

***Created 2022-12-05***

**ImageRecog**

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**Recording**

<https://utoronto.zoom.us/rec/share/tT4lgpnmsB3zKWGLWzDLjIOb9ODKOXrmjRe8u1nhoC7WXY-JdOWt7L8OM8K7v357.iNiqIa8t7XkeTIm4>

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## SECTION 1: REPORT SUMMARY

Everything that humans recognize is based on perception. Perception is not inherent but learned. The motivation of this project was to recognize colors and shapes by making the machine learn human perception of colors and shapes. The Bayes Theorem captures this idea of perception being built after several observations and is the basis of our machine learning algorithm. As of now the model can identify colors. In addition, users can train a model or use a pre-trained model, then upload images for classification.

## SECTION 2: PROCESS DOCUMENTATION

### ***2.1. SPRINT 1 OVERVIEW***

**Start date and end date:** The sprint started on 21st of November 2022 and ended on 26th of November 2022.

#### **2.1.1 Sprint Overview:**

The goal for this sprint is to be able to extract data and train it. This is a vital component for the application to write and receive the image files and turn them into CSVs that can be analyzed by the Bayes Classifier. Furthermore, this sprint is also aimed at creating the basic layout for concurrency within the program.

#### **2.1.2 Stories Selected for this Sprint:**

feature/1.4-Command-Center → Nipun

feature/1.2-Concurrent-Images → Shiva

feature/1.5-Model-Training → Muhammad

feature/1.7-Compute-RGB-Map-of-Images → Karanvir

feature/1.1-File-IO-System → Muhammad

### **2.1.3 Team Capacity:**

The team expects all tasks of sprint 1 as listed above to be done by 26th of November 2022 at the latest.

### **2.1.4 Participants:**

All group members were responsible for documenting their own code

Muhammad

- Implementing the Visitor pattern to write both image and train data to their respective files
- Training a model by counting the pixels from the image data files and pushing it to a file with trained data.

Karanvir

- Implementing the observer pattern to compute the general color scheme of an image and save the findings

Shiva

- Implementing the concurrency pattern to allow multiple images to be uploaded.

Nipun

- Implementing the command center using the observer pattern.

### **2.1.5 Tasks Completed:**

Most of what was planned was finished, however some of the tasks took a little longer than expected and spilled into the second sprint. For instance, the Concurrency-Images and Train-Model both took 2 extra days to complete.

## **2.2. SPRINT 1 PRODUCT BACKLOG**

All of the following user stories that were targeted towards the sprint were completed in the order of priority as listed in the phase 1 document.

- 1.4-Command-Center
- 1.2-Concurrent-Images
- 1.5-Model-Training
- 1.7-Compute-RGB-Map-of-Images
- 1.1-File-IO-System

## **2.3. SPRINT 1 CODE REVIEWS**

Story Reviewed	Name of Reviewer	Pull Request Link
[DEV-1.1]: File IO system	Karanvir	<a href="https://github.com/MD-Hamza/imageRecog/pull/1">https://github.com/MD-Hamza/imageRecog/pull/1</a>
[DEV-1.7]: Compute RGB Map of Images	Nipun	<a href="https://github.com/MD-Hamza/imageRecog/pull/4">https://github.com/MD-Hamza/imageRecog/pull/4</a>
[DEV-1.4]: Command Centre	Shiva	<a href="https://github.com/MD-Hamza/imageRecog/pull/5">https://github.com/MD-Hamza/imageRecog/pull/5</a>
[DEV-1.5]: Model Training	Karanvir	<a href="https://github.com/MD-Hamza/imageRecog/pull/6">https://github.com/MD-Hamza/imageRecog/pull/6</a>
[DEV-1.2]: Concurrent Images	Muhammad	<a href="https://github.com/MD-Hamza/imageRecog/pull/7">https://github.com/MD-Hamza/imageRecog/pull/7</a>

## **2.4 SPRINT 1 RETROSPECTIVE**

All participants were in the meeting and all tasks were completed. Everyone had multiple commits with intervals, demonstrating a strict adherence to the timeline. Constructive feedback was provided in daily meetings to ensure that no one is left behind and is aware about the components of the project to the point that they can do the whole project themselves. Some bad practices were not putting in documentation in code. Moving forward, team members will document all the undocumented code and document code while writing the code. Lastly, the best experience during the sprint was having the train model and image to map pass the tests and the worst experience was having problems with the JavaFX VM arguments.

## ***2.1. SPRINT 2 OVERVIEW***

**Start date and end date:** The sprint started on 26th of November 2022 and ended on 7th December 2022.

### **2.1.1 Sprint Overview:**

The goal of this sprint is to finish the classifier and the UI such that the user can use the application to train data and classify images. On top of that here the accessibility feature of dark mode will be implemented.

### **2.1.2 Stories Selected for this Sprint:**

feature/2.1-Application-Wide-Concurrency → Shiva

feature/2.2-Controlling-Thread-Amount → Shiva

feature/2.3-Saving-Output-Files→ Muhammad

feature/2.4-FAQ-and-About-Page→ Nipun

feature/2.5-Colour-Speech→ Karanvir

feature/2.6-Dark-Mode→ Karanvir

### **2.1.3 Team Capacity:**

The team expects to complete everything by the day of submission and take out 4 hours to review the whole application.

### **2.1.4 Participants:**

All group members were responsible for documenting their own code

Muhammad

- Linking the fxml pages
- MVC for upload

Karanvir

- MVC for dark mode
- MVC includes the UI for the main menu because that is where the dark mode accessibility feature is available.

Shiva

- MVC for classify

Nipun

- Linking the uploaded data to the classifier.

### **2.1.5 Tasks Completed:**

From the tasks that were planned, the FAQ/about page, Colour to speech and application wide concurrency were not completed. Additionally new user stories needed to be created to break the UI components into smaller pieces.

The new user stories were, Train UI, Classify UI, Link-UIs all of which were completed

## **2.2. SPRINT 2 PRODUCT BACKLOG**

These user stories from the initial design document were completed. The difference made was that the user story for Saving Output files was assigned to Shiva from Muhammad.

feature/2.2-Controlling-Thread-Amount → Shiva

feature/2.3-Saving-Output-Files→ Shiva

feature/2.6-Dark-Mode→ Karanvir

### **New User Stories**

feature/2.1-Image-Classify

- The Naive Bayes Classification algorithm was implemented to classify the images into the given categories.

feature/2.7-Train-UI

- The User interface for training data, this included receiving input for the number of categories, the names of the categories and the files that belong to each of these categories.

feature/2.8-Classify-UI

- This user interface receives images and then saves them into the classified folders.
- Also loads a model that the user would like to use to train.

Feature/2.9/Connect-Back-End

- Links the backend logic to the UI for the classification and uploading.

feature/2.10-Link-UI

- Links the scenes together, so that the user can transition from one scene to another. Also, allows the user to go back to a previous page in the event the user changes their mind.

### **Deleted User Stories**

These user stories were low priority, except for the Colour Speech. Since the dark mode accessibility feature was implemented, the color speech was dropped to keep on track to finishing the project.

feature/2.1-Application-Wide-Concurrency → Shiva

feature/2.4-FAQ-and-About-Page→ Nipun

feature/2.5-Colour-Speech→ Karanvir

### **2.3. SPRINT 2 CODE REVIEWS**

Story Reviewed	Name of Reviewer	Pull Request Link
[DEV-2.1]: ClassifyImage	Karanvir	<a href="https://github.com/MD-Hamza/imageRecog/pull/12">https://github.com/MD-Hamza/imageRecog/pull/12</a>
[DEV-2.6]: Dark-Mode	Shiva	<a href="https://github.com/MD-Hamza/imageRecog/pull/11">https://github.com/MD-Hamza/imageRecog/pull/11</a>
[DEV-2.7]: Training-UI	Nipun	<a href="https://github.com/MD-Hamza/imageRecog/pull/8">https://github.com/MD-Hamza/imageRecog/pull/8</a>
[DEV-2.8]: Classify-UI	Karanvir	<a href="https://github.com/MD-Hamza/imageRecog/pull/9">https://github.com/MD-Hamza/imageRecog/pull/9</a>
[DEV-2.9]: Connect-Backend	Muhammad	<a href="https://github.com/MD-Hamza/imageRecog/pull/16">https://github.com/MD-Hamza/imageRecog/pull/16</a>
[DEV-2.10]: Link-UIs	Nipun	<a href="https://github.com/MD-Hamza/imageRecog/pull/17">https://github.com/MD-Hamza/imageRecog/pull/17</a>

### **2.4 SPRINT 2 RETROSPECTIVE**

All participants were in the meeting. There were many unfinished tasks as noted in the deleted user stories. Moreover, this was expected by the instructors as noted in their feedback. However the team did make substantial progress by completing the classifier, upload and the UI. JavaFX is unfamiliar to all of us and working through the hurdles together helped the team move forward at a quicker pace. Moving forward, it would be a good practice to spend some time learning about the platform such as JavaFX before just guessing and trying out things. Some practices



that won't be repeated moving forward is testing the compatibility of classes at the very last minute for instance using buffered images in ImageToMap would have made it easier to implement the classifier. However this was realized much later for the changes to be made. Lastly, the best experience during the sprint was having the UI working flawlessly and the worst experience was having problems with the classifier where the images weren't sent to the right folders to be classified.

### SECTION 3: SUMMARY

In this final section, briefly summarize both your project **accomplishments** and its **limitations**.

The MVC for the UI had to be reduced majorly. The previous implementation was simplified majorly due to the use of the FXML interface. In addition, a lot of features including the extra accessibility feature, audio mode, that were previously thought as implementable were taken out due to the excess workload.

However, there are a lot of things to be proud of. The team was able to implement a fully functional UI along with the classifier, the upload and the dark mode accessibility feature that is the core of the project.