MKSSS's Cummins COLLEGE OF ENGINEERING FOR WOMEN, PUNE

EMOTION-BASED MUSIC RECOMMENDATION SYSTEM

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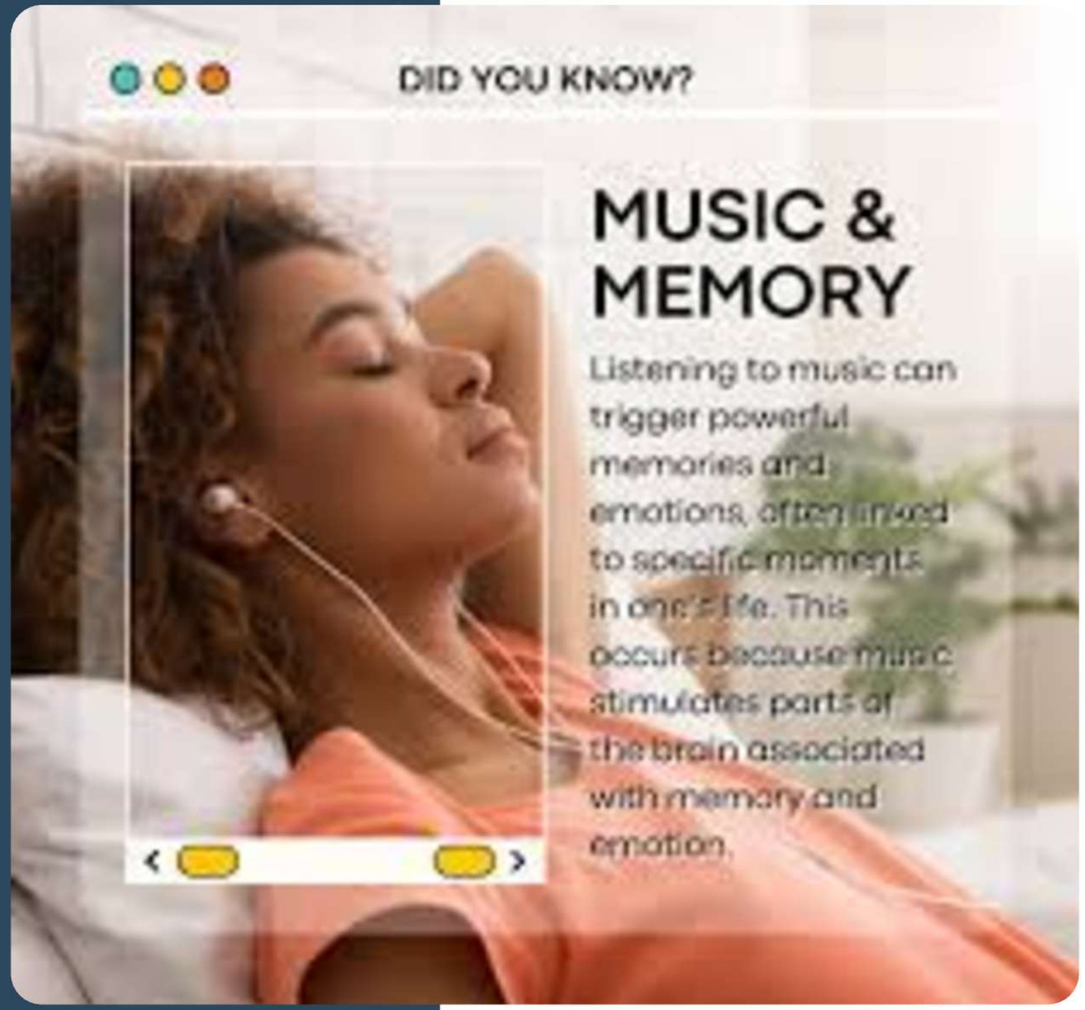
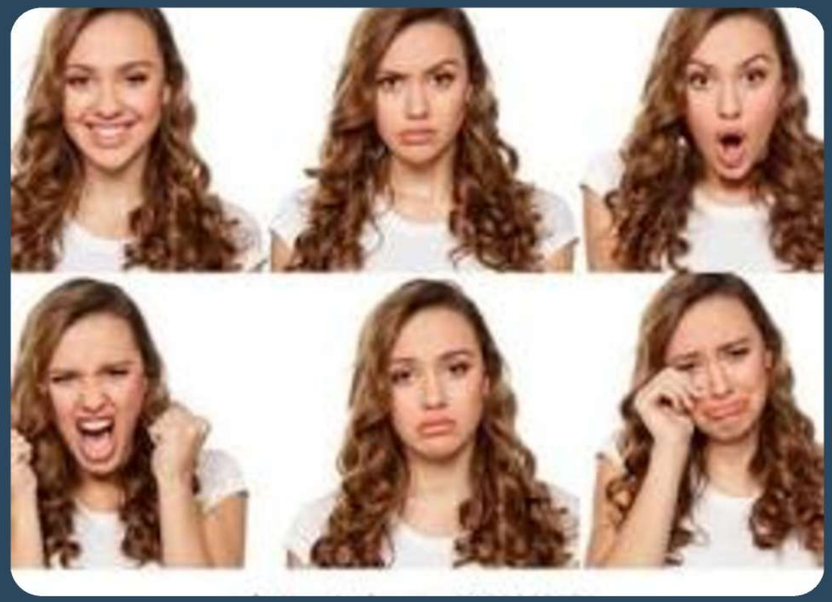


Problem Statement

- Users spend time searching for songs that match their mood.
- Existing apps do not automatically detect emotions.
- Need for a system that understands human feelings through facial expressions.
- Aim to recommend appropriate songs instantly based on detected emotion.

Aim / Objectives

- To detect real-time facial emotions using AI & ML.
- To recommend songs based on the user's current mood.
- To build an interactive, user-friendly interface.
- To connect frontend & backend with an emotion recognition model.



Introduction

- Music preferences change according to a person’s current emotional state.
- Detecting facial emotions helps the system understand what type of music the user needs.
- AI-driven song suggestions make the process faster, smarter, and fully automatic.
- Our system combines emotion recognition and music recommendation to deliver a personalized listening experience.

Dataset & Technologies Used

Dataset:

- FER-2013
- total of 35,887 images
- Happy, Sad, Angry, Fear, Surprise, Disgust, and Neutral.

Frontend:

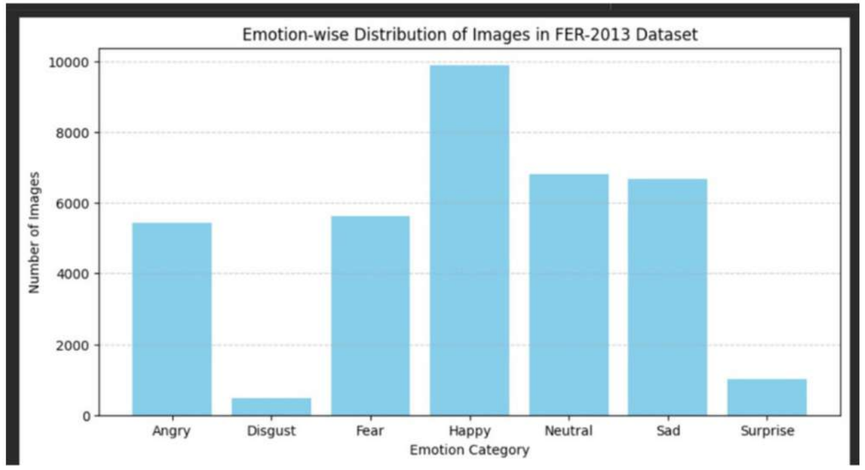
- HTML
- CSS
- JavaScript

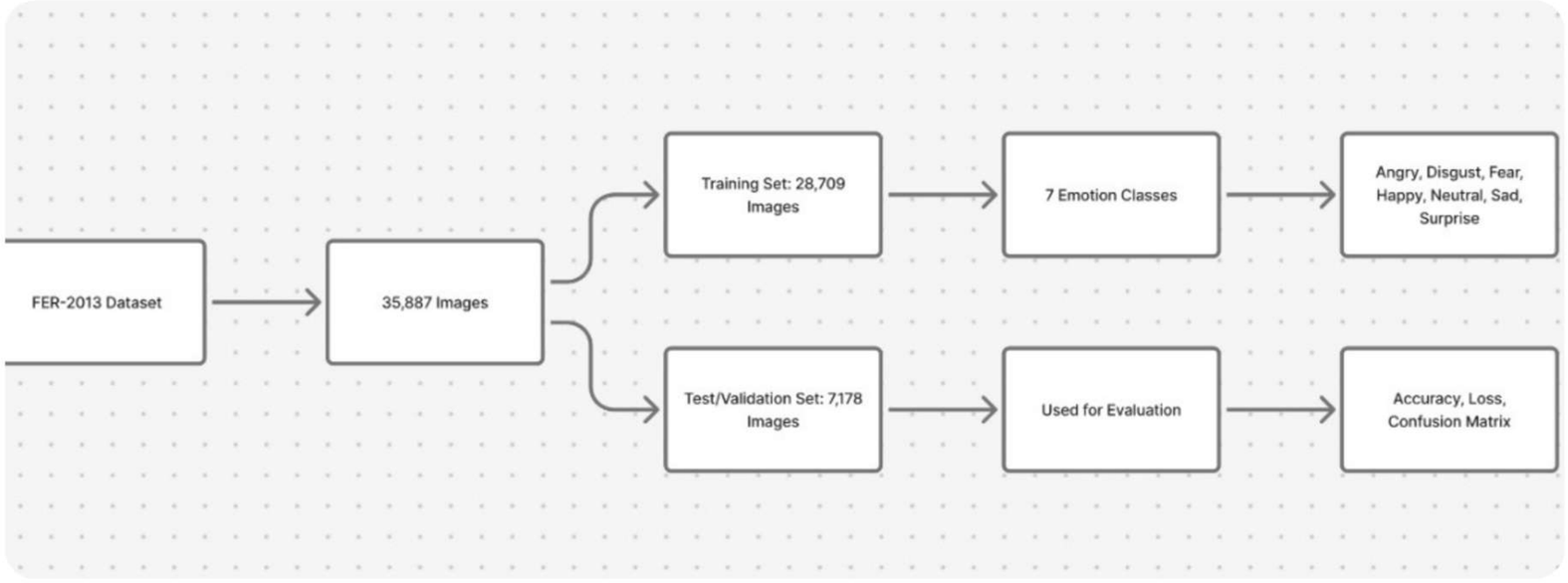
Backtend:

- Python Flask / FastAPI
- Google Colab

Machine Learning:

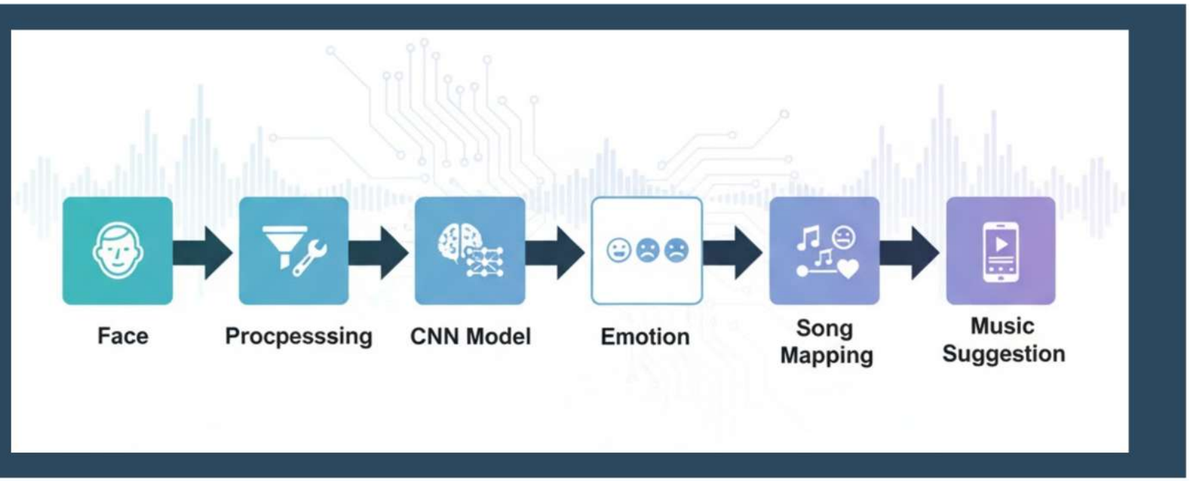
- CNN (TensorFlow/Keras)
- OpenCV for face detection

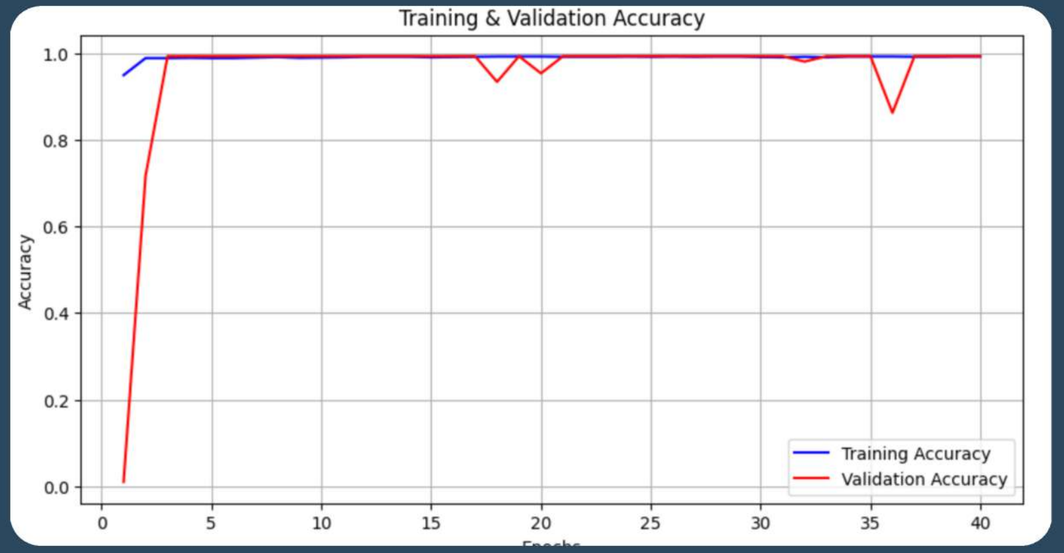


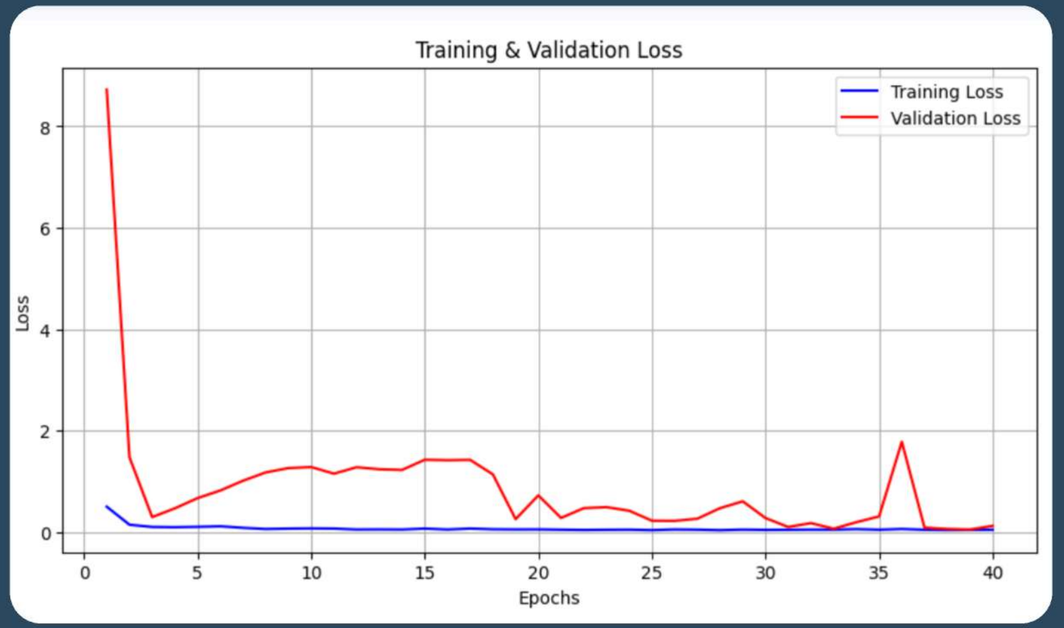


Workflow

- System captures user image (normal users click once; blind users auto-capture every 5 seconds).
- Image is pre-processed (grayscale, resized).
- CNN model (trained on FER2013) analyzes the face.
- Emotion is detected from 7 categories.
- System generates and announces emotion-based playlist.





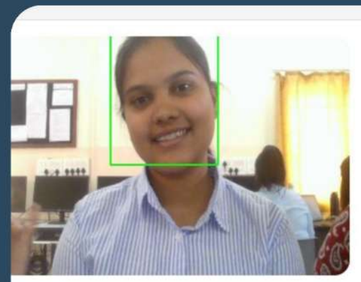


Key Features

- Real-time Facial Emotion Detection using a trained CNN model
- Live Webcam Integration for capturing user emotions.
- Emotion-to-Song Mapping for multiple mood categories.
- Auto-capture + voice output makes the system blind-friendly.
- Automatic Song List Generation for each emotion type

Dynamic Playlist Generalization

- Automatically creates playlists based on the user’s detected mood
- Updates song list instantly when the user’s emotion changes
- Mixes user history + current mood for more accurate playlists
- Continuously refreshes recommendations as new songs are played
- Ensures every playlist feels personalized, relevant, and unique

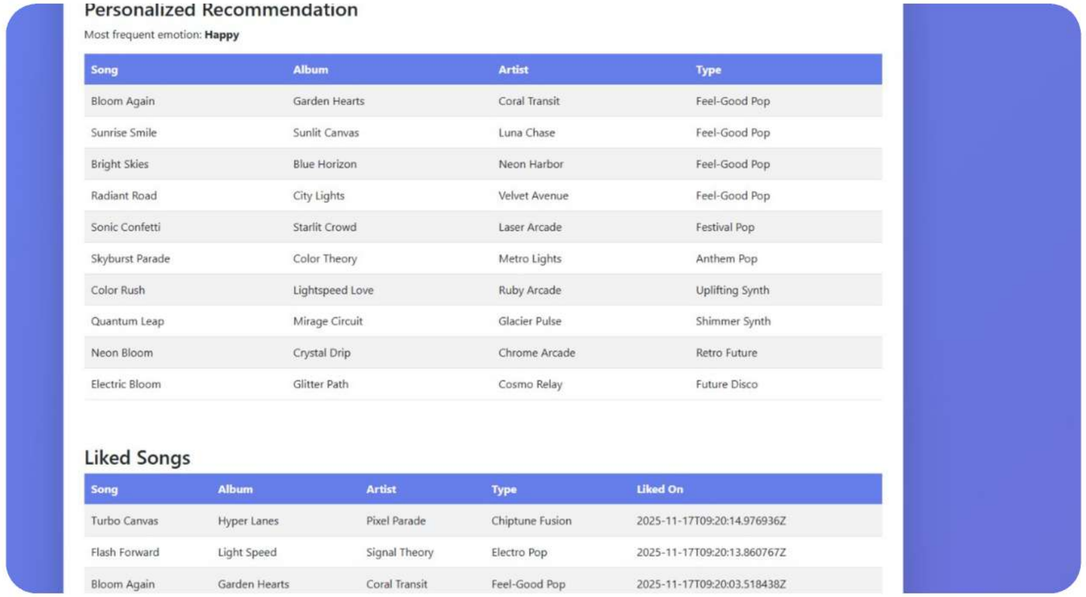


Emotion: Happy

Captured: 2025-11-17T09:24:06.975287Z

Song	Artist	Type
Bloom Again	Coral Transit	Feel-Good Pop
Sunrise Smile	Luna Chase	Feel-Good Pop
Bright Skies	Neon Harbor	Feel-Good Pop
Radiant Road	Velvet Avenue	Feel-Good Pop
Sonic Confetti	Laser Arcade	Festival Pop
Skyburst Parade	Metro Lights	Anthem Pop
Color Rush	Ruby Arcade	Uplifting Synth
Quantum Leap	Glacier Pulse	Shimmer Synth
Neon Bloom	Chrome Arcade	Retro Future
Electric Bloom	Cosmo Relay	Future Disco

Personalised Recommendation System



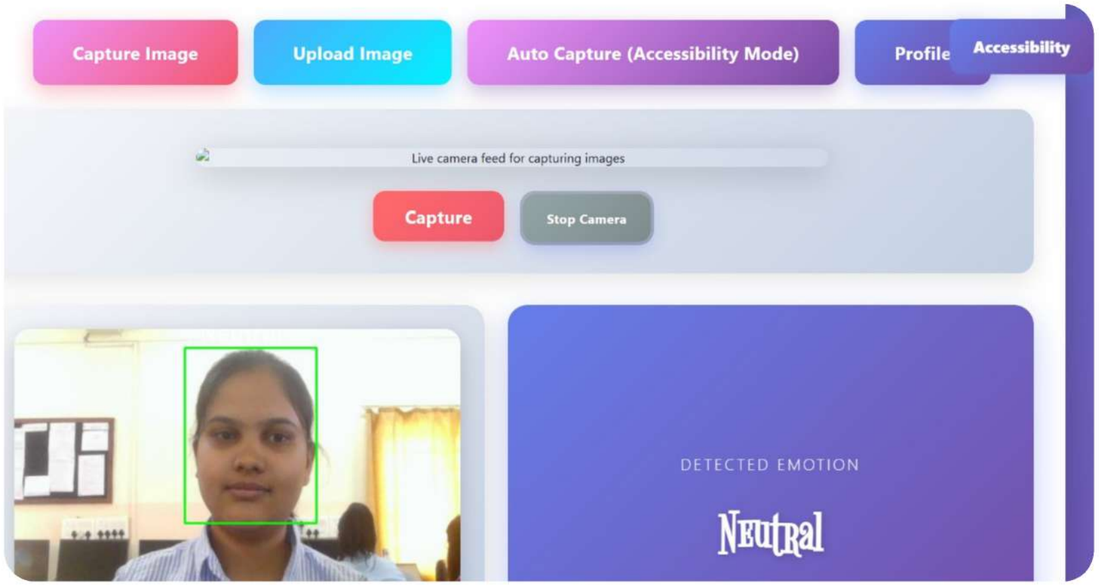
Personalized Recommendation

Most frequent emotion: **Happy**

Song	Album	Artist	Type
Bloom Again	Garden Hearts	Coral Transit	Feel-Good Pop
Sunrise Smile	Sunlit Canvas	Luna Chase	Feel-Good Pop
Bright Skies	Blue Horizon	Neon Harbor	Feel-Good Pop
Radiant Road	City Lights	Velvet Avenue	Feel-Good Pop
Sonic Confetti	Starlit Crowd	Laser Arcade	Festival Pop
Skyburst Parade	Color Theory	Metro Lights	Anthem Pop
Color Rush	Lightspeed Love	Ruby Arcade	Uplifting Synth
Quantum Leap	Mirage Circuit	Glacier Pulse	Shimmer Synth
Neon Bloom	Crystal Drip	Chrome Arcade	Retro Future
Electric Bloom	Glitter Path	Cosmo Relay	Future Disco

Liked Songs

Song	Album	Artist	Type	Liked On
Turbo Canvas	Hyper Lanes	Pixel Parade	Chiptune Fusion	2025-11-17T09:20:14.976936Z
Flash Forward	Light Speed	Signal Theory	Electro Pop	2025-11-17T09:20:13.860767Z
Bloom Again	Garden Hearts	Coral Transit	Feel-Good Pop	2025-11-17T09:20:03.518438Z



- Learns each user’s listening habits and mood preferences
- Suggests songs that match the user’s emotional patterns
- Creates customized playlists unique to every user
- Improves recommendations based on likes, skips, and repeats
- Combines mood detection with song history for highly accurate suggestions

Results

- Model trained and tested on a large labeled emotion dataset.
- Successfully detects 7 human emotions.
- Achieved 99.63% accuracy in emotion classification.
- Generates emotion-based music playlists automatically.
- Delivers a personalized and smooth music recommendation experience.

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26/26 ━━━━━━━━━━━━━━━━━━━━ 28s 1s/step - accuracy: 0.9942 - loss: 0.0361 - val_accuracy: 0.9926 - val_loss: 0.2202
Epoch 27/40
26/26 ━━━━━━━━━━━━━━━━━━━━ 27s 1s/step - accuracy: 0.9898 - loss: 0.0508 - val_accuracy: 0.9926 - val_loss: 0.2619
Epoch 28/40
26/26 ━━━━━━━━━━━━━━━━━━━━ 28s 1s/step - accuracy: 0.9910 - loss: 0.0369 - val_accuracy: 0.9926 - val_loss: 0.4706
Epoch 29/40
26/26 ━━━━━━━━━━━━━━━━━━━━ 28s 1s/step - accuracy: 0.9938 - loss: 0.0370 - val_accuracy: 0.9926 - val_loss: 0.6049
Epoch 30/40
26/26 ━━━━━━━━━━━━━━━━━━━━ 27s 1s/step - accuracy: 0.9928 - loss: 0.0424 - val_accuracy: 0.9926 - val_loss: 0.2752
Epoch 31/40
26/26 ━━━━━━━━━━━━━━━━━━━━ 27s 1s/step - accuracy: 0.9931 - loss: 0.0336 - val_accuracy: 0.9926 - val_loss: 0.0993
Epoch 32/40
26/26 ━━━━━━━━━━━━━━━━━━━━ 28s 1s/step - accuracy: 0.9910 - loss: 0.0494 - val_accuracy: 0.9803 - val_loss: 0.1756
Epoch 33/40
26/26 ━━━━━━━━━━━━━━━━━━━━ 28s 1s/step - accuracy: 0.9862 - loss: 0.0690 - val_accuracy: 0.9926 - val_loss: 0.0646
Epoch 34/40
26/26 ━━━━━━━━━━━━━━━━━━━━ 28s 1s/step - accuracy: 0.9918 - loss: 0.0641 - val_accuracy: 0.9926 - val_loss: 0.1935
Epoch 35/40
26/26 ━━━━━━━━━━━━━━━━━━━━ 28s 1s/step - accuracy: 0.9914 - loss: 0.0436 - val_accuracy: 0.9926 - val_loss: 0.3073
Epoch 36/40
26/26 ━━━━━━━━━━━━━━━━━━━━ 28s 1s/step - accuracy: 0.9911 - loss: 0.0790 - val_accuracy: 0.8621 - val_loss: 1.7795
Epoch 37/40
26/26 ━━━━━━━━━━━━━━━━━━━━ 28s 1s/step - accuracy: 0.9901 - loss: 0.0496 - val_accuracy: 0.9926 - val_loss: 0.0862
Epoch 38/40
26/26 ━━━━━━━━━━━━━━━━━━━━ 27s 1s/step - accuracy: 0.9907 - loss: 0.0440 - val_accuracy: 0.9926 - val_loss: 0.0596
Epoch 39/40
26/26 ━━━━━━━━━━━━━━━━━━━━ 28s 1s/step - accuracy: 0.9921 - loss: 0.0394 - val_accuracy: 0.9926 - val_loss: 0.0480
Epoch 40/40
26/26 ━━━━━━━━━━━━━━━━━━━━ 28s 1s/step - accuracy: 0.9963 - loss: 0.0286 - val_accuracy: 0.9926 - val_loss: 0.1214
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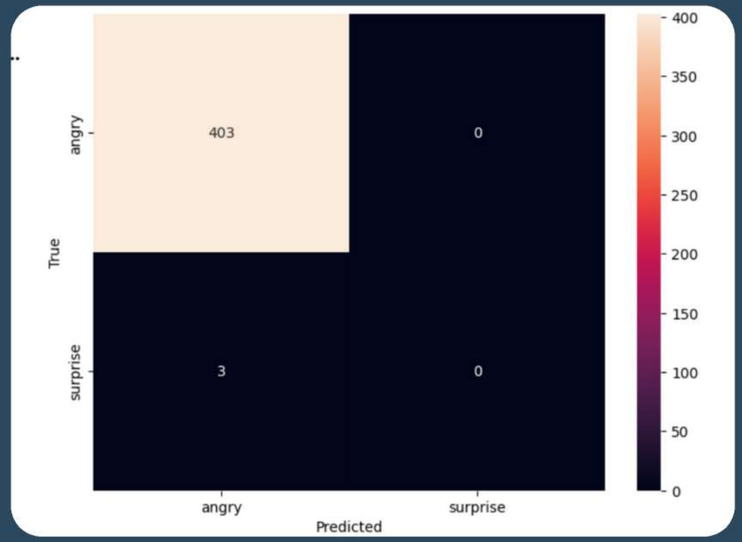


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7/7 ━━━━━━━━━━━━━━━━━━━━ 3s 314ms/step
              precision    recall  f1-score   support

       angry       0.99      1.00      1.00       403
    surprise       0.00      0.00      0.00         3

    accuracy                           0.99       406
   macro avg       0.50      0.50      0.50       406
weighted avg       0.99      0.99      0.99       406
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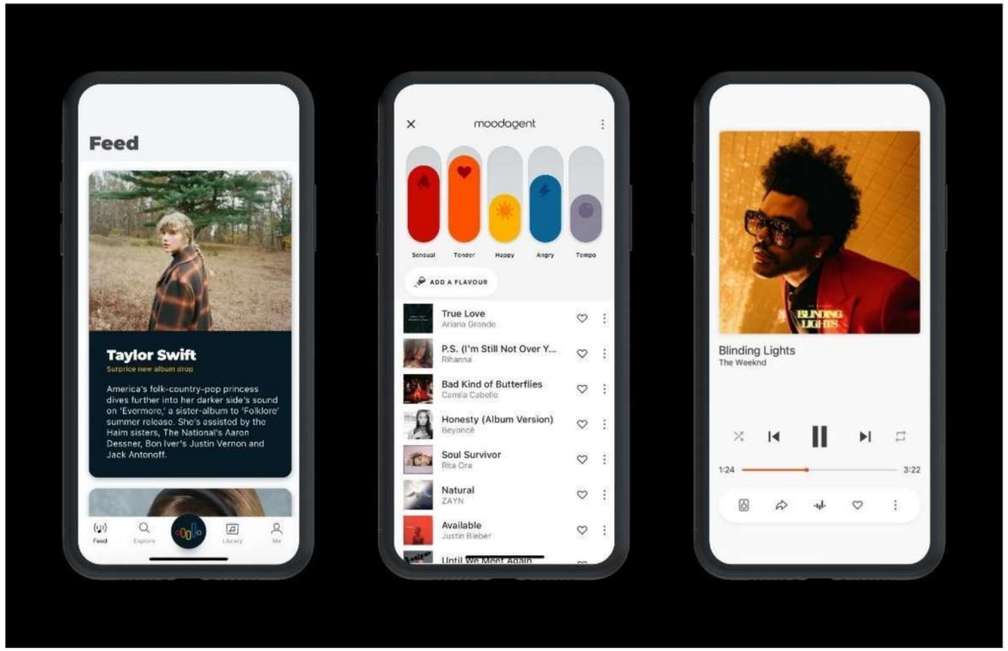
Conclusion & Future Scope



Future Scope:

- Integration with Spotify/YouTube APIs for real-time music recommendations.
- Add automatic volume adjustment based on detected emotion.
- Add offline mode to play saved emotion-based playlists.
- Add dynamic playlist switching where songs automatically change if the user's mood changes during listening

Conclusion:

Our project accurately detects emotions using CNN (FER2013) and delivers personalized music recommendations, while also supporting blind users through automatic image capture and voice feedback —creating a smart, inclusive, and emotion-aware music system..

Thank you!