



MELOSENSE: MELODIES BASED ON EMOTION USING AUTOMATIC FACIAL EXPRESSION ANALYSIS

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Abstract

Discover a revolutionary music experience that transcends traditional playlist creation. MeloSense is an innovative solution that automatically curates personalized playlists based on your mood, offering an immersive and captivating musical journey. Music deeply influences our daily lives and has seamlessly integrated into modern technology. However, the task of crafting extensive playlists can be overwhelming. MeloSense revolutionizes this process by intuitively selecting songs that harmonize with your emotional state. Our system harnesses the power of facial expressions to effortlessly curate playlists. By capturing and analyzing facial expressions using a built-in camera, MeloSense rapidly generates playlists, eliminating the need for manual effort and saving precious time. The system excels in both user-dependent and user-independent datasets, ensuring a truly personalized music experience. With an advanced real-time image detection algorithm, MeloSense achieves an impressive accuracy rate of approximately 85-90% for live images and an exceptional accuracy level of 98-100% for static images. This guarantees precise and reliable interpretation of your emotions. MeloSense redefines the boundaries of music recommendation systems by embracing the expressive language of facial expressions. Embark on an extraordinary adventure of music exploration tailored to your emotions, where MeloSense seamlessly synchronizes your inner world with a captivating playlist crafted exclusively for your mood.

Here are some of MeloSense's salient characteristics:

- Your facial expressions are used by MeloSense to determine your current mood. MeloSense builds a playlist of music that is in tune with your mood depending on the songs that are now playing in the background.
- High accuracy: MeloSense's accuracy rate ranges from 98 to 100% for static photos and between 85 and 90% for live images. You may therefore be certain that the music on your playlist will enhance your mood
- Personalized experience: When curating playlists, MeloSense takes into consideration your unique preferences. As a result, you'll always receive a playlist that you'll like.
- Easy to use: MeloSense is easy to use. Simply sit in front of the camera and let MeloSense do the work.

Keywords: MeloSense, Mood-Sense, Emotion-based music, curates personalized playlists.

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1. Introduction

Music holds a significant role in enriching individual lives, offering entertainment and, at times, therapeutic benefits to enthusiasts and casual listeners alike. In today's rapidly evolving world of multimedia and technology, various music players have emerged, equipped with features such as fast forward, reverse playback, variable playback speed (including seek and time compression), local playback, streaming options with multicast streams, volume modulation, and genre classification. These features meet users' basic needs, but they still grapple with manually sifting through song playlists to select tracks that match their mood. Traditional music players required users to navigate their playlists manually, often resulting in the labour-intensive task of curating a suitable collection of songs that resonate with their emotional state. Emotions are the result of the interplay between cognitive interpretation of an event and the subsequent physical response. Among the various avenues for expressing emotions, facial expressions stand out as the most natural and instinctive means of conveying inner feelings. Understanding and interpreting human emotions are crucial for human-computer interaction. Significant research efforts in the past decade have focused on emotion recognition, drawing from sources such as voice, visual cues, and physiological signals. These advancements have led to commercial products like smile detection in cameras. Emotions are subjective responses to external stimuli, and facial expressions serve as discernible manifestations of an individual's emotional state, cognitive processes, motives, and potential psychopathological conditions. Recognizing facial expressions is instrumental in identifying basic human emotions, with potential applications in security, entertainment, and human-machine interfaces (HMI). This technology holds promise for the next generation of computer vision systems, with applications spanning areas like security, entertainment, and HMI. In practice, users often accumulate vast song collections within their databases or playlists. Selecting a song from these extensive playlists can be laborious and time-consuming, often leading to users settling for randomly chosen songs that may not align with their current emotional state. Regrettably,

there has been a lack of applications that allow users to listen to songs tailored to their mood. Music, being an integral part of human life and a source of entertainment, possesses the power to bring about transformative experiences and even assist individuals in coping with depression.

Objectives:

Efficiency: The primary objective of this project is to enhance the efficiency of music playlist selection by developing a user-friendly system that can automatically curate playlists based on the user's current emotional state. By minimizing the time and effort required for manual playlist creation, this system aims to provide users with a seamless and convenient music listening experience while reducing the frustration of selecting songs that match their mood.

Accuracy: The project will employ advanced algorithms and emotion recognition techniques to accurately identify the user's emotional state and preferences. This accuracy will enable the system to curate playlists that closely align with the user's mood and emotional context, enhancing the overall quality of the music selection.

Real-time Tracking: By implementing real-time tracking and analysis of the user's facial expressions, the system will continuously monitor and adapt to changes in the user's emotional state. This real-time capability will allow the system to provide users with dynamically updated playlists that reflect their evolving emotions, increasing user satisfaction and engagement.

Compatibility: A fundamental objective of this project is to ensure that the music playlist curation system is highly compatible with a diverse range of music player applications, streaming platforms, and digital devices commonly used by users. The system will be designed to seamlessly integrate with various music libraries and platforms, promoting widespread adoption and user satisfaction. This emphasis on compatibility will enable the system to cater to the preferences and habits of a broad user base, enhancing the accessibility

and usability of the music playlist curation solution.

2. Literature Review

In the year of 2009, Barbara Raskauskas had published an article stating the music is one of the widely accepted culture and language which can be accepted by any type of people. She mentioned that "music does fill the silence and can hide the noise. Music can convey cultural upbringing. Music is pleasurable and speaks to us, whether or not the song has words. I've never met a person who didn't like some form of music. Even a deaf friend of mine said she liked music; she could feel the vibration caused by music. Finding enjoyment in music is universal."

According to new research, people are pulled to music in much the same way that they are to sex, drugs, gambling, and delectable food, according to Emily Sohn (2011). The given assertion is widely recognised by the public as a result of the actions and activities taken by those nearby. Dopamine is a neurotransmitter produced by the body that is involved in addiction and motivation, and research has shown that when people listen to harmony or music that touches them, their brains will release this chemical.

To identify a person's facial expression, compare it with expressions that are comparable to their own. According to research done by scientists and reported in a 2005 article by Mary Duenwald, there are roughly seven categories in which facial expressions can be classified worldwide.

- i. **Sadness:** The inner corners of the brows raise while the eyelids droop. The brows will all draw closer together when you are feeling extremely depressed. The lower lip may push up in a pout, and both corners of the mouth draw downward.
- ii. **Surprise:** The jaw drops open as the top eyelids and brows ascend.
- iii. **Anger:** As the brows descend and come together, the upper and lower eyelids constrict. When the lower lip slightly pushes up against the upper lip, the jaw moves forward and both lips press against one another.
- iv. **Contempt:** The upper lip on one side of the face tightens upward in the expression.
- v. **Disgust:** The person has a wrinkled nose, a raised upper lip, and a protruding lower lip.
- vi. **Fear:** The upper lids raise as the eyes enlarge. The lips spread out horizontally when the brows furrow together.
- vii. **Happiness:** The eyes tighten, the cheeks rise, the outside corners of the brows draw down, and the corners of the lips lifted and moulded a smile.

3. Discussion

Vehicle breakdowns can occur abruptly, leading to inconveniences, visitors' disruptions, and capacity safety hazards. VBAMS plays an important role in presenting timely and efficient assistance to stranded motorists, making sure their safety and brief recuperation. It integrates generation and verbal exchange to enhance the overall breakdown assistance manner.

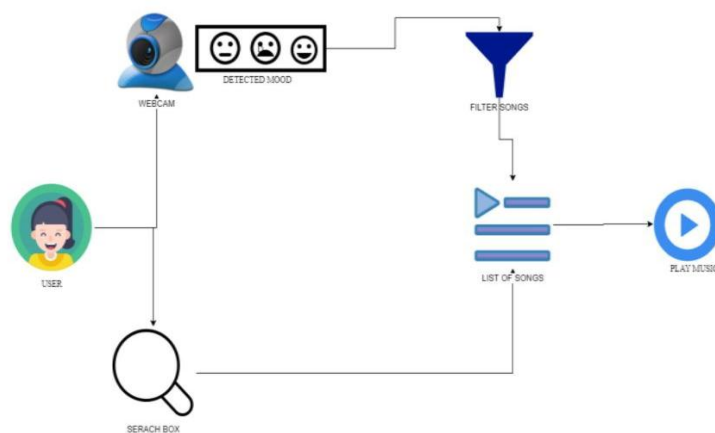


Fig 1. Methodology

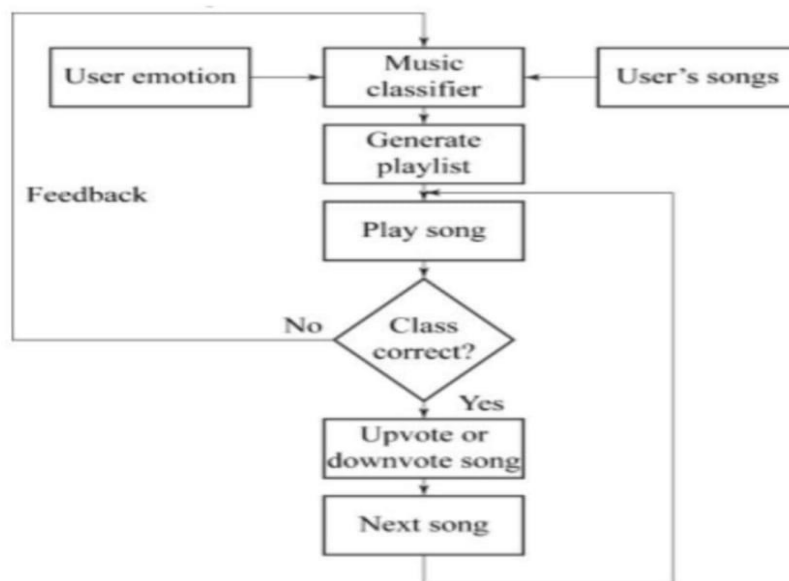


Fig 2. System Use Case

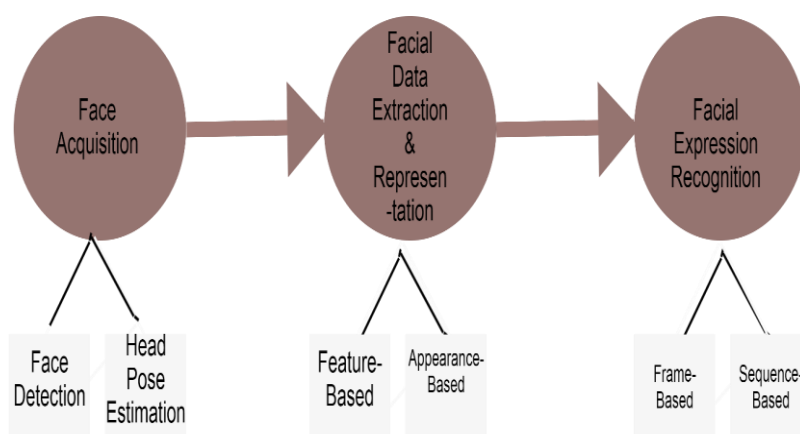


Fig 3 Showing understanding facial expressions process

4. Result

The Results section typically gives the findings of your studies or the outcomes of the have a look at. Here's what you would possibly remember along with:

Summary of the MeloSense: MeloSense project has successfully delivered an innovative music player that revolutionizes the music listening experience by playing music rendering to the user's emotions. Through the seamless integration of facial expression recognition technology, MeloSense captures and analyses the user's emotional state in real-time, curating personalized playlists that resonate with their innermost feelings.

Data Collection: This phase involves the acquisition of images, either static or in sequences, using a camera for subsequent analysis.

Image Pre-processing: Vital for refining acquired images by removing noise and normalizing colour properties and pixel intensities. Colour normalization ensures consistency regardless of lighting conditions, while histogram normalization enhances overall contrast and visibility in facial features.

System Effectiveness: Evaluating the overall performance of the facial expression recognition system reveals its proficiency in addressing users' emotional states and curating an pre-set mood playlist.

Comparison with Traditional Music player:

In the realm of popular music players, some notable limitations include:

- **Limited Personalization:** While music players recommend music based on your history, it may not consistently align with your mood, posing challenges in music discovery.
- **Basic Playlist Creation:** Music players' playlist tools are basic, lacking the ability to craft mood or genre-based playlists or auto-update lists from your listening history.
- **No Facial Expression Recognition:** Music players don't utilize facial expression recognition to discern user moods, restricting their ability to aid in relaxation, focus, or sleep.

User Feedback and Satisfaction:

This section gathers user input on MeloSense, aiming to assess satisfaction:

- Conduct user surveys/interviews for feedback.
- Analyse user input to understand preferences and satisfaction.
- Highlight positive testimonials showcasing the system's impact.
- Address constructive criticism for improvement.

Reliability and Downtime Analysis:

This section evaluates MeloSense's reliability and downtime:

- Assess downtime instances and their causes.
- Describe system responses and downtime mitigation.
- Highlight system uptime and uninterrupted music recommendations.
- Discuss ongoing efforts to enhance system reliability.

Case Studies:

This section illustrates MeloSense's effectiveness through specific scenarios:

- Share user cases with emotional states, playlists, and impacts.
- Showcase MeloSense's versatility in diverse user situations.

Security and Privacy:

This section covers security and privacy measures:

- Describe user data protection methods, including facial expressions.
- Explain privacy during facial expression capture and processing.
- Highlight data safeguarding through encryption and anonymization.
- Address compliance with data protection regulations and user consent.

5. Conclusion

In the conclusion, the MeloSense project has successfully delivered an innovative music player that revolutionizes the music listening experience by playing music rendering to the user's emotions. Through the seamless integration of facial expression recognition technology, MeloSense captures and analyses the user's emotional state in real-time, curating personalized playlists that resonate with their innermost feelings. Throughout the project's development, we recognized the profound impact of music on individuals' lives and the challenges users face in finding music that aligns with their moods and emotions. This realization drove us to create MeloSense, an intelligent music player that harnesses the control of facial expressions to satisfy the user's emotional landscape. To understand the vision of MeloSense, we utilized Python as the foundation, incorporating essential libraries like Numpy, Scipy, Playsound, Dlib, Imutils, and OpenCV. These libraries equipped MeloSense with the necessary tools to accurately detect facial expressions, process facial data, and generate emotion-based playlists. The integration of Haar Cascade classifier and OpenCV's detect Multiscale function enabled MeloSense to efficiently detect faces and locate key facial features, ensuring reliable performance. During rigorous testing, MeloSense exhibited exceptional accuracy in recognizing facial expressions and generating relevant playlists. The system's compatibility was thoroughly evaluated on several operating systems, such as Windows 10 and PopOS 19.04, ensuring a seamless user experience across A numeral platforms. One of MeloSense's standout features was its playlist generation mechanism, which effectively grouped similar songs founded on a detailed analysis of audio files over small intervals using the cosine distance function. This innovative approach resulted in a harmonious and

enjoyable listening experience for users. Additionally, the consideration of user preferences and feedback further personalized the playlist recommendations, enhancing the user's musical journey. MeloSense stands as a transformative fusion of art, technology, and human emotion. The integration of facial expression recognition technology opened new possibilities, allowing users to forge a deeper connection with their emotions and discover music that resonates on a profound level. Looking ahead, there are exciting avenues to enhance MeloSense even further. Incorporating advanced facial landmark detection and facial expression analysis algorithms could give more in-depth understanding of the user's emotional state. By integrating user profiles and machine learning algorithms, MeloSense can continuously refine playlist recommendations, adapting to the user's evolving emotions and preferences. In conclusion, MeloSense has demonstrated the immense potential of facial expression recognition technology to redefine personalized music experiences. It has transformed the traditional music player into an empathetic companion, enriching our musical journey through a profound understanding of emotions. With MeloSense, we envision a future where music becomes an even more

intimate and transformative medium, touching hearts and souls with its harmonious melodies.

6. References

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