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Meloform:Emotion or Weather Based Music Recommendation System

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ABSTRACT:*The present research proposes a novel mu- sic recommendation approach that considers the mood of the user or the weather to enhance the listening experience. The system proposed in this work has two major aspects: emotion recognition and weather assessment. By analyzing the facial expressions of the user, it can determine the user's mood now and suggest songs accordingly. Additionally, it employs actual weather data to adjust playlists according to the mood of the day. For instance, on a sunny day, the system can suggest energetic and cheerful songs, and on a rainy day it can suggest more soothing and reflective songs. The inside-outside solution with regard to music choice takes into account the user's mood as well as ambient weather. The system offers a blend of mood and weather recommendations, thus enhancing the individual's experience of the environment as well as their internal affective states,leading to a more dynamic and richer experience of music. This new approach makes music an infinitely more effective tool for expression of the emotions and communication with the world, which, unexpectedly, boosts the daily experiences and overall well-being of the listener. In this way, it has the potential to transform our use of music because it is set to become an integral and dynamic part of our daily lives. Music can have a great influence on emotions and even behaviors. A well-crafted playlist can capture a person's mood, maintain concentration at the appropriate times, or successfully combat stress after a long day.*

INDEX TERMS: *Music Recommendation System, Emotion-Based Music, Weather Detection, Mood-Based Playlist, Adaptive Recommendations, User-Centered Music, Real-Time Emotion Analysis*

1. INTRODUCTION

Most of the existing music recommendation systems rely on more or less simple methods: Collaboration by either filtering or content-based logic approaches happens. These methods overlook small details that are very important to the user, such as a user's mood or outside elements, for example, the sky (weather that affects music choice) at the time music was listened to.Admittedly, the whole system now introduces a new technology, which includes the capability to analyze the weather and emotional detection so that more individualized listening experiences can be formed using machine learning technology.Emotions are detected from reading facial expressions and then being able to decode emotions. Using the facial recognition technology, that is considered to be of the most advanced type, the system decodes various emotional clues. For instance, it might ascertain if a user happens to be happy, sad, relaxed or even slightly angry. This emotional data is, afterwards, analyzed in order to make recommendations of music in alignment with the mood of the user.For example, if it feels the user may be depressed, it would suggest those songs that might help make the user somewhat happy or cheerful. If it iden- tifies the mood of the user as relaxed, the system might suggest calm and relaxing tracks for the user so that he or she maintains this state of relaxation. In addition to emo- tional evaluation, the system makes use of real-time weather analysis to fine-tune its suggestions.

The system will be able to tailor playlists based on the weather and atmosphere details it has gathered. For example, on a rainy day, it may suggest songs that are quiet and reflective, casting a befitting mood with the normally introspective day most people experience when it rains. Conversely, on a sunny day, it could suggest bright, energetic tracks that match the lively and cheerful nature of the day. This is a two-pronged approach: emotion detec- tion and weather analysis; it's a ubiquitous understanding of the context of a user, in terms of both the inner and outer directions. It's more sophisticated than traditional recommendation systems, in terms of how fluid and multi-faceted human experience is.

Human beings are not static in music preferences; they are dynamic because of multifaceted reasons, for example, mood and environment. By recognising and incorporating such parameters, our system generates a more riveting and enjoyable listening experience. Moreover, the adaptability of such a system to real-time changes in the environment ensures that its recommendations will be relevant through- out the day. For example, if it changes from sunny to stormy, the system could immediately make adjustments in the playlist to suit the new conditions. Even if some- thing strange swings the mood of a user, this system can then update its suggestions for such a user.

Through continuous adaptation, it ensures that there is a harmonious connection between the inner feelings of a user and the outer world. Another is the vast scope for application that this system can be applied to outside of its personal uses; it may find application in streaming apps, smart home devices, and in pubs, coffee shops, and retail outlets more generally. In this way it can amplify the general ambience by providing music congruent with the collective mood of a space or group of people. This system uses both emotional or environmental cues to give a truly better music experience.

By the use of emotion detection and weather into mu- sic recommendation systems opens up some really exciting ways to make music feel more personal.Emotion-based music detection analyzes users' emotional states through facial

expressions to recommend songs that align with or influence their mood. Also by matching music to the weather, the system can make the listening experience even more immersive and enjoyable.If you want to play music like a normal music player,that option is also available.These approaches enhances personalization.Beyond personal use, the potential applications of this system extend to streaming services, smart home devices, public spaces, and commercial establishments, where music can be tailored to enhance the collective ambiance.

2. LITERATURE SURVEY

”Facial Expression-based Music Recommendation System using MobileNet and Keras” [1] presents an AI model that is low in computation and runs in a mobile phone. It can detect facial expressions from a live camera feed and tell the user which songs are best suited for them, thus, it enriches user engagement. Besides, it can help manage a mood too. The system features content-based and collaborative filtering to refine the accuracy and enables Firebase for song storage and retrieval. This technique significantly shortens the time to recommend songs and thus is the best method for real-time apps. The final system’s accurateness is institutioned on the aspect of the facial feature being visible and the camera quality.

”Location-aware Music Recommender for Mobile Users” [2] is a music recommender system that modifies song suggestions according to the surroundings where the user is. A mobile application which has been tested in Italy is playing background music in order to improve the emotional ambience of the environment doping with the emotional tags, therefore, user experience is enriched. Clients supposed that place-oriented advice had contributed to their satisfaction with the music they picked. One of the shortages of this study is that the preindeed emotions for specific locations which may be unusal for different users are the main factor of the study.

”Emotion-based Music Selection System using Facial Recognition” [3] deals with grayscale images in which emotional features are extracted and combined with the audio databases. The accuracy of the system gets to over 80% but it prefers to have the best possible lighting to work normally. The authors are of the view that the prospective enhancements would be a deep learning-based feature extraction to the strengths of the systems when lighting intensifies.

”Facial Emotion Detection through Convolutional Neural Networks (CNNs) for Music Recommendation” [4] arranges seven emotions at an efficiency of 78.63%. The system associates emotions with pre-prepared playlists, so in this way, it makes it easier on users and eliminates the necessity of choosing songs by themselves. A feature worth of note is the system’s capability but it is hardly noticed with the delicate facial expressions which are the point of critical emotional states. The reality, however, is the mist that sometimes occurs that is the glasses or mask and this would result in a lower degree of detection.

”ClimaSound: A Weather-based Music Recommendation System” [5] chooses the music that must be listened to, depending on the weather and its pollution levels. The system combines OpenWeatherMap and Spotify APIs, using fuzzy logic to pair environmental factors with song moods and thus make listening customizable. This process introduces an independent element into the systems of recommendation, and by doing so, it makes them more active and sensitive to the users’ environment.

”HIN-MRS: A Heterogeneous Information Network-based Music Recommendation System” [6] factors in user location, time, and weather to personalize music suggestions. It solves the ”cold start” problem using relevant data instead of typical music listening history. And that’s how it gets better because of the different data sources. Not only users’ rating but also user’s location at the current time might be a great way to get to know the user’s mu- sical interests due to the fact that their friends also at the moment can be somewhere nearby. However, requires nu- merous actions so as the set of data grows, this increases computational capacity as well.

”Multi-task Ubiquitous Music Recommendation (MUMR) Model” [7] enhances recommendations using data from smart bracelets. MUMR tracks the user’s health and fitness level by the help of the heart rate, type of activity, and the person’s feeling and happiness level. These bracelets are used on the wrist to measure data that is being used for health and wellness purposes. Through the music recommendation process, physical feedback, that might enhance the user’s overall mood, is given to the user from the smart bracelet. This method introduces physiological data into the recommendation process, ensuring music aligns with the user’s emotional and physical state.

”Emotion-based Music Player using HAAR Cascade Classifiers” [8] develops a budget-friendly emotion-based music player that employs HAAR cascade classifiers and the COHN-KANADE dataset. Emotion based music player uses Ospry to get the audio data from the phone which is processed with the CPU. To create accurate programmed actions in the music player, lastly the music player and its related entities will serve as programmable interfaces to the user responses through a content sharing platform that uses P2P technology to transport media files between users. The system also uses image processing to conduct facial emotion analysis and presents the users with song suggestions in the order of the most suited one. The system detects fa- cial expressions and autonomously curates playlists, making the selection process more intuitive and responsive. Future implementation may consider deep learning strategies like CGAN that are suitable for the task to improve emotion detection and classify a wider range of emotions. They may also use techniques like sentiment analysis which would allow to analyze real-time data and more purposes than just emotions.

In conclusion,these papers discusses about various emotion detection techniques and how they recommend songs based on the detected emotion.And also discusses various weather detection too.

3. METHODOLOGY

Meloform is an intelligent music recommendation system utilising facial emotion recognition, weather,and vibe mode.

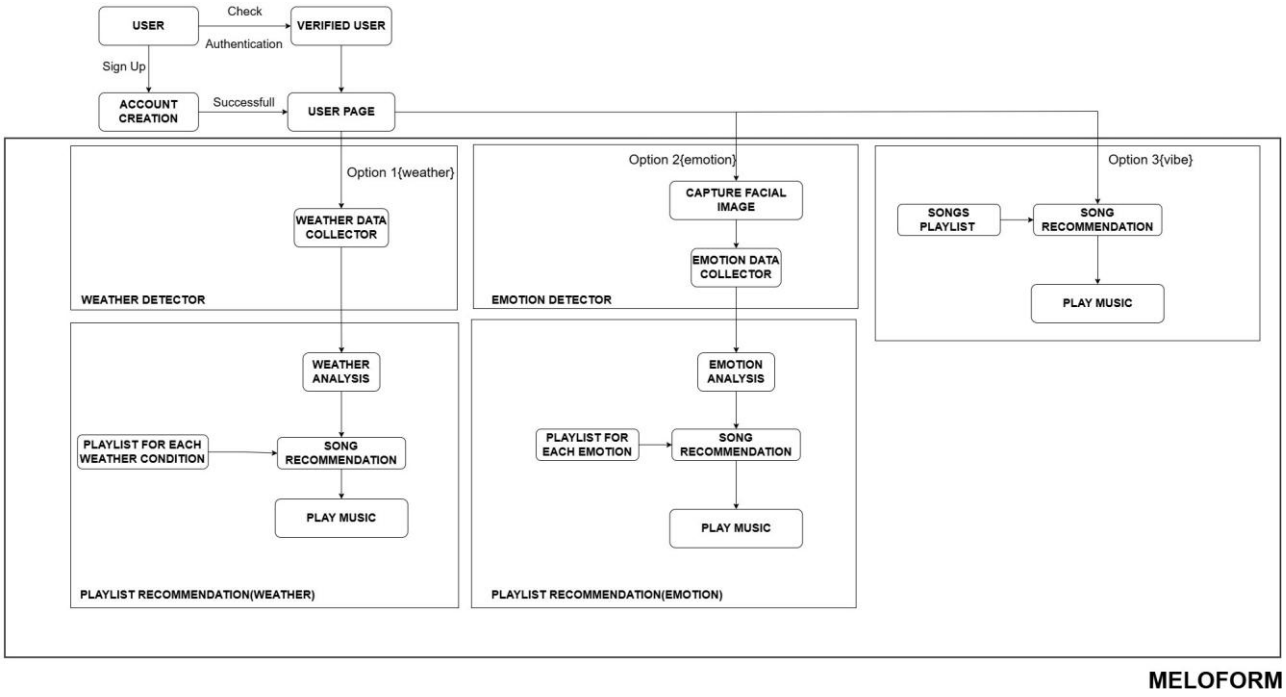


Figure 1: System Architecture

The system uses DeepFace for emotion recognition and OpenWeather API for real-time weather information in order to deliver a dynamic music selection process. The methodology guaranteeing the seamless operation of the system. The workflow can be seen as :

1. User Authentication and Access: The MELOFORM music recommending system's workflow starts with user authentication. A User takes the initiative by registering himself or herself through the account creation module. At this phase, authentication verifications are carried out to check the user's credentials. Upon successful authentication, the user is identified as a Verified User and is granted access to the User Page. The User Page is the master dashboard from which users select how they desire to get music recommendations.

2. Recommendation Mode Selection: Once the user has logged in, he or she can pick between three different modes of music recommendation:

- Weather-Based Recommendation
- Emotion-Based Recommendation
- Vibe Mode

Each mode involves a precise data collection, analysis, and recommendation procedure to come up with tailored playlists.

3. Weather-Based Music Recommendation Workflow: When the user chooses the Weather-Based Recommendation option, the system triggers the Weather Data Collec- tor module. The module retrieves current weather data in real time, with the help of OpenWeather API. The gath- ered weather data is then analyzed in the Weather Analysis module to establish current environmental conditions such as Clear, Clouds, Rain, Drizzle, Thunderstorm, Snow, Mist, Smoke, Haze, Dust, Fog, Sand, Ash, Squall, and Tornado.

Depending on the weather condition identified, the system chooses a pre-defined playlist corresponding to the mood usually linked to this weather. For instance:Rain weather can trigger a slow and soothing playlist, clear weather can result in happy and energetic tracks, Cloudy weather can recommend gentle and soothing melodies. The Song Recommendation module further screens out the most appropriate songs from the chosen playlist, and then Play Music.

4. Emotion-Based Music Recommendation Workflow: In the case of users choosing the Emotion-Based Recommendation, the system detect emotion of the user. The photograph is analyzed by the Emotion Analysis to derive important facial features to gauge the emotional condition of the user. The dominant emotion, like happiness, sadness, anger, surprise, or neutrality, is ascertained by the Emotion Analysis module.

Once the emotion is recognized, the system picks a predefined playlist for the recognized emotion. For example: If the user seems to be happy, the system can suggest celebratory and lively songs. If the user seems sad, the system can suggest slow, comforting, or soothing music. If the user is neutral, the system can suggest a balanced playlist with mixed emotions. The Song Recommendation module then further narrows down the choice, and then Play Music , providing a better listening experience.

5. Vibe Mode Workflow: If the user selects Vibe Mode, they can directly listen to a pre-curated Songs Playlist without needing any external inputs (weather or emotion data). This mode is best suited for users who just want to listen to music without customized recommendations.

Vibe Mode provides an easy and hassle-free means of listening to music without any disturbance. Whether you want to relax, concentrate, or simply immerse yourself in a beat, this mode gives you instant access to a thoughtfully curated music playlist.

4. RESULTS AND DISCUSSION

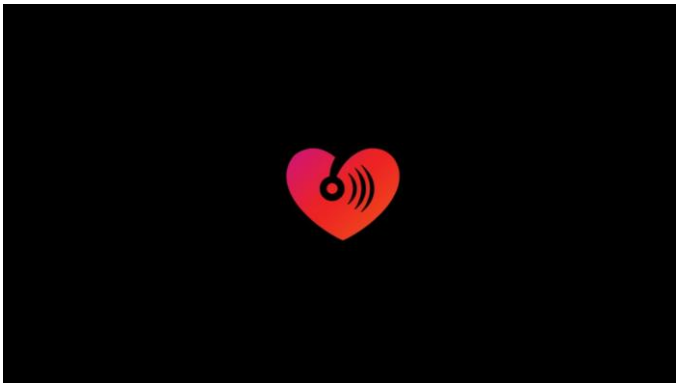


Figure 2: Welcome Screen

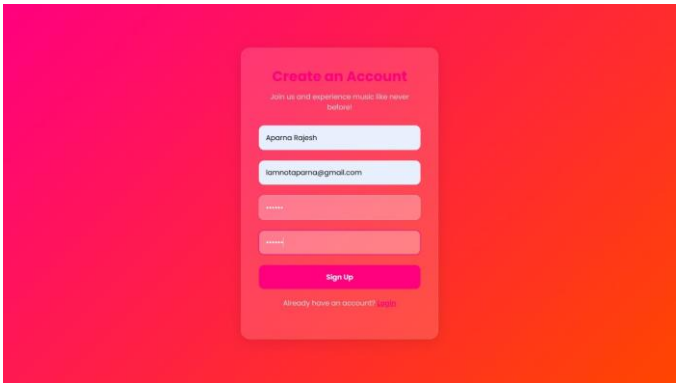


Figure 3: Signup page

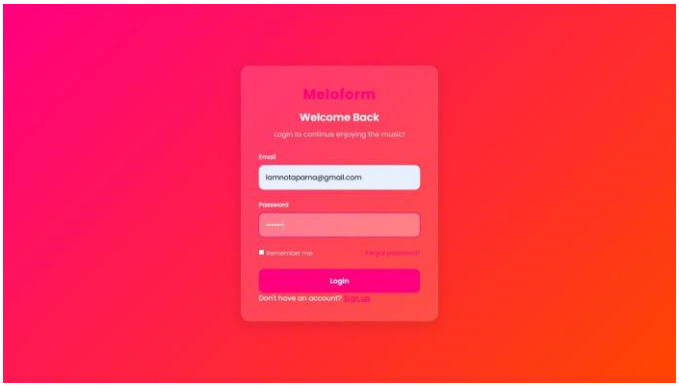


Figure 4: login Page

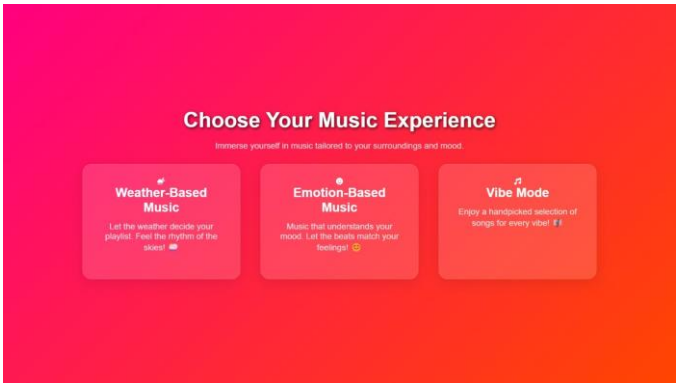
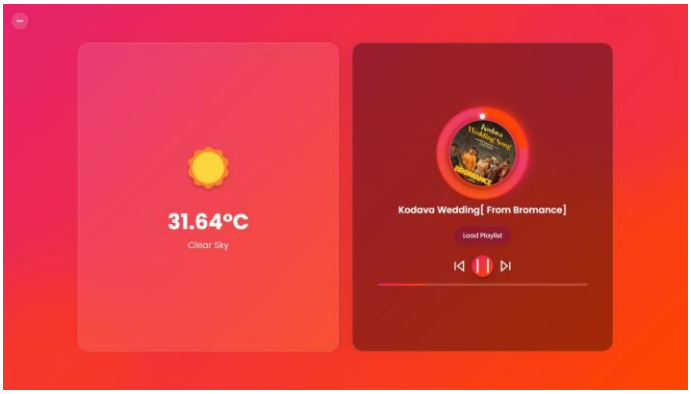


Figure 5: Module Selection Page



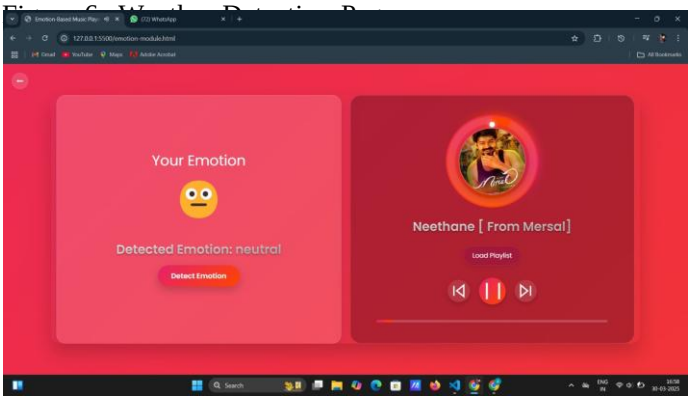


Figure 7: Emotion Detection Page

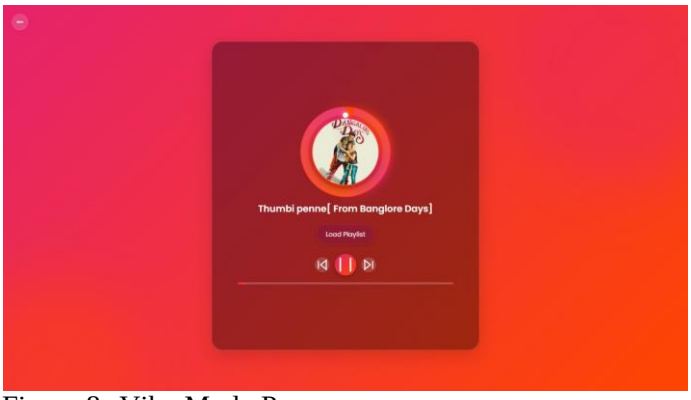


Figure 8: Vibe Mode Page

Meloform usage has been effective in establishing an interactive and dynamic music selection process through facial emotion recognition and current weather conditions. The system is successful in utilizing DeepFace for emotion recognition and the OpenWeather API for weather-driven music selection, thus yielding an optimized user experience. Additionally, Vibe Mode offers a facility for music listening. The Welcome Screen serves as the initial interface of the Meloform web application,shown in Figure 2.

Figure 3 shows the sign-up screen for users, where they can create a new account. The UI is in accordance with a formal layout with labeled input boxes for username, email, and password to make it clear and user-friendly. The ”Sign Up” button is readily available, inviting users to click it.

Figure 4 displays the Meloform platform’s login page, where users sign in using an email and password to access their accounts. The ”Welcome Back” is the kind of message that creates a personalized environment, supporting repeat visitors in their ongoing experience without interruption. The location of the login button improves accessibility and usability.

Figure 5 displays the essential feature of Meloform, which offers several music selection modes to users. The screen shows three options: Weather-Based Music, Emotion-Based Music, and Vibe Mode, designed to meet the diverse preferences of users. The module selection page is designed to enhance user interaction by incorporating a voice command feature. The function enables the system to ask the user a question, requesting them to pick one among three modules: Weather, Emotion, or Vibe. Rather than going through the interface manually, the user can just answer with the preferred module via voice command.Upon a user’s selection, the system executes the command and smoothly redirects them to the respective module page. This facility enhances accessibility as well as ease of use by the user, making the selection process more convenient and intuitive.By integrating voice recognition technology, the module selection page ensures a hands-free and interactive experience, catering to users who prefer voice commands over traditional touch or click-based navigation.The clean typography and separate selection boxes enhance navigation, enabling users to browse and customize their music with ease. Such an interface is a vital aspect in presenting Meloform’s interactive and dynamic music curation system.

Figure 6 displays the Meloform platform’s Weather Detection Page. The Weather Detection Page of Meloform incorporates current weather information to make the mu- sic experience of the user better. As illustrated in Fig- ure 6, the user interface is divided into two sections;The left panel graphically depicts the weather condition de- tected.The right panel shows a suggested song according to the weather at the moment, providing a seamless, person- alized music experience.This feature enables users to enjoy music that resonates with their surroundings, enhancing in- teraction and emotional affinity. The simple UI guarantees simplicity, making weather-based music choice a hassle-free experience.

Figure 7 illustrates Meloform’s Emotion-Based Music functionality. The left panel shows the detected emotion of the user in the form of an emoji and text verification. The right panel shows a suggested song according to the detected mood, providing a personalized music experience. The clean but efficient layout improves readability, while the double-panel format allows for easy navigation, underscoring Meloform’s emphasis on dynamic and interactive music discovery.

Figure 8 is the Vibe Mode.The Vibe Mode Page allows users to explore music that resonates with their current mood or personal preference without external detection.The screen is dominated by the album artwork of the playing song, and it gives a visually appealing feel. The artist name and title of the song are shown below the artwork for user identification. The playback controls, such as a progress bar and navigation buttons, are optimized for simplicity and functionality.

5. .CONCLUSION

In conclusion,our music recommendation system, which leverages weather conditions and user emotions, has presented to the music streaming industry a whole new way to improve user experience. The application analyzes facial expressions to detect emotional states while compiling real-time weather data, subsequently recommending playlists that match the user’s current mood or environment. The contextual recommendation system will surely engage the user more with the most relevant content and truly push the growing trend for more personalized and AI-driven solutions. Future enhancements may be concentrating on improving the accuracy of emotion detection and diversifying the weather-related responses measure incorporated in order to gain more precision and versatility in recommendations, creating even more immersive and responsive music experience to users. Furthermore, user feedback mechanisms should be adaptive to fine-tune such recommendations over time. The application should also be compatible with more streaming platforms so that users can access it with ease. Besides using machine learning models to analyze listening patterns, the application could be enhanced in the future for more predictive accuracy. Enhancing system user feedback, platform compatibility, and even machine learning capabilities will further sharpen personalization.

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