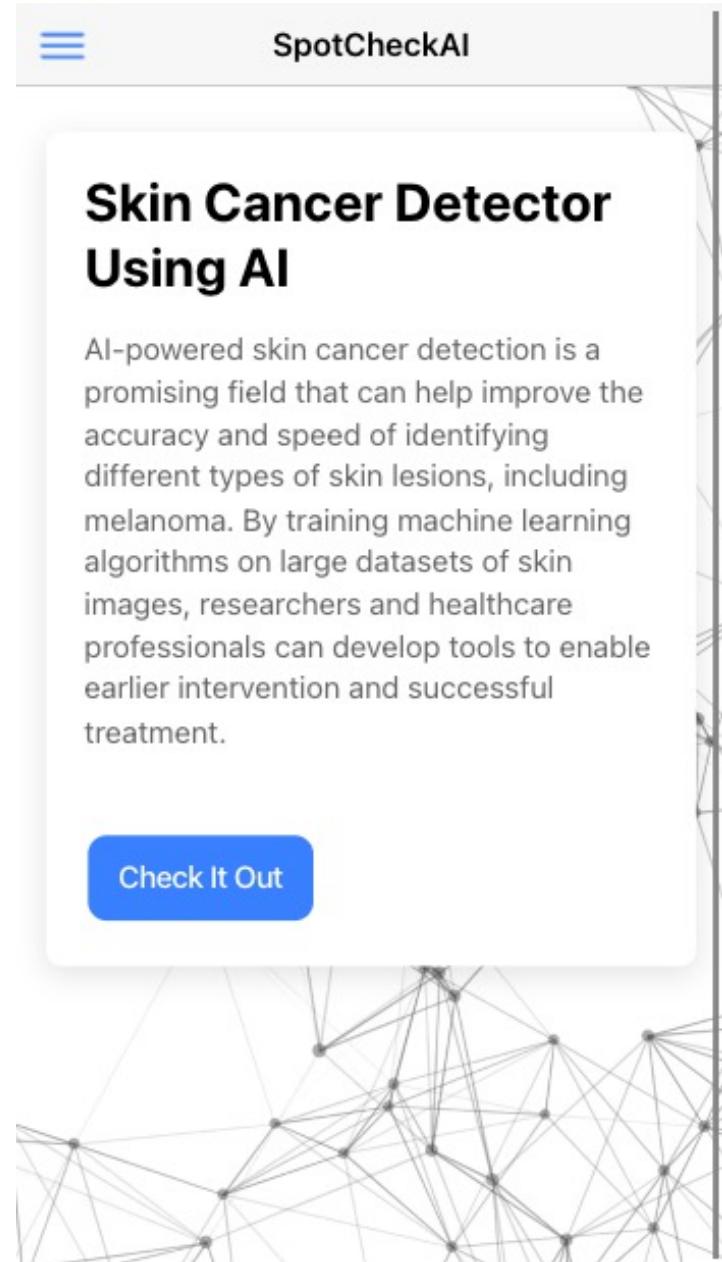
Challenges: Thomas faces challenges in keeping track of his skin health while spending long hours outdoors meeting with clients. He hopes to use a skin cancer detection app to help him monitor any changes in his skin but is concerned about the accuracy of such tools. He also struggles with work-life 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.

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

The wireframe diagram illustrates the user interface of the MVP Prediction Form. It features a central vertical column with three main sections: 'Instructions', 'Current Model Metrics', and 'Result'. To the left of this column is a sidebar titled 'Form' containing a 'Current Model Metrics' card. To the right is a sidebar titled 'Submit Photo' containing a file upload form. The entire interface is set against a background of a network graph.

Instructions

1. Click the upload button.
2. Select the photo of interest.
3. Click the submit button.
4. The page will send the data to the model and will output a result.

In Development: Uploading Directly From Camera

Current Model Metrics

Model ID: ImageClassifier02222023
Loss: 0.3981
Accuracy: 0.815625
Precision: 0.74556214
Recall: 0.8873239

Current Model Metrics

Model ID: ImageClassifier02222023
Loss: 0.3981
Accuracy: 0.815625
Precision: 0.74556214
Recall: 0.8873239

Submit Photo

Only Image Files are Accepted
png, jpeg, jpg, bmp

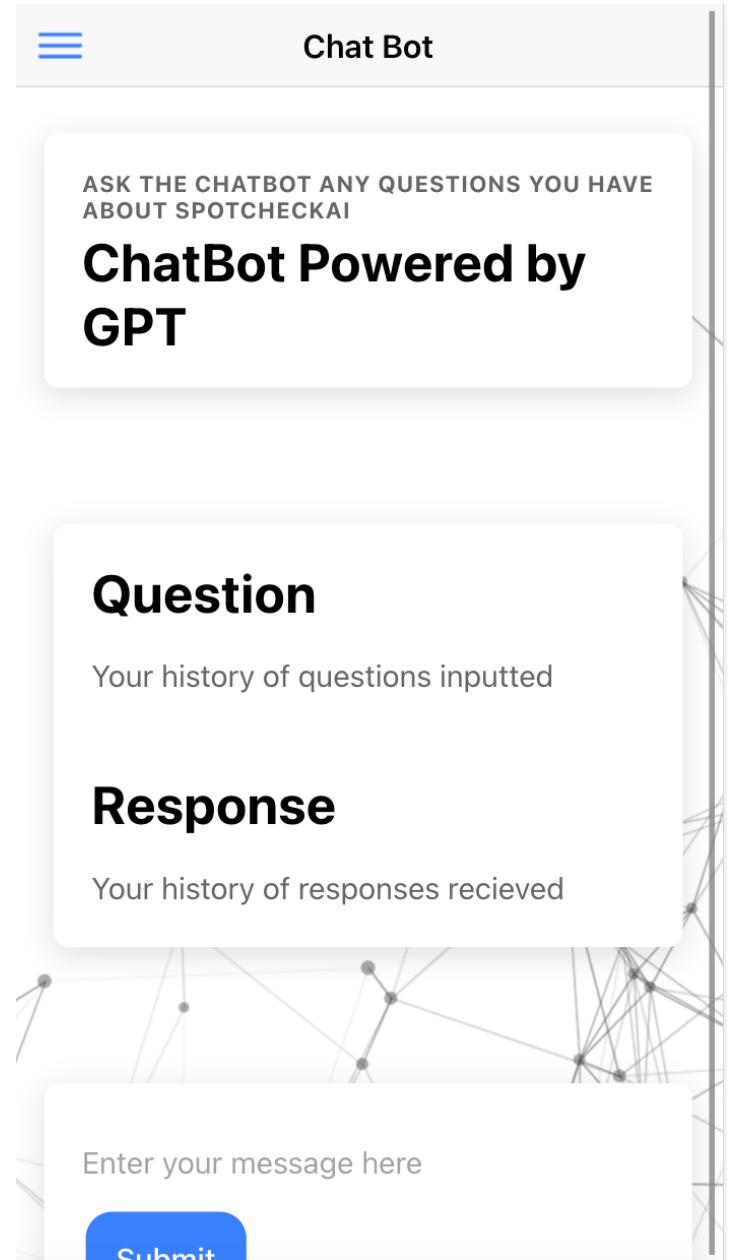
Choose File No file chosen

Submit

Result

MVP: Chatbot

- Questions and Answers Generated by ChatGPT



Current Technologies Utilized

Client Side



Server Side

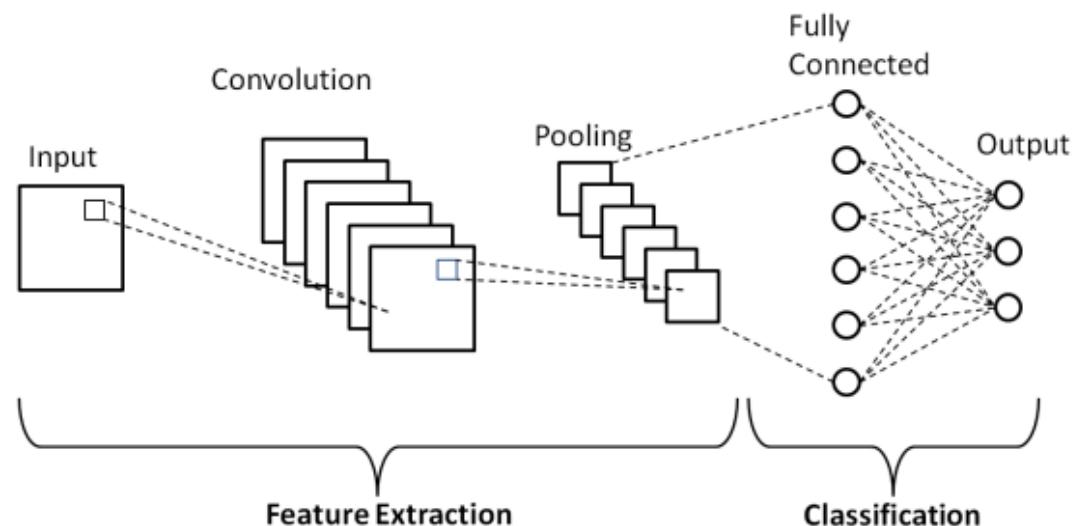


Other Technologies Used

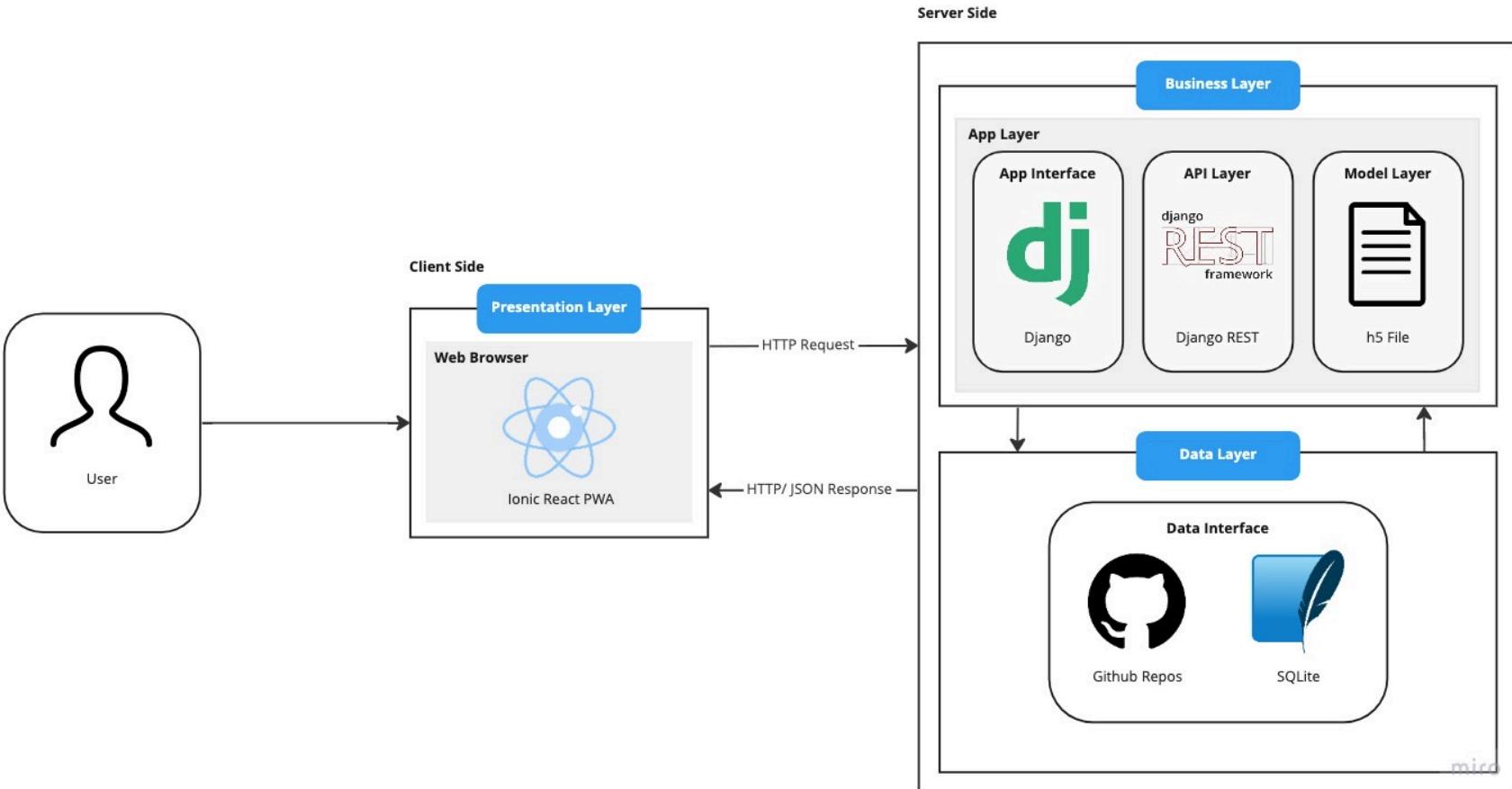


Algorithm: CNN

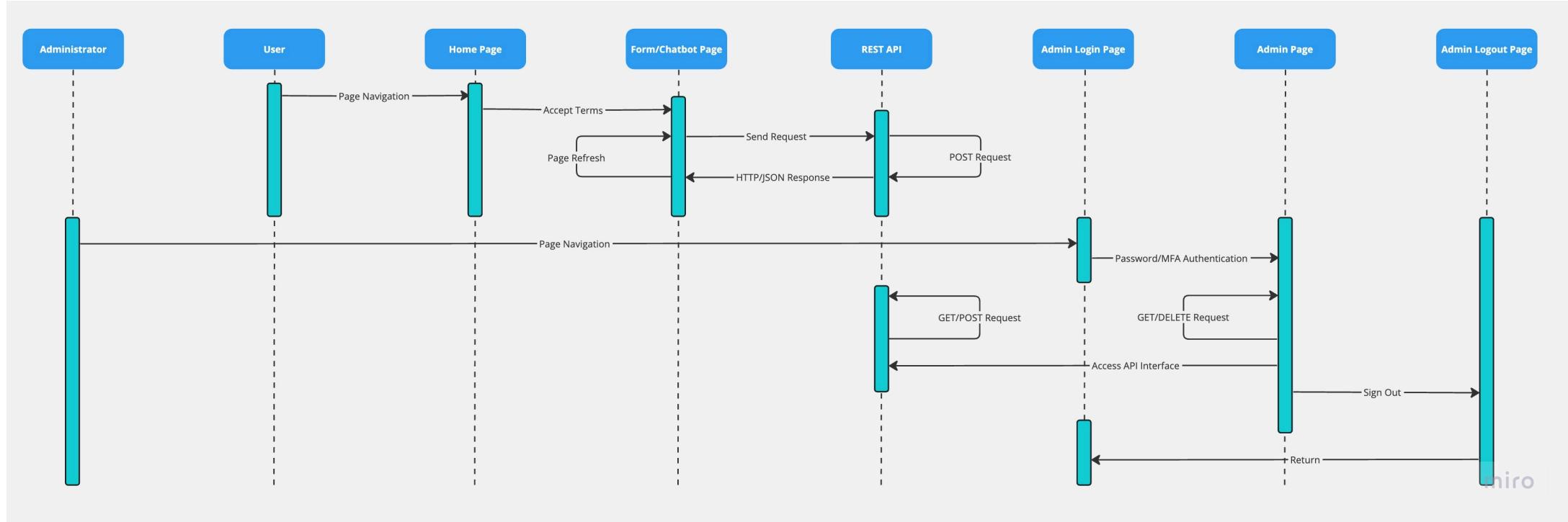
- Image Recognition → Convolution Neural Network
- Three separate “stacks” of 2D layers:
 - Convolution Layer with ReLU activation
 - Max Pooling Layer
 - Drop Out Layer
- Flatten Layer
- Dense Layer
- **SpotCheckAI uses ResNet50**



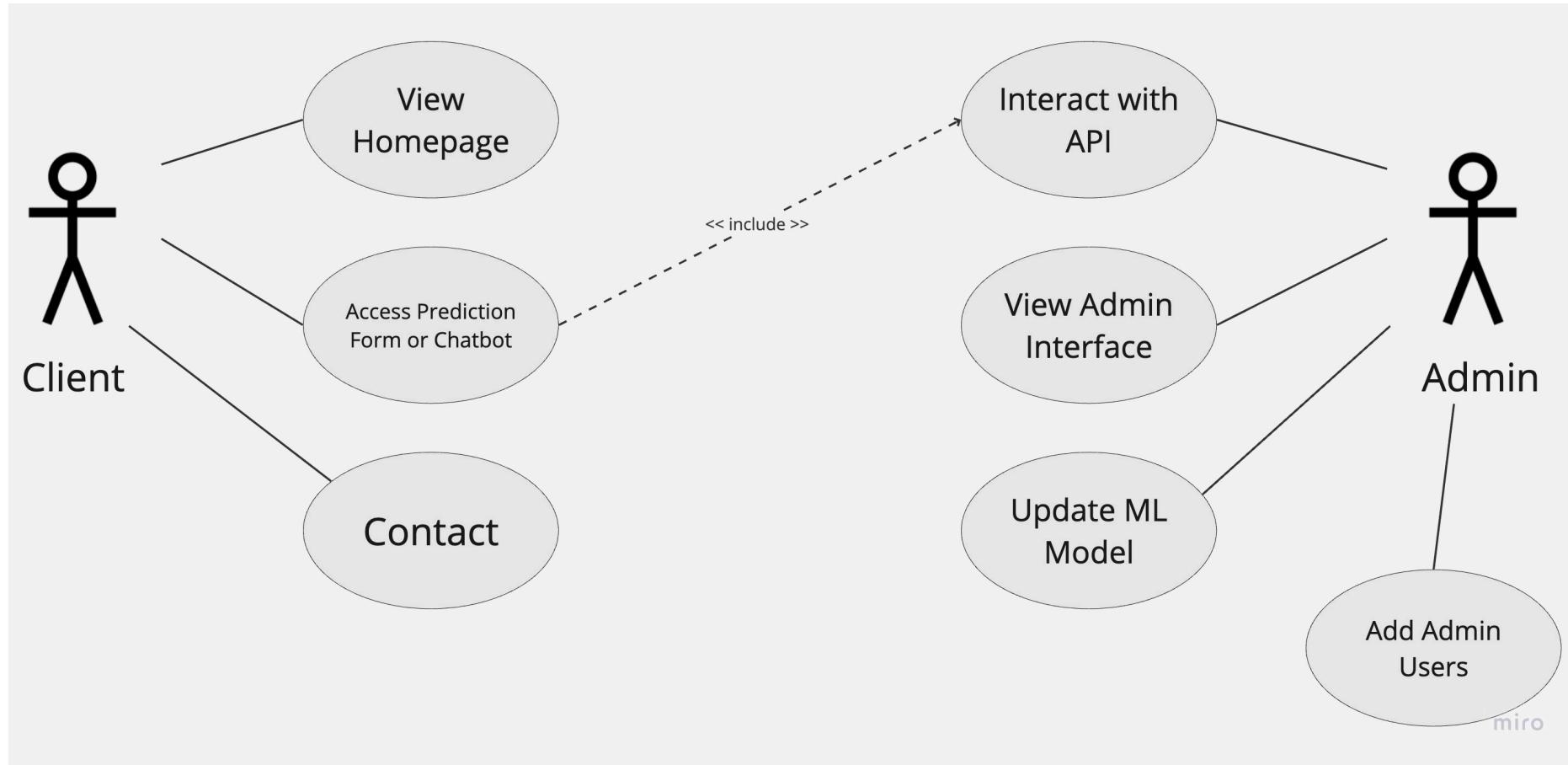
Diagrams: Architecture



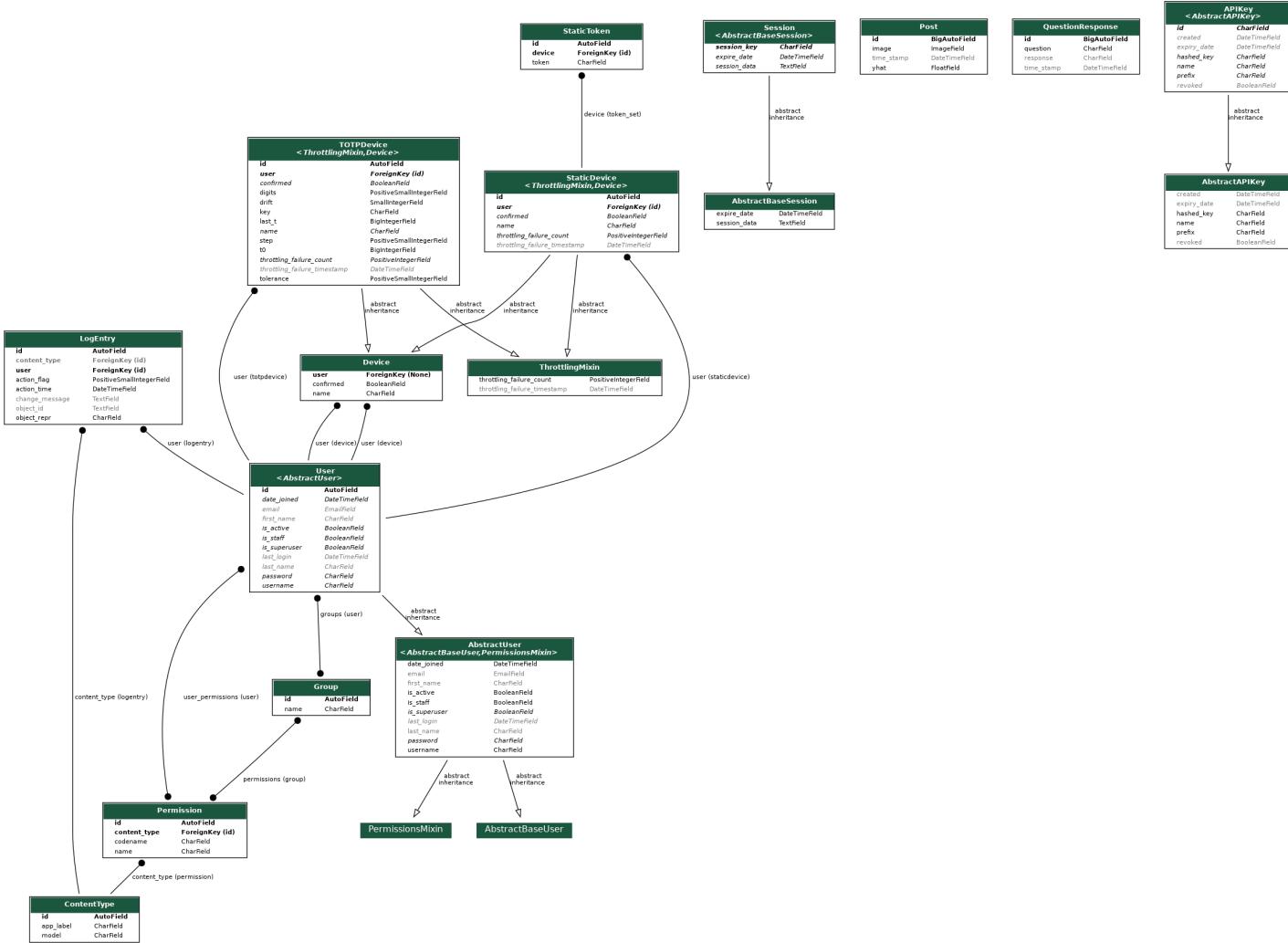
Diagrams: User Sequence



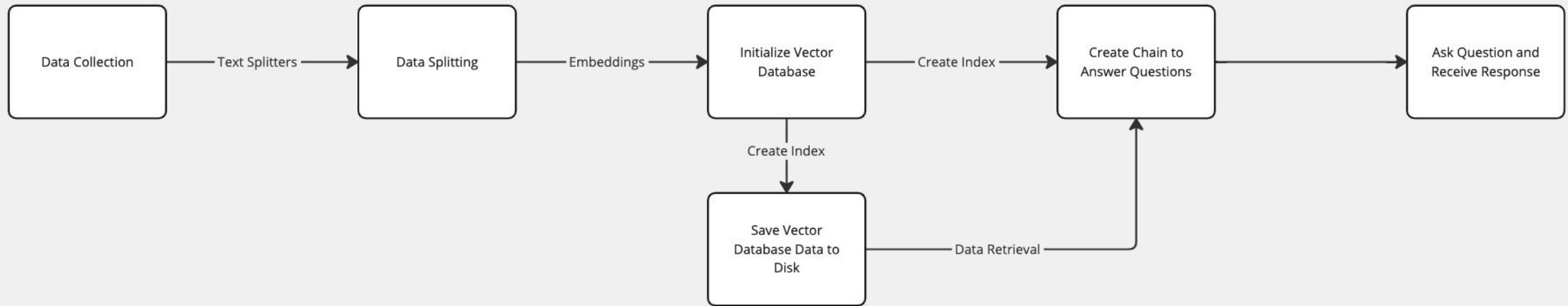
Diagrams: Use Case Diagram



Diagrams: Class Diagram



Diagrams: Process Flow of Chatbot



miro

Sprint 1 Recap

- MVP creation
- Simple application that could send and receive a response based off of a simple machine learning model

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.

Product 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
Task	CAP-3	Add a new model to optimize
Task	CAP-4	Add more training data
Task	CAP-9	Implement Back End Web Hosting
Task	CAP-10	Implement Front End Web Hosting
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-27	Capacitor/Cordova Implementation
Task	CAP-28	Add API Key
Task	CAP-35	AWS S3 Buckets

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
Task	CAP-3	Add a new model to optimize
Task	CAP-4	Add more training data
Task	CAP-9	Implement Back End Web Hosting
Task	CAP-10	Implement Front End Web Hosting
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-27	Capacitor/Cordova Implementation
Task	CAP-28	Add API Key
Task	CAP-35	AWS S3 Buckets

User Stories and Acceptance Criteria

User Story ID	Summary	Status	Place
CAP-37	<p>As a user I want to be able to use this on any device so that it is convenient to use.</p> <p>Scenario: User visiting website for the first time</p> <p>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.</p>	Done	Platform
CAP-41	<p>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.</p> <p>Scenario: Anxious user who is health conscious</p> <p>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</p>	Done	Webpage
CAP-42	<p>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.</p> <p>Scenario: First time user</p> <p>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</p>	Done	Webpage
CAP-43	<p>As a user I want my data to be protected so that my data and information is private.</p> <p>Scenario: A concerned user about their data</p> <p>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.</p>	Done	Platform
CAP-44	<p>As a user I want to take a photo and send it without having the photo save to my phone first.</p> <p>Scenario: Native-like use application</p> <p>Given I am a role of a user When I visit this webpage Then I want this page to be seamless and integrated with my phone/device</p>	Incomplete	Platform
CAP-40	<p>As a user I want this to have reliable and provide information about the data</p> <p>Scenario: First time user</p> <p>Given I am a role of a user When I visit this webpage Then I want this page tell me what my results mean</p>	Complete	Webpage
CAP-39	<p>As a user I want to have instant feedback as well as detailed feedback</p> <p>Scenario: User sends photo</p> <p>Given I am a role of a user When I visit this webpage Then I want this page to display feedback so that I can understand my result</p>	Complete	Webpage
CAP-38	<p>As a user I want to chat with someone or find out more information regarding the website</p> <p>Scenario: User has questions</p> <p>Given I am a role of a user When I visit this webpage Then I want this page to have someone available to "speak" with</p>	Complete	Webpage

Test Cases

User Story ID	Unit to Test	Assumption	Test Data	Steps to be Executed	Expected Results
CAP-40	Front End	Data displayed will be intuitive	Test image	Upload Image → Obtain Response	Result should be the same on the front end and back end
CAP-38	Chat Bot	User will have questions about the website	User query	Ask question → Returns valid response	Valid response returned
CAP-3	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

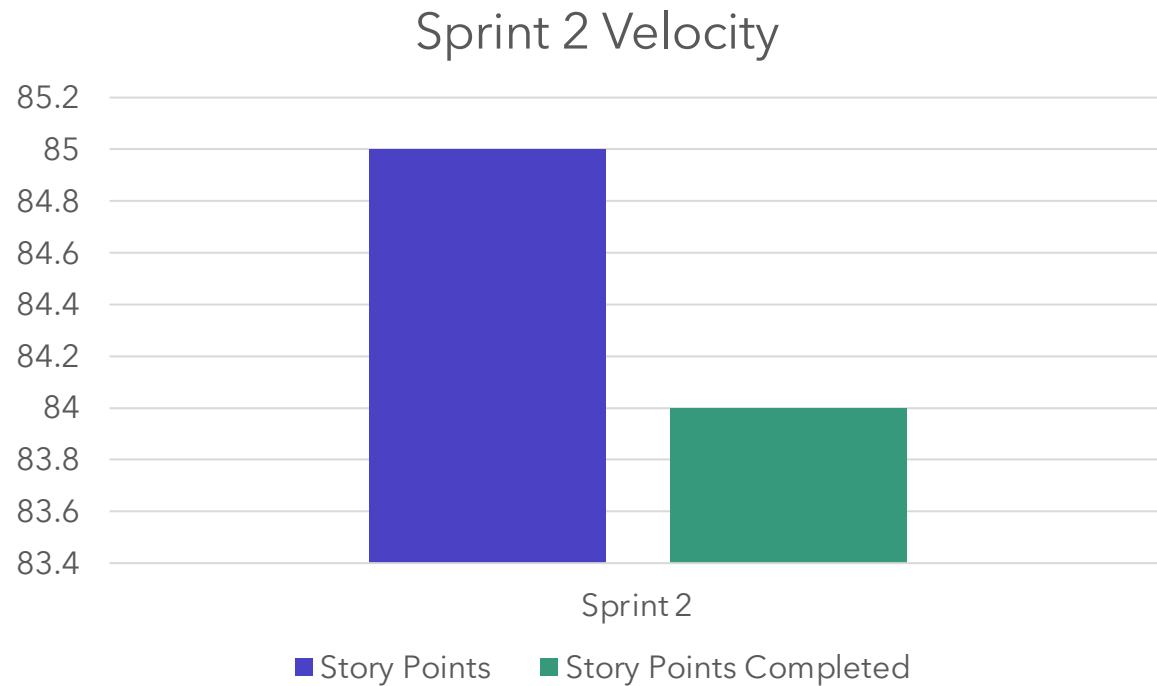
Stories Completed

Issue Type	Key	Description
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

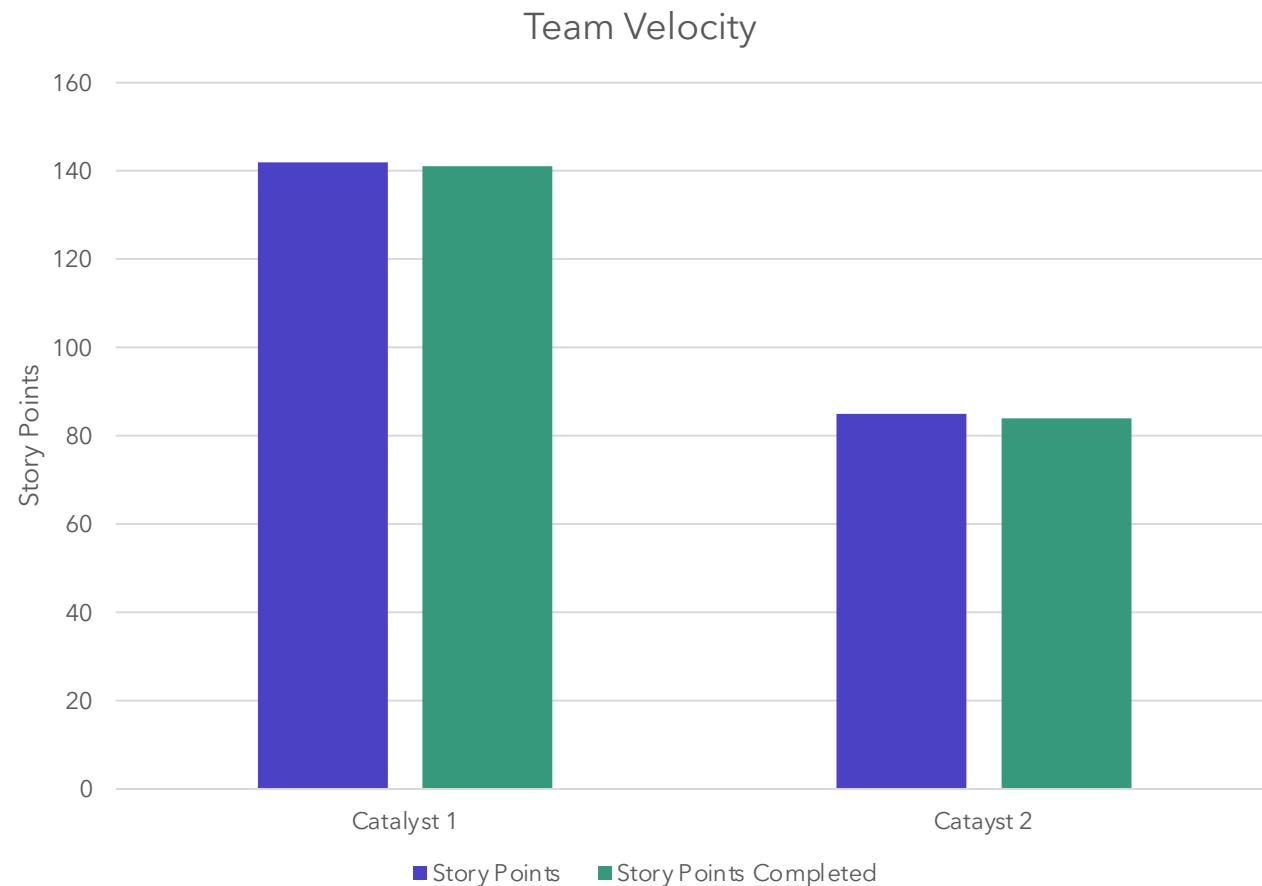
Stories Incomplete

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.

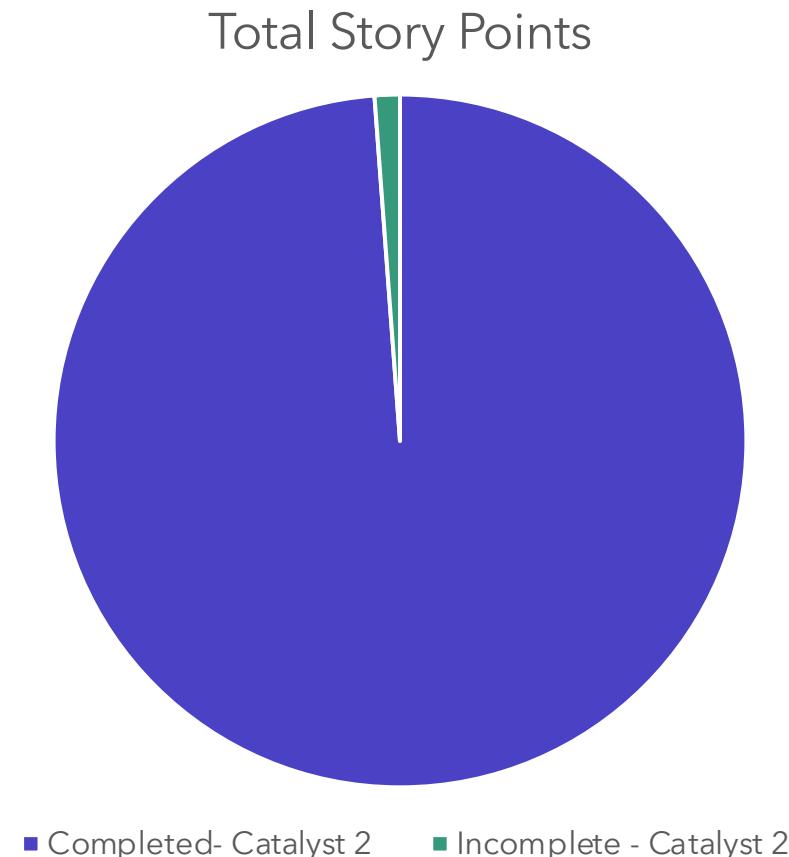
Team Velocity



Historical Velocity



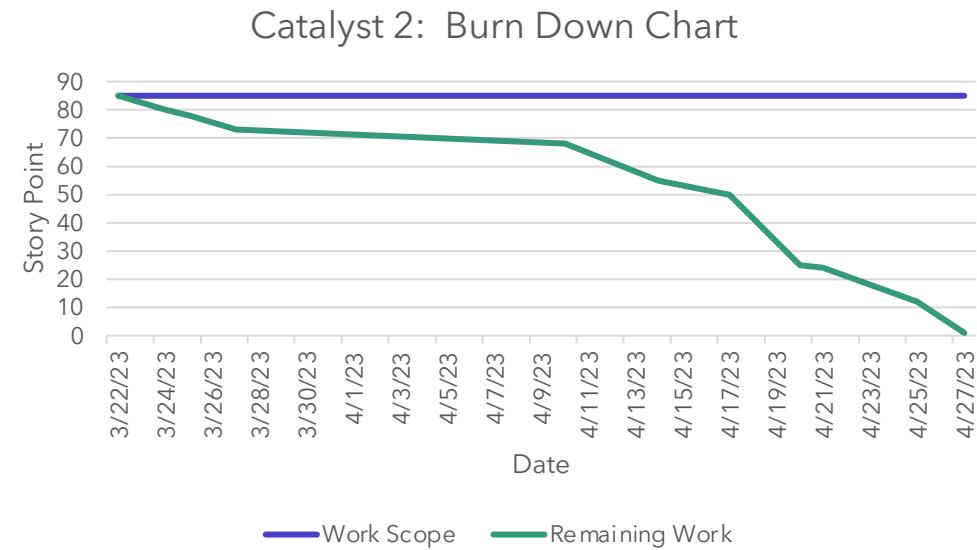
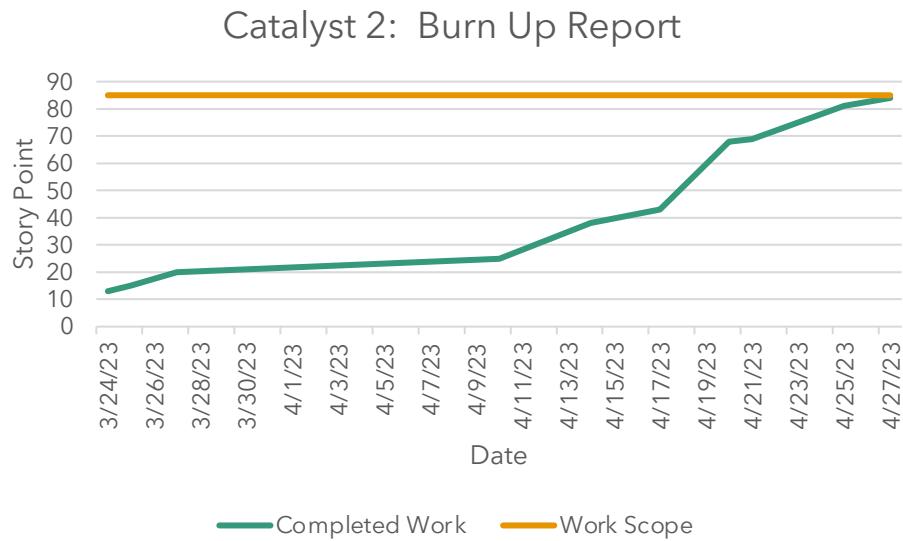
Completed/Committed Ratio



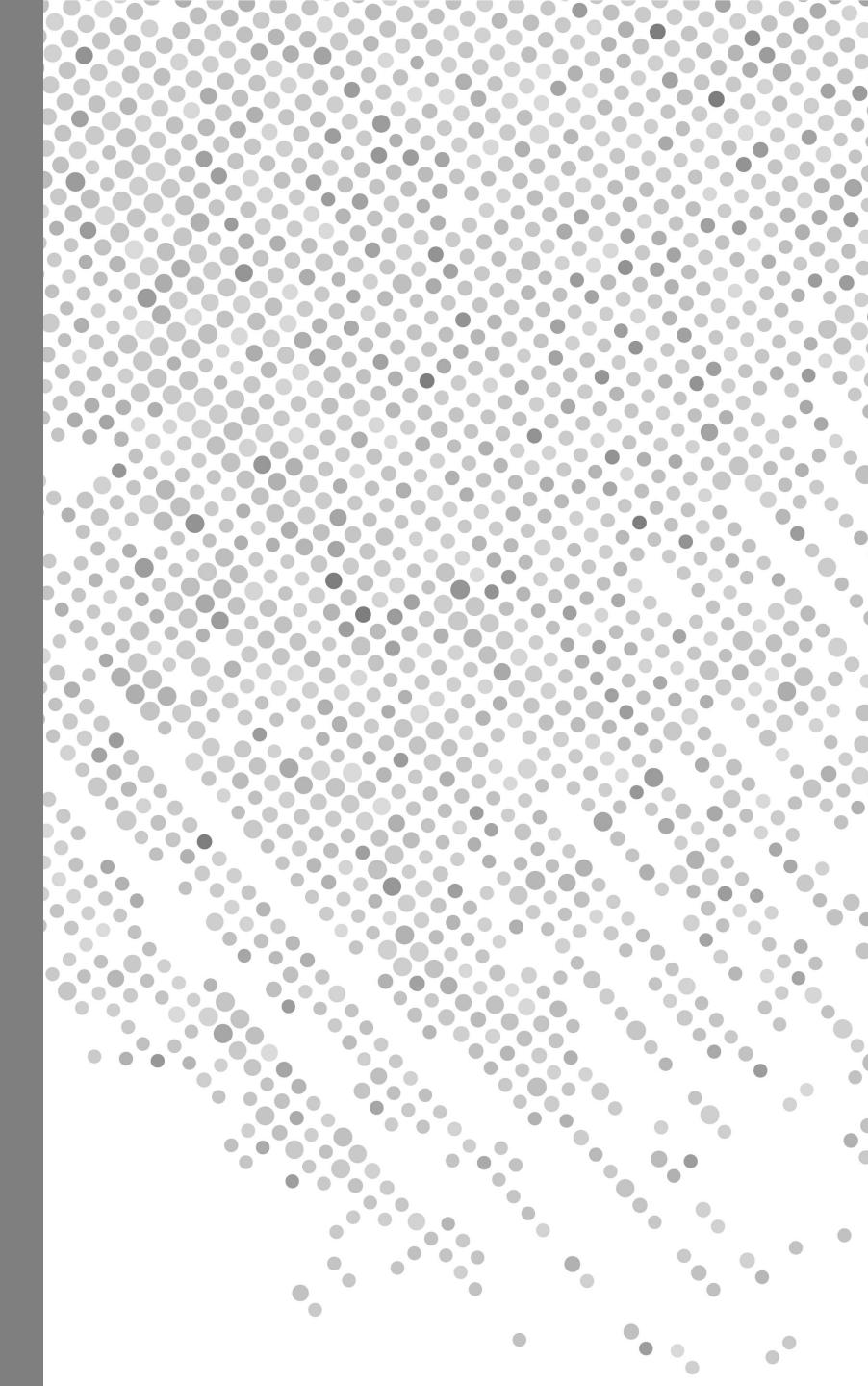
Completed/Committed Ratio

$$\frac{84}{85} = 0.988$$

Burndown Chart



Retrospective



What Went Well

01

Version control and use of Git

02

Completed program works end-to-end

What Needs Improvement

01

More time spent on the specific execution of the sprint cycle (ie. day by day planning for progress)

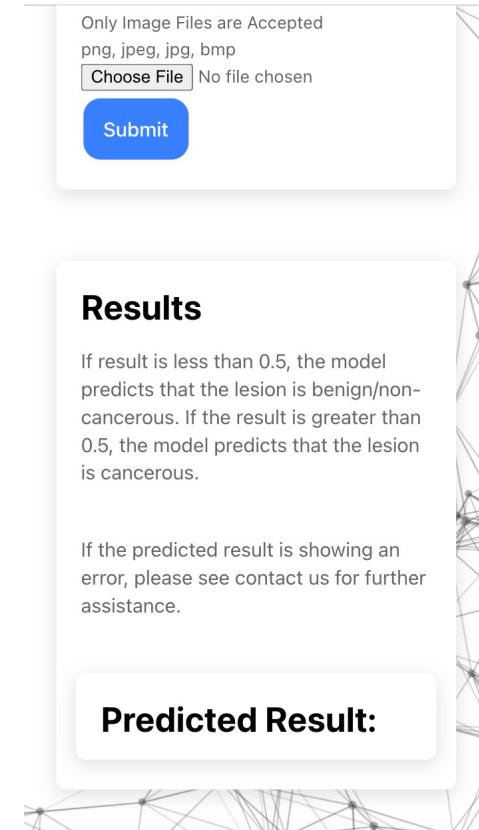
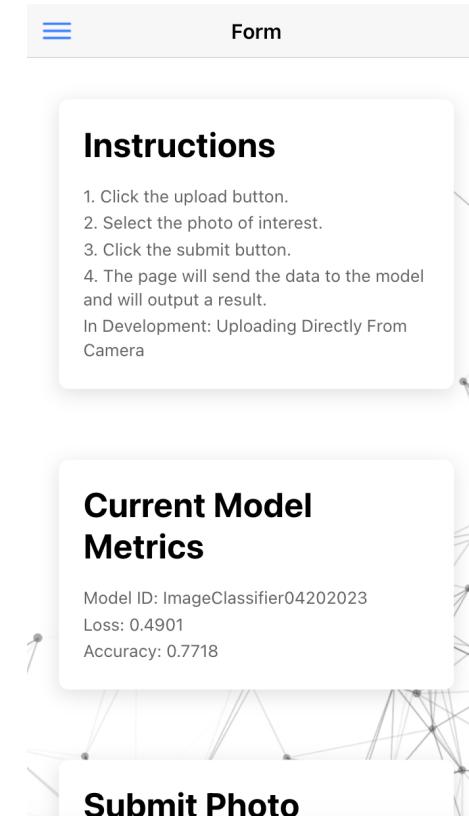
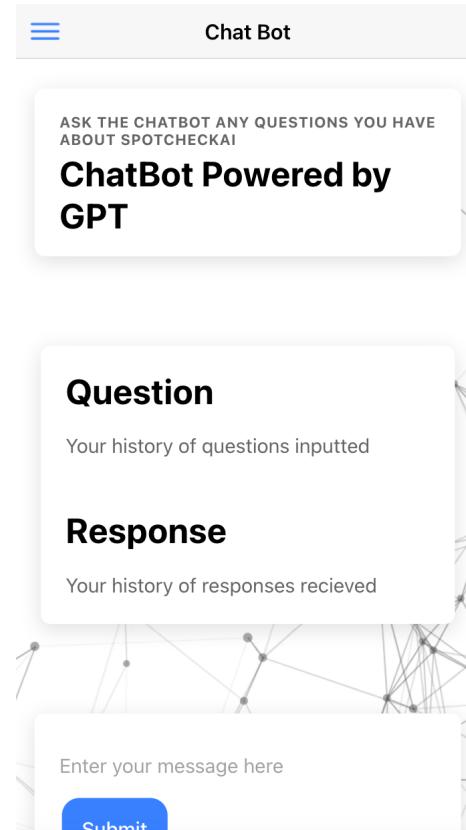
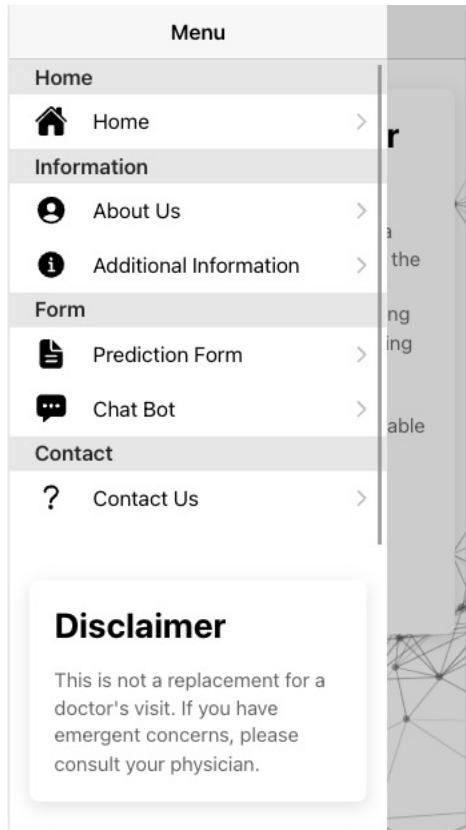
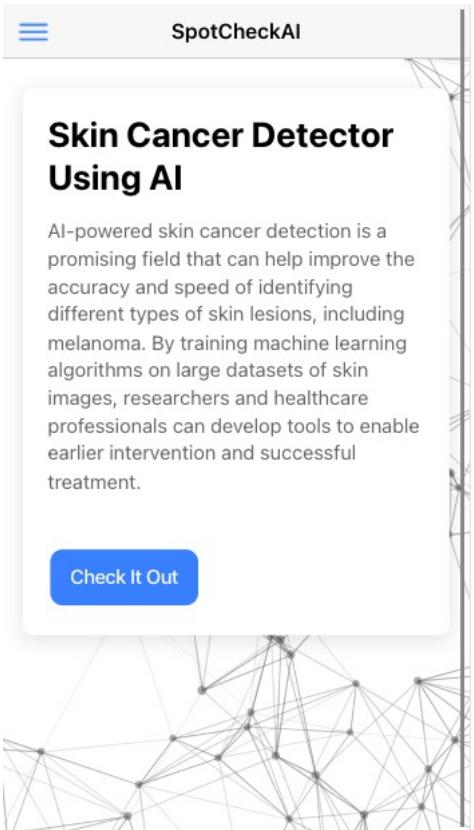
02

Detailed documentation within codebase for easier recall, coding style enforcement.

Sprint 3

- Application is complete and ready to be hosted on the web

Application Screenshots



API- Backend

- REST API written in Python
 - Django REST Framework
 - Two endpoints:
 - ML Model Prediction
 - Chatbot
 - Admin Interface

API Screenshots

Django administration

Username:

Password:

OTP Token:

Log in

Django administration

Select post to change

Action: Go 0 of 12 selected

POST

- 2023-02-14 22:20:59.036823+00:00
- 2023-02-14 22:15:27.182119+00:00
- 2023-02-14 22:09:57.231747+00:00
- 2023-02-10 06:53:43.501529+00:00
- 2023-02-10 02:37:45.753590+00:00
- 2023-02-10 02:37:40.604659+00:00
- 2023-02-10 02:35:07.549132+00:00
- 2023-02-10 02:33:03.711971+00:00
- 2023-02-10 02:32:28.2847547+00:00
- 2023-02-10 02:28:46.825906+00:00
- 2023-02-10 02:22:31.909200+00:00

12 posts

Django administration

Select question response to change

0 question responses

Django REST framework

Post

OPTIONS

GET /api/posts/

HTTP 405 Method Not Allowed
Allow: POST, OPTIONS
Content-Type: application/json
Vary: Accept

{ "detail": "Method 'GET' not allowed." }

Raw data HTML form

Image No file chosen

Yhat

POST

Django REST framework

Post

OPTIONS

POST /api/posts/

HTTP 201 Created
Allow: GET, POST, OPTIONS
Content-Type: application/json
Vary: Accept

0.22746983178509338

Raw data HTML form

Image No file chosen

Yhat

POST

Django REST framework

Question Response

OPTIONS

GET /chat/qa/

HTTP 405 Method Not Allowed
Allow: POST, OPTIONS
Content-Type: application/json
Vary: Accept

{ "detail": "Method 'GET' not allowed." }

Raw data HTML form

Question

Response

POST

Links

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