MOODSPHERE

AN EMOTION BASED MUSIC RECOMMENDER

AGENDA

- Improvements from Feedback
- Problem Statement
- Project Description
- Personas
- Minimal Viable Product (MVP)
- Architecture
- Prototype
- Acceptance Criteria & User Stories
- Technologies
- Algorithms
- Sprint Backlogs & Plannings
- Retrospective
- Teamwork Agreement
- GitHub Link




IMPROVEMENTS FROM FEEDBACK + CHANGES

Algorithms were added.

Teamwork agreement was documented.

The technologies used in the project are well explained.

Team roles and responsibilities were updated.

Minimum Viable Product (MVP) was added.

PROBLEM STATEMENT

Conventional music streaming services frequently rely on general recommendation algorithms that ignore emotional relevance, which leaves users' emotional demands unmet. The Emotion-Based Music Recommender using Facial Recognition and Convolutional Neural Networks (CNN) project aims to combine state-of-the-art computer vision techniques in order to address this. The system uses CNNs and facial recognition technologies to accurately assess users' facial expressions for emotional indicators. The goal of this integration of sophisticated machine learning algorithms with visual data is to provide consumers with individualized music recommendations that are in line with their current emotional states, improving their listening experience as a whole.

PROJECT DESCRIPTION

Unlike traditional music recommenders that often rely on static factors like genres and artists, this project goes a step further by dynamically adjusting recommendations based on the user's current emotional state.

The goal is to curate playlists that resonate with the user's feelings at a given moment, creating a more engaging and relevant music experience. Using emotion analysis techniques, this project determines the user's present emotional state and suggests music that reflects those feelings. The goal of this user-centric strategy is to produce a more engaging and customized music recommendation experience.

TEAM

Bhavik Chopra

Data Scientist

Dhyey Dave

Developer

Krushil Sheladiya

Developer

Mahesh Nakka

QA Tester/Machine Learning Engineer

TEAM

Nisarg Bhuva

Scrum Master/Developer

Shane Parmar

Product Owner/Developer

Urmil Trivedi

Developer

Vijay Devkate

Machine Learning Engineer

PERSONAS

Sarah:

The Busy Professional

Background:
Sarah is a 32-year-old marketing executive who works long hours and travels frequently. She often experiences stress due to her demanding job.

Emotional Profile:
Sarah seeks music as a means of unwinding and finding solace after a hectic workday. She values tracks that induce a sense of calmness and relaxation.

Preferred Genres:
Instrumental tracks, Jazz for its soothing melodies, Ambient music for background ambiance, and Calm Pop for its easy-listening qualities.

Alex:

The Energetic Fitness Enthusiast

Background:
Alex is a 27-year-old fitness trainer who is passionate about leading an active lifestyle. He regularly engages in high-intensity workouts to maintain his physical health.

Emotional Profile:
For Alex, music serves as a motivational tool during workouts. He looks for energetic beats and rhythmic tunes that can enhance his performance and keep his energy levels high.

Preferred Genres:
Alex leans towards EDM with upbeat tempos, Hip-Hop for its rhythmic flow, Rock for its adrenaline-pumping vibe, and Upbeat Pop for its lively tunes.

MOODSPHERE

Mia:

The Reflective College Student

Background:
Mia is a 20-year-old college student majoring in philosophy. She values moments of introspection and often immerses herself in thoughtful activities like reading and studying.

Emotional Profile:
Music is an integral part of Mia's study routine, and she looks for tracks that complement her moods. She prefers music that fosters focus and a calming ambiance.

Preferred Genres:
Indie music for its authenticity, Alternative tunes for a diverse sound, Acoustic tracks for their simplicity, and Chill Electronica for a relaxing background.

Oliver:

The Busy Professional

Background:
Oliver is a 35-year-old artisan who spends his days crafting unique handmade items. His work requires precision and creativity, and he often seeks inspiration through various artistic outlets.

Emotional Profile:
Oliver values music that fuels his creative process. He looks for tracks with eclectic and innovative sounds that inspire his artistic imagination and enhance his focus.

Preferred Genres:
Ambient Electronic for its atmospheric sounds, Indie Experimental for its creative diversity, Classical for its timeless inspiration.

MINIMAL VIABLE PRODUCT(MVP)

	name	artist	mood	popularity
0	Chop Suey!	System Of A Down	Energetic	79
1	Killing In The Name	Rage Against The Machine	Energetic	78
2	Dani California	Red Hot Chili Peppers	Energetic	77
3	Duality	Slipknot	Energetic	76
4	Uprising	Muse	Energetic	75

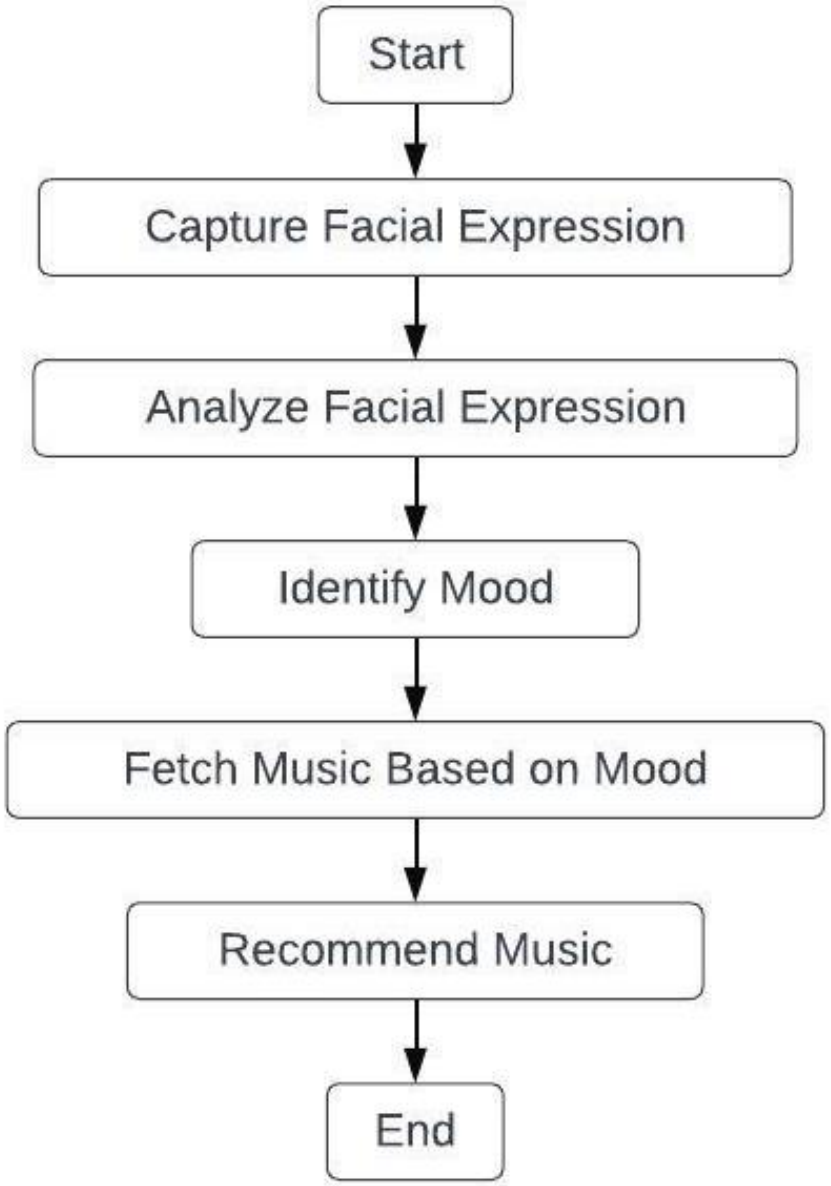
CODE SNIPPETS

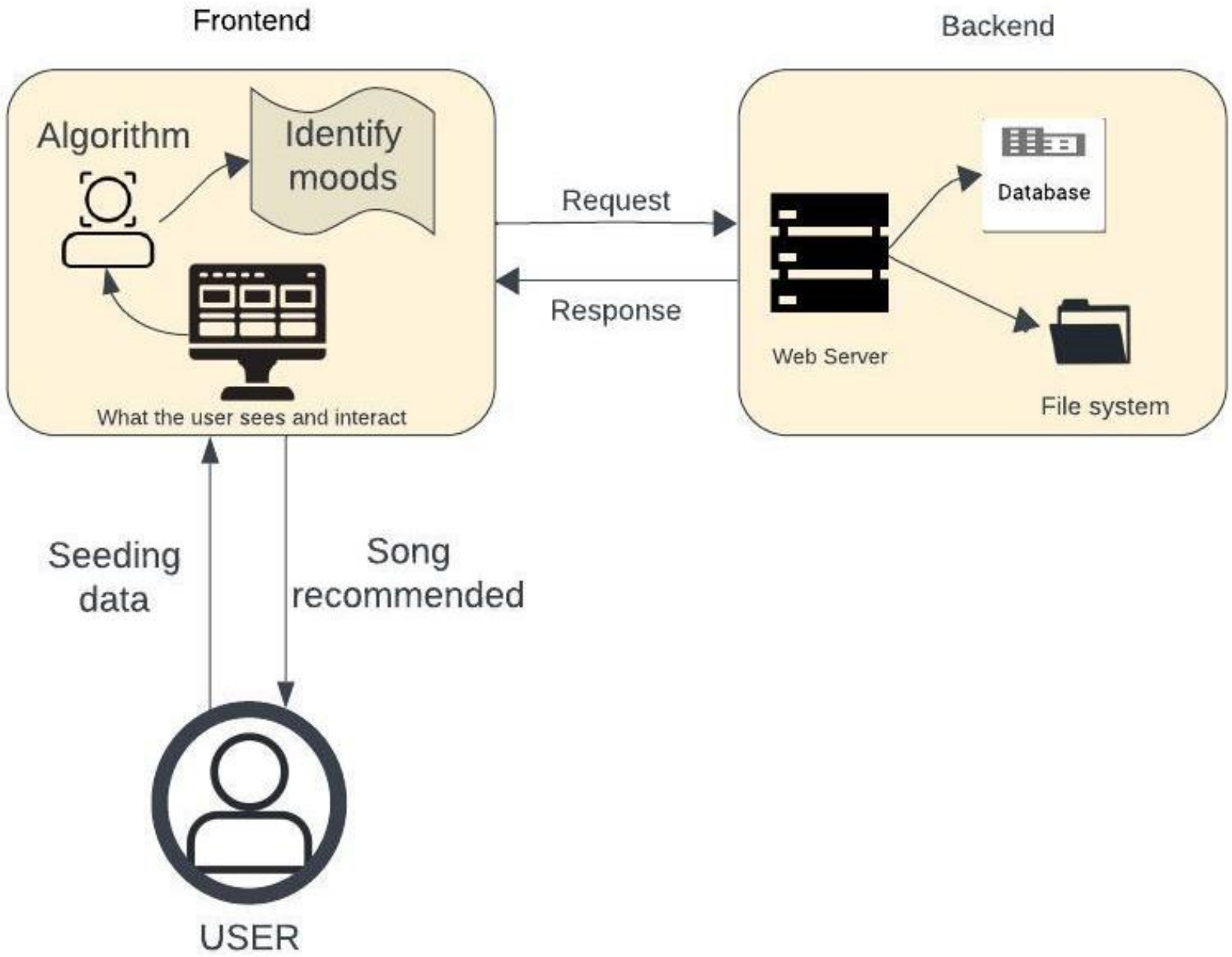
```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 resnet50v2 (Functional)     (None, 7, 7, 2048)        23564800

 dropout (Dropout)           (None, 7, 7, 2048)        0

 batch_normalization (Batch  (None, 7, 7, 2048)        8192
 Normalization)

 flatten (Flatten)           (None, 100352)            0

 dense (Dense)               (None, 64)                6422592

 batch_normalization_1 (Bat  (None, 64)                256
 chNormalization)

 dropout_1 (Dropout)         (None, 64)                0

 dense_1 (Dense)             (None, 7)                 455

=================================================================
Total params: 29996295 (114.43 MB)
Trainable params: 22779527 (86.90 MB)
Non-trainable params: 7216768 (27.53 MB)
```

```
ResNet50V2_history = ResNet50V2_Model.fit(train_data ,validation_data = test_data , epochs=2, batch_size=batch_size,
                                          callbacks = callbacks, steps_per_epoch=steps_per_epoch, validation_steps=validation_steps)
```

```
Epoch 1/2
897/897 [==============================] - 10080s 11s/step - loss: 1.6521 - accuracy: 0.4421 - val_loss: 1.8461 - val_accuracy: 0.5446 - lr: 0.0010
Epoch 2/2
897/897 [==============================] - 10102s 11s/step - loss: 1.4519 - accuracy: 0.4709 - val_loss: 1.2841 - val_accuracy: 0.5226 - lr: 0.0010
```

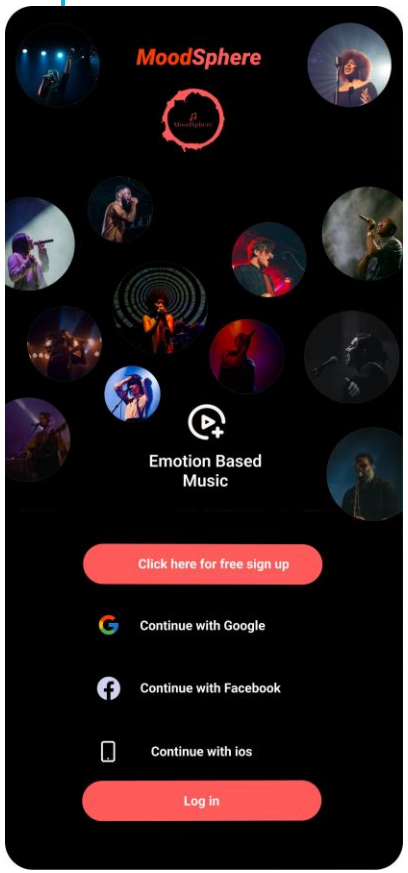
ARCHITECTURE DIAGRAM

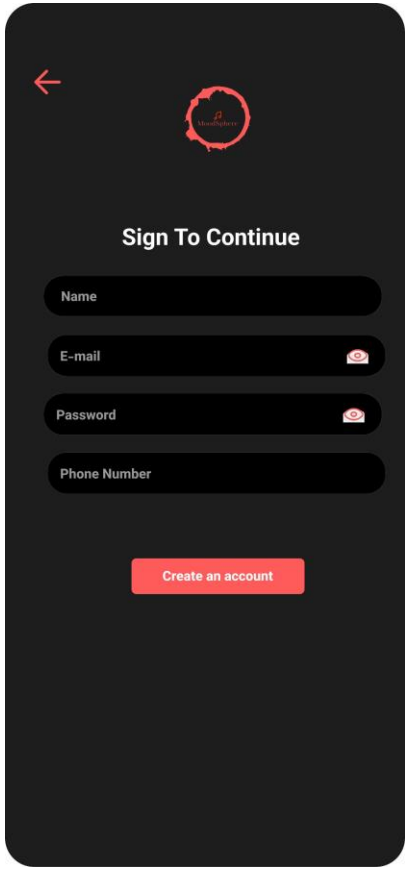

Start
Capture Facial Expression
Analyze Facial Expression
Identify Mood
Fetch Music Based on Mood
Recommend Music
End

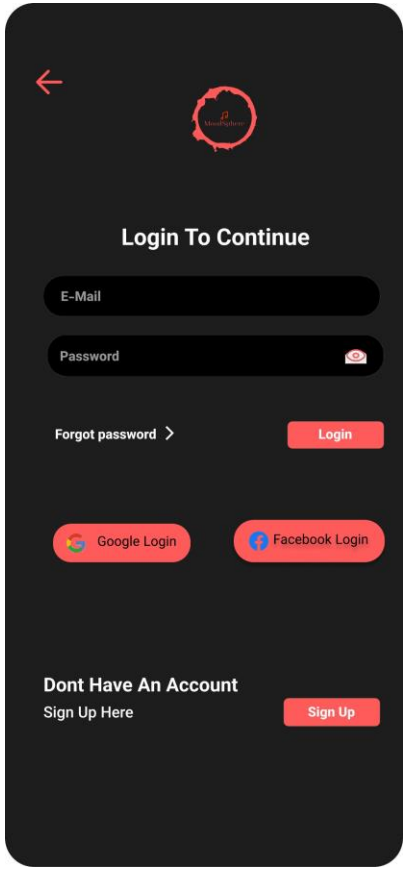

Frontend
Backend
Algorithm
Identify moods
Request
Response
Database
Web Server
File system
What the user sees and interact
Seeding data
Song recommended
USER

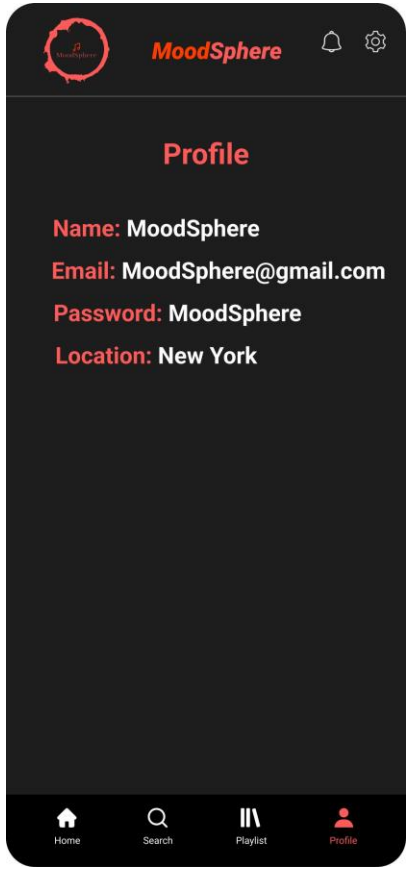
PROTOTYPE

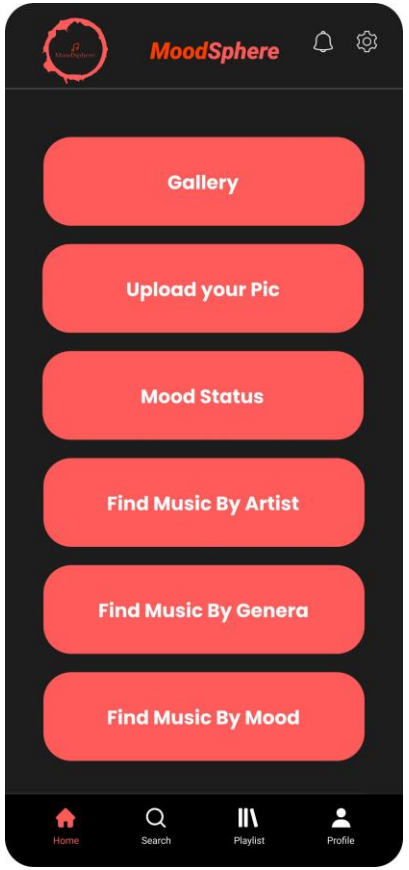
Prototype


MoodSphere
Emotion Based Music
Click here for free sign up
Continue with Google
Continue with Facebook
Continue with ios
Log in

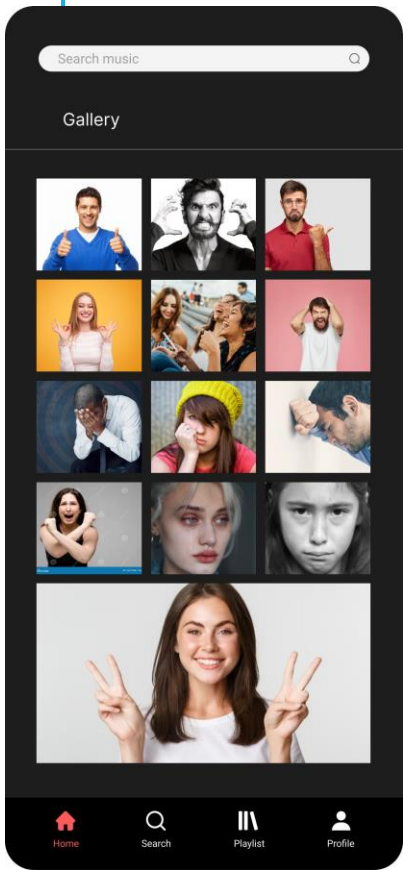

Sign To Continue
Name
E-mail
Password
Phone Number
Create an account

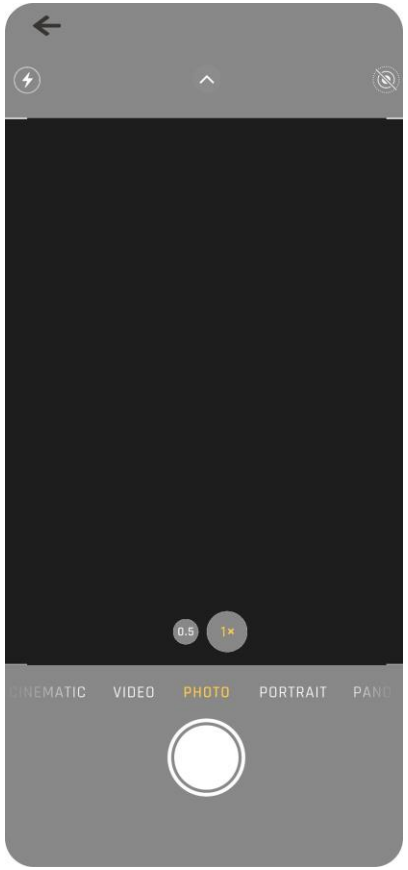

Login To Continue
E-Mail
Password
Forgot password
Login
Google Login
Facebook Login
Dont Have An Account
Sign Up Here
Sign Up


MoodSphere
Profile
Name: MoodSphere
Email: MoodSphere@gmail.com
Password: MoodSphere
Location: New York
Home
Search
Playlist
Profile

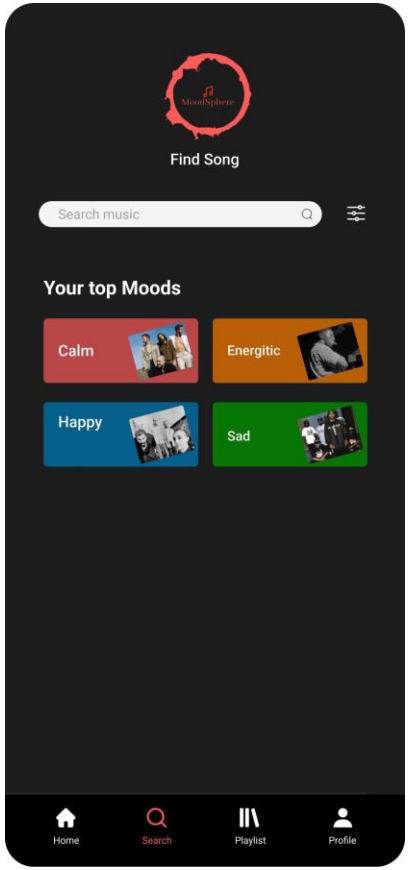

MoodSphere
Gallery
Upload your Pic
Mood Status
Find Music By Artist
Find Music By Genera
Find Music By Mood
Home
Search
Playlist
Profile

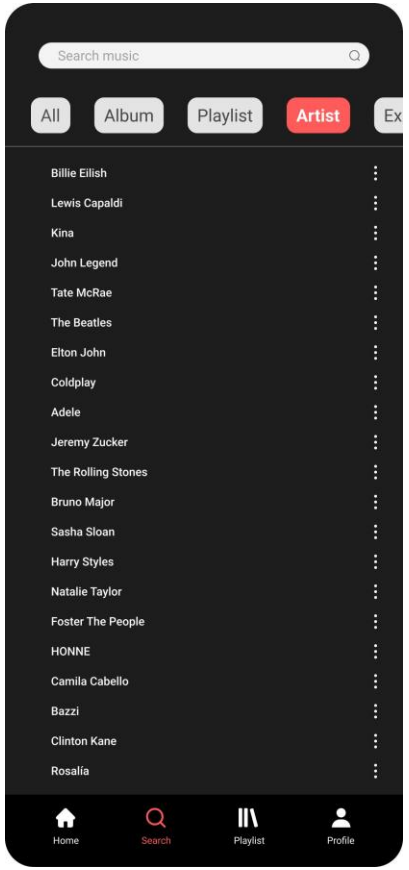
Prototype


Search music
Gallery
Home
Search
Playlist
Profile

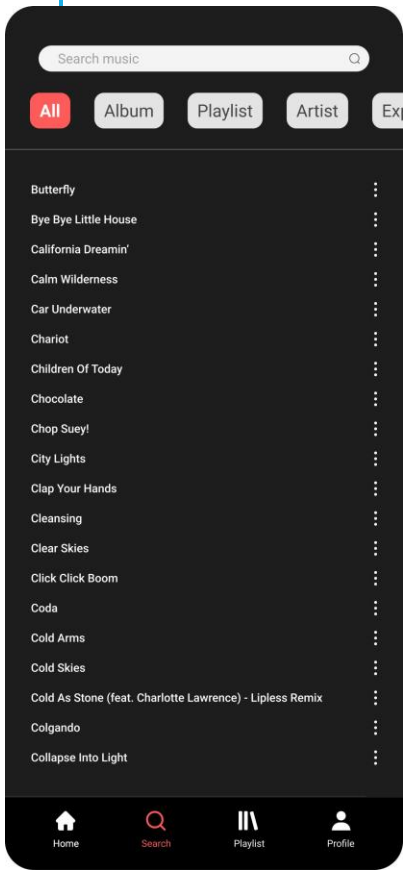

0.5
1×
CINEMATIC
VIDEO
PHOTO
PORTRAIT
PANO

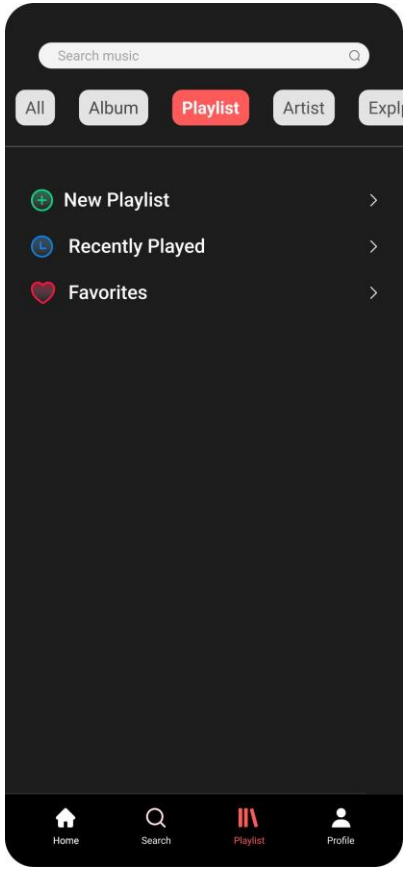

MoodSphere
Mood Status
Your Current Mood Status Is You Are Feeling Happy
Home
Search
Playlist
Profile

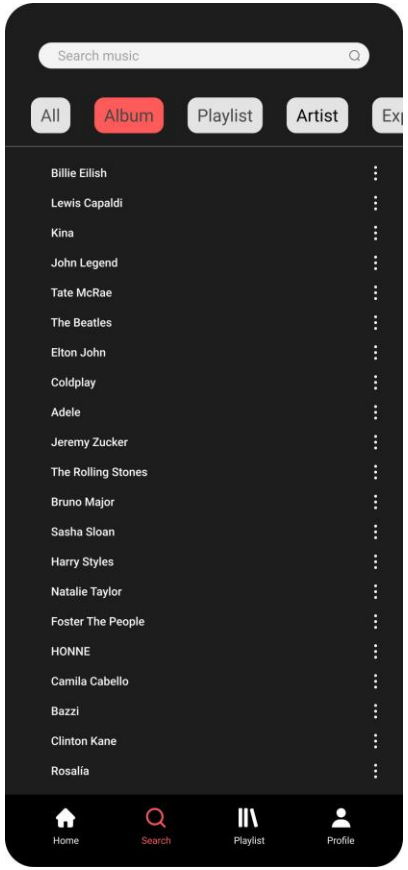

Find Song
Search music
Your top Moods
Calm
Energitic
Happy
Sad
Home
Search
Playlist
Profile

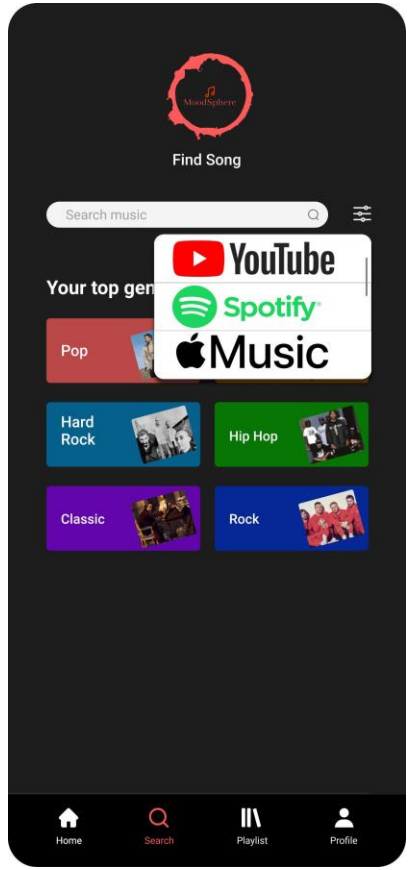

Search music
All
Album
Playlist
Artist
Billie Eilish
Lewis Capaldi
Kina
John Legend
Tate McRae
The Beatles
Elton John
Coldplay
Adele
Jeremy Zucker
The Rolling Stones
Bruno Major
Sasha Sloan
Harry Styles
Natalie Taylor
Foster The People
HONNE
Camila Cabello
Bazzi
Clinton Kane
Rosalía
Home
Search
Playlist
Profile

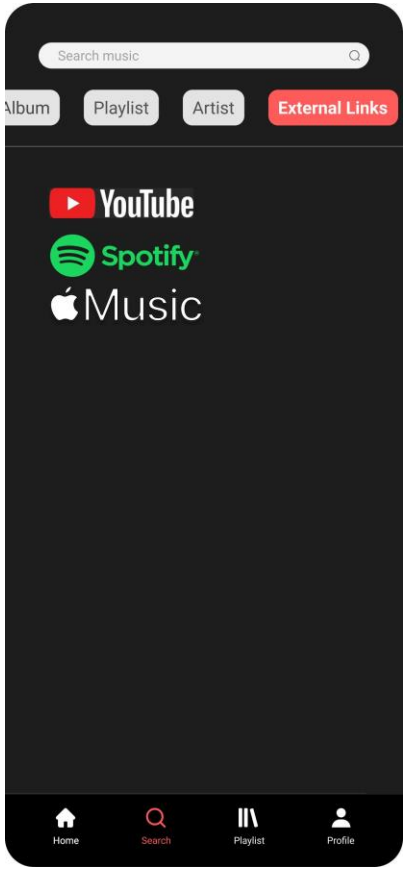
Prototype


Search music
All
Album
Playlist
Artist
Butterfly
Bye Bye Little House
California Dreamin'
Calm Wilderness
Car Underwater
Chariot
Children Of Today
Chocolate
Chop Suey!
City Lights
Clap Your Hands
Cleansing
Clear Skies
Click Click Boom
Coda
Cold Arms
Cold Skies
Cold As Stone (feat. Charlotte Lawrence) - Lipless Remix
Colgando
Collapse Into Light
Home
Search
Playlist
Profile


Search music
All
Album
Playlist
Artist
New Playlist
Recently Played
Favorites
Home
Search
Playlist
Profile


Search music
All
Album
Playlist
Artist
Billie Eilish
Lewis Capaldi
Kina
John Legend
Tate McRae
The Beatles
Elton John
Coldplay
Adele
Jeremy Zucker
The Rolling Stones
Bruno Major
Sasha Sloan
Harry Styles
Natalie Taylor
Foster The People
HONNE
Camila Cabello
Bazzi
Clinton Kane
Rosalía
Home
Search
Playlist
Profile


Find Song
Search music
YouTube
Spotify
Music
Pop
Hard Rock
Hip Hop
Classic
Rock
Home
Search
Playlist
Profile


Search music
Playlist
Artist
External Links
YouTube
Spotify
Music
Home
Search
Playlist
Profile

USER STORIES, ACCEPTANCE CRITERIA AND TEST CASES

USER STORIES

As a	I want to	So that	Feature
Music Enthusiast	express my current emotional state	the system can suggest music that resonates with my feelings	Emotion Analysis
Melody Seeker	discover personalized music recommendations	I can explore new music that resonates with my current emotional state	User Profiling
Emotion Explorer	receive real-time music suggestions	I can enjoy music that aligns with my mood at any given moment	Real-Time Emotion Detection
System	adapt to my changing music preferences	it can refine its recommendations based on my evolving emotional states	User Profiling

USER STORIES

As a	I want to	So that	Feature
Music Maven	receive music suggestions based on my emotions	I can enjoy a personalized and relevant music listening experience	Emotion Analysis
Emotion Explorer	explore music based on specific emotions	I can easily find music that matches my current mood and emotions	Emotion Analysis
System	offer a variety of music genres and artists	I can discover new music that resonates with my emotional preferences	Music Database Integration
Interface Explorer	have an aesthetically pleasing interface	I can navigate and interact with the music recommendation system effortlessly	User Interface (UI)

ACCEPTANCE CRITERIA

User Story	Acceptance Criteria	Status
Login/Signup	- Users can sign up for an account using valid credentials. - Users can log in to their account using valid credentials. - Users receive appropriate error messages for invalid login/signup attempts.	In Progress
Emotion Analysis	- The system should correctly identify and categorize user emotions based on selected emojis or words. - Music recommendations should reflect the user's identified emotions.	In Progress
User Profiling	- User profiles should be created and updated accurately with emotional data and music preferences. - Recommendations should be aligned with the user's emotional states and preferences over time.	In Progress
Real-Time Emotion Detection	- The system should detect changes in the user's emotional state in real time. - Real-time music suggestions should match the user's current emotional state.	Pending

ACCEPTANCE CRITERIA

User Story	Acceptance Criteria	Status
Machine Learning Models	- Machine learning models should accurately relate emotional states with musical attributes, genres, or artists. - Recommendations should be precise and distinguishable based on emotional states.	Pending
Music Database Integration	- The system should integrate a comprehensive music database with metadata such as genre, tempo, and lyrical content. - Recommendations should be relevant and match the user's emotional preferences based on the music database.	Pending
User Interface (UI)	- The UI should be user-friendly and allow easy input of emotions. - Users should be able to easily input emotions, view recommendations, and provide feedback through the UI.	Pending

TEST CASES

Test Case ID	Test Scenario	Description	Expected Outcome
USR_ERR_1	User tries to log in with an incorrect password.	Verify that users receive suitable error messages for incorrect login attempts.	User receives an error message for an incorrect password or invalid input.
USR_SGN_1	User signs up for an account using valid credentials.	Verify that users can successfully create an account with valid credentials.	Account is created, and the user can log in successfully.
USR_LGN_1	User logs in using valid credentials.	Verify that users can log in successfully with valid credentials.	User is logged in successfully.
USR_EMN_1	User selects an emotion to express their current emotion.	Verify that the system accurately identifies and categorizes user emotions based on the selected emotion	Emotion is correctly identified and used for music recommendations.

TEST CASES

Test Case ID	Test Scenario	Description	Expected Outcome
USR_PRF_1	User updates their music preferences and emotional data.	Verify that user profiles are updated accurately with the new preferences and emotional data.	User profiles are updated with the new preferences and emotional data.
USR_DET_1	User's facial expression changes, indicating a different emotional state.	Verify that the system detects changes in the user's emotional state in real time.	Real-time music suggestions match the user's current emotional state.
ML_MOD_1	System correlates user's emotional data with musical attributes using machine learning models.	Verify that machine learning models accurately relate emotional states with musical attributes.	Recommendations are precise and distinguishable based on the emotional states.
DB_INT_1	User's emotional state indicates a preference for upbeat music.	Verify that the system integrates a comprehensive music database to match the user's emotional state.	Recommendations match the user's emotional preferences based on the music database.
UI_INT_1	User navigates to the emotion input screen and selects an emotion.	Verify that the user interface allows easy selection of emotions for music recommendations.	Users can easily input emotions and view recommendations through the user interface.

TECHNOLOGIES

TECHNOLOGIES

TensorFlow

React

Firebase

Python

HTML

CSS

Django

Jira

TECHNOLOGIES DESCRIPTION

TensorFlow will be the foundation for building the emotion detection engine of our music recommender. Main applications of using TensorFlow will be Model Development and Real-Time Inference

React serves as the cornerstone for constructing the user interface (UI) of your music recommender app. Main applications of using React will be UI Design and Data Visualization

It is a suite of cloud-based services from Google that simplifies building mobile and web applications by providing features like: Authentication, Database Cloud Functions Hosting Analytics

Python supports OOP principles, allowing you to structure your code using classes and objects. This promotes code reusability, modularity, and maintainability, especially when dealing with complex data structures like user profiles and music recommendations.

TECHNOLOGIES DESCRIPTION

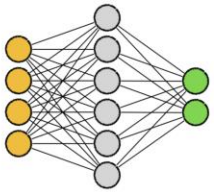
HTML Defines the structure and content of web pages. Creates the basic building blocks of web pages using elements like headings, paragraphs, lists, images, and forms.

CSS controls the presentation of web pages, applying visual styles like fonts, colors, layout, and animations.
It defines styles that are applied to HTML elements, controlling their appearance.

High-level web framework built in Python, simplifying the development process for building web applications.
Can be employed to create the backend of your application, handling data processing, routing, and interacting with Jira

Project management software specifically designed for agile teams, facilitating task tracking, issue reporting, and collaboration.

ALGORITHMS



Convolutional neural networks (CNNs) are a form of deep neural network that are frequently used in computer vision tasks like object detection, picture segmentation, and image recognition. When the term "CNN algorithm" is used, it usually refers to CNNs.

ResNet-50

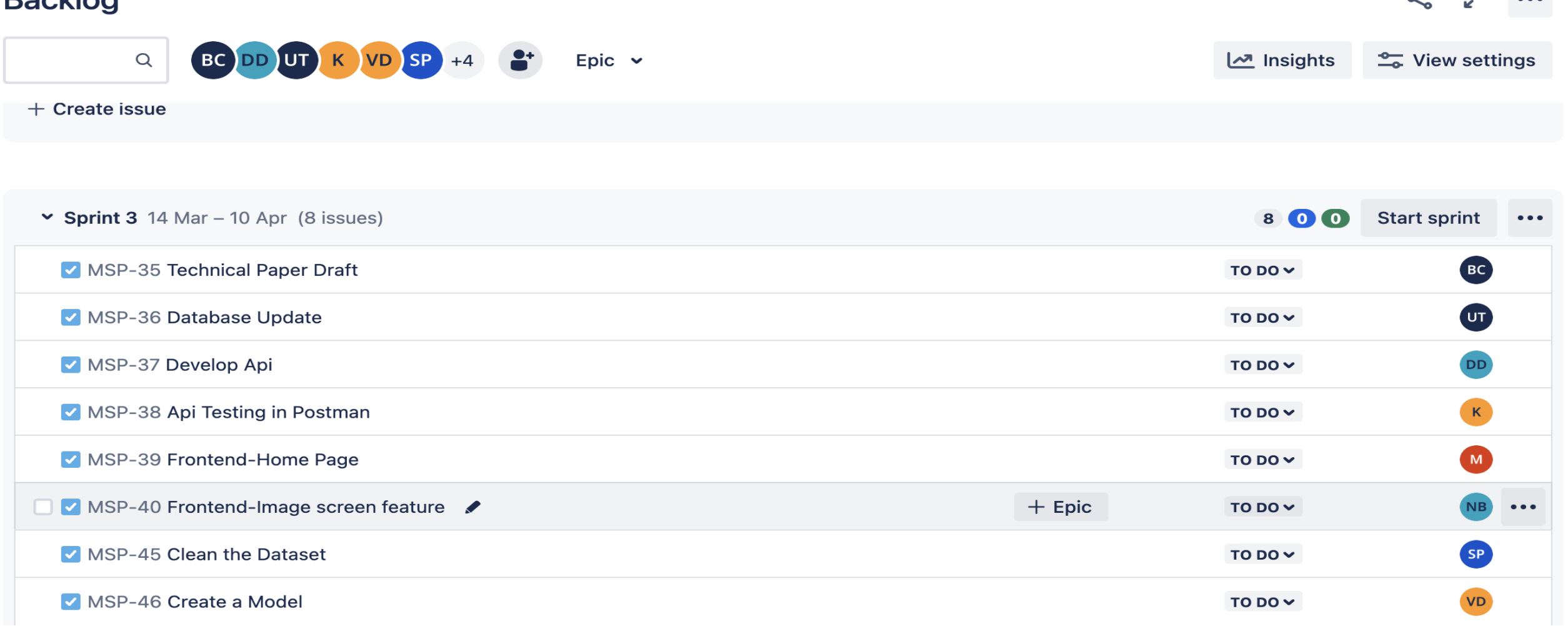
PRETRAINED MODEL

ResNet-50 is a deep convolutional neural network with 50 layers, renowned for its use of residual connections that aid in training very deep networks. Because of its outstanding performance in tasks like object identification, picture segmentation, and image classification, it has been frequently used in computer vision applications.

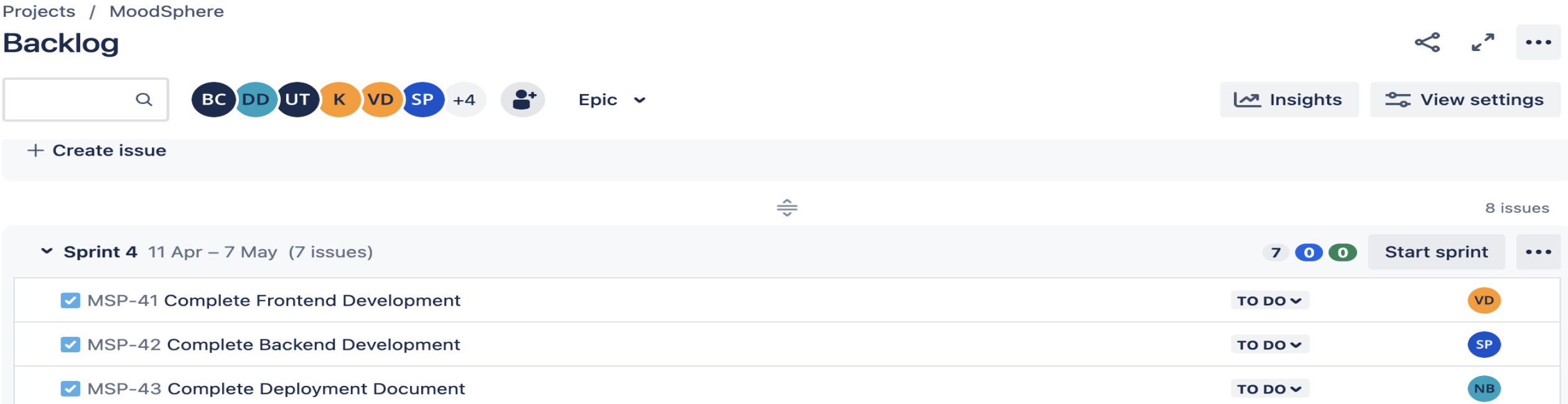
ALGORITHMS

Keras is a popular Python framework that makes neural network construction and training simple and straightforward. It provides an elevated interface to deep learning frameworks like as TensorFlow and Theano, facilitating swift model deployment and development.

SPRINT BACKLOG


Backlog
BC DD UT K VD SP +4
Epic
Insights
View settings
Create issue
Sprint 3 14 Mar – 10 Apr (8 issues)
8 0 0
Start sprint
MSP-35 Technical Paper Draft
TO DO
BC
MSP-36 Database Update
TO DO
UT
MSP-37 Develop Api
TO DO
DD
MSP-38 Api Testing in Postman
TO DO
K
MSP-39 Frontend-Home Page
TO DO
M
MSP-40 Frontend-Image screen feature
Epic
TO DO
NB
MSP-45 Clean the Dataset
TO DO
SP
MSP-46 Create a Model
TO DO
VD

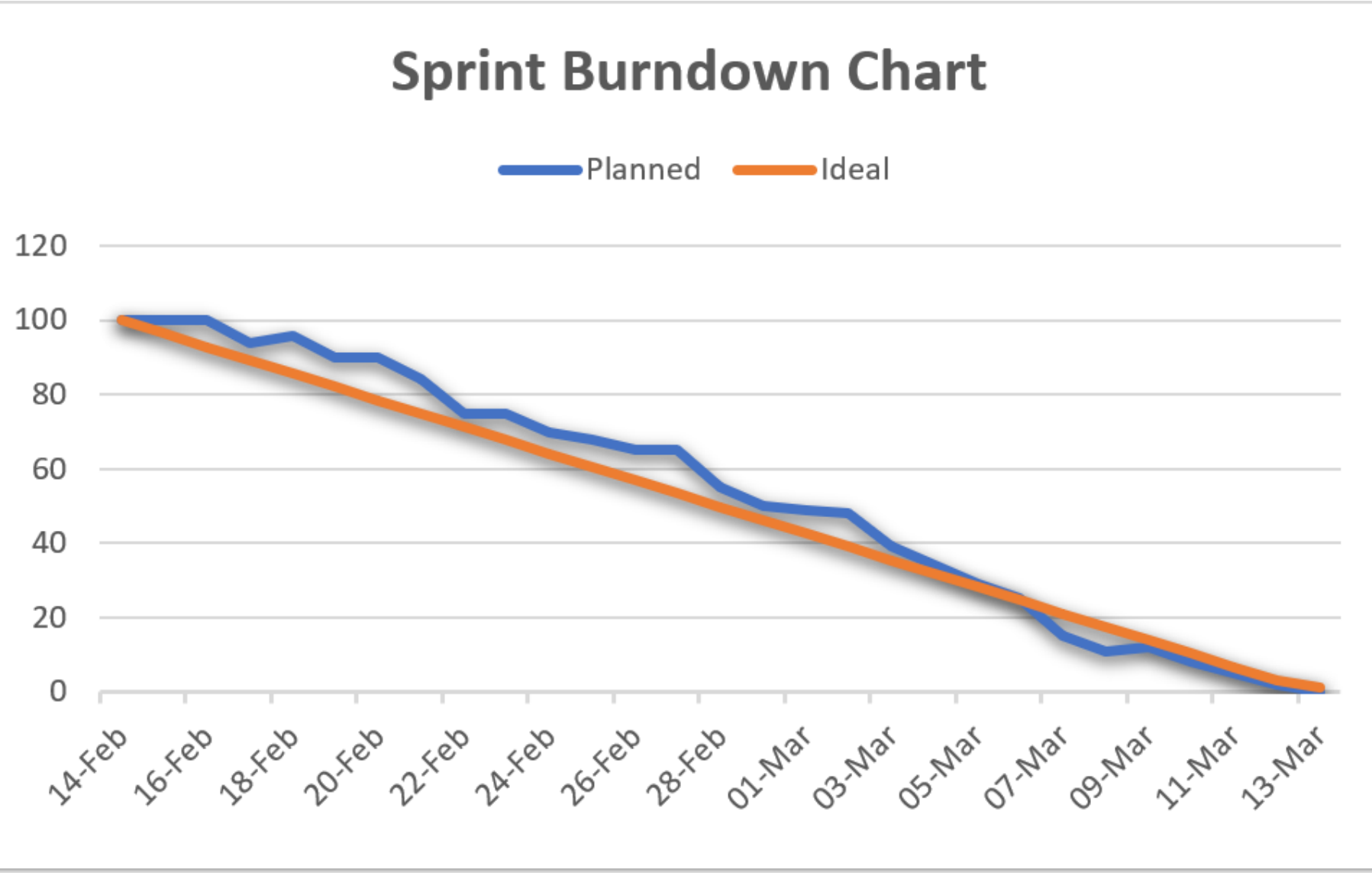
SPRINT 3


Projects / MoodSphere
Backlog
BC DD UT K VD SP +4
Epic
Insights
View settings
Create issue
8 issues
Sprint 4 11 Apr – 7 May (7 issues)
7 0 0
Start sprint
MSP-41 Complete Frontend Development TO DO VD
MSP-42 Complete Backend Development TO DO SP
MSP-43 Complete Deployment Document TO DO NB
MSP-44 Complete Updated Technical Paper TO DO MS
MSP-47 Create the Flask App TO DO K
MSP-48 Send the post request TO DO DD
MSP-49 Evaluate the predictions/Backend TO DO UT

SPRINT 4

Stories Completed – Sprint 2

Key	Summary	Issue type	Epic	Details of scope change
MSP-17	Two Team Presentation comparison	Task		Issue added to sprint
MSP-26	Frontend Setup Task	Task		Issue added to sprint
MSP-27	Wireframe Creation Task	Task		Issue added to sprint
MSP-28	Firestore Database Connect/firebase authenticat...	Task		Issue added to sprint
MSP-29	Backend Setup Task	Task		Issue added to sprint
MSP-30	Training Model Locally Task	Task		Issue added to sprint
MSP-31	Database Connection Backend Task	Task		Issue added to sprint
MSP-32	Connecting Model with Backend Server Task	Task		Issue added to sprint


Sprint Burndown Chart
Planned
Ideal
120
100
80
60
40
20
0
14-Feb
16-Feb
18-Feb
20-Feb
22-Feb
24-Feb
26-Feb
28-Feb
01-Mar
03-Mar
05-Mar
07-Mar
09-Mar
11-Mar
13-Mar

RETROSPECTIVE

Retrospective

What went well

- got incredible reference for UI from team +1
- Making Wireframes in Advance +3
- Designing the UI of MoodSphere on Figma was smooth +2
- Collaboration and dependency of tasks on Jira +3
- Strong collaboration during problem solving sessions +1
- Successful completion of all the tasks assigned to each individual +0
- everyone given valuable feedback +2

What can be improved

- Quick responses and time management +4
- need more team collaboration for making CNN model more accurate on predicting images +1
- Communication is still something that can be improved +1
- stay in loop with other team member's work so that we know we all are on the same page +1
- documentation needs to be improved like meeting notes +2
- discuss the challenges faced in the previous sprint and ways to improve +2

Action Items

- empower team members to make timely decisions +1
- meet for daily standup just for updating each other with their tasks +2
- Need to split work in-between frontend and backend part separately in the team. +2
- meeting in person twice a sprint +2

TEAM WORK AGREEMENT

CS691 - Teamwork Agreement (Team Dev Dynasty)

We at Dev Dynasty follow the seamless and triumphant completion in the project, where we are committed to the following principles and expectations. Team Collaboration, Proactiveness are classified by Involvement, Awareness, Task Allocation, and Time management. As, we members of Team Dev Dynasty take initiative based on individual skills, prioritise the capstone project success to ensure the completion.

INVOLVEMENT

- As the involvement is necessary we came to a point to meet In-person twice in 10 days which will make the team more stronger and collaborative.
- We shall agree that during the meet time or discussion about any crucial part all are requested to put their opinions and comments on what will be the best for the team to succeed in the outcome.
- The three moto's i.e. Trustworthiness, Truthfulness and Openness based on this value every individual shall or can have diverse perspectives, provide equal opportunity and a new ideology which can be developed towards great success of the project,instead of blaming people when issues occur.
- If the task assigned to the teammate gets undone or its tough to get complete then he must report and communicate to teammates via whatsapp.

AWARENESS

- As performing tasks if a teammate posts something which he's unaware the other if are available can react to it as quickly as possible.
- All should be aware that the discussion took place during the meeting hours and it's no one's responsibility to take care of each other; some exceptions might be taken in a state of medical emergency or sickness.
- We will communicate on every second day to keep updated about the task distributed and its individual responsibilities to openly ask for help if needed rather wasting time which he can't persist off. This can make a smooth process for the project to be on the right track.
- All the deliverables or the task based on theories will only be performed via Google doc which can be given access before submitting the final copy.
- Following the task distributions, planning for the upcoming sprint, next meeting times all will be followed on a single platform i.e. Jira.

Task allocation:

- Meeting via online or In-person for a daily standup which will eventually help teammates to get updated on every task.
- The project work should be distributed according to the individual knowledge and skill which can provide actual results and can help in problem solving.
- Based on the roles assigned if the teammates failed to perform correctly and failed to meet the deadline the scrum master has the right of decision making and make sure the task gets fulfilled or the teammate completes it in the next sprint.
- As respecting the privacy of every teammate, timing contact unless it's necessary regarding the project work.

Time Management

- The scrum master will make sure that the meeting links have been reached to everyone and everyone is readily available on same time for better coordination.
- We shall coordinate on each other's schedules to maintain consistency on working projects followed by a track on it after every discussion.

Team Member's	Email IDs
Urmil Trivedi	ut24256n@pace.edu
Bhavik Chopra	bc04992n@pace.edu
Dhyey Dave	dd28633n@pace.edu
Krushil Sheladiya	ks84830n@pace.edu
Shane Parmar	sp91003n@pace.edu
Vijay Devkate	vd19129n@pace.edu
Mahesh Nakka	mn01776n@pace.edu
Nisarg Bhuva	nb95325n@pace.edu

WIKI PAGE LINK

HOME · HTMW/2024S-DEV-DYNASTY WIKI (GITHUB.COM)

PROTOTYPE FRONTEND DESIGN EXPLANATION LINK

https://www.youtube.com/watch?v=g2YqTIXZXeQ&feature=youtu.be

THANK YOU

DevDynasty