TED University

MelodyMood

Recommending Music Based On Emotion Analysis

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MelodyMood

Purpose

“MellodyMood” is the application's recommendation of music by determining the mood of users through emotional analysis by involving users in the application compared to ordinary music listening platforms. Thus, the platform becomes more entertaining than ordinary applications. The application increases people's music repertoire by discovering new music without having to search for music according to their emotions and situations.

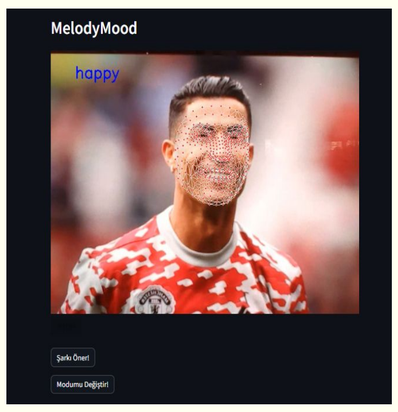
Abstract

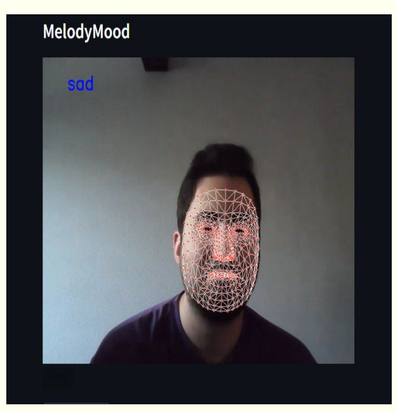
There are over 600 million active listeners in the music industry worldwide, and “MelodyMood”, which targets this large audience, has found that 30% of users are bored with current platforms. The project aims to solve this problem by analyzing users' facial expressions and offering music suggestions suitable for their mood. Thus, a quality music experience is offered to listeners, allowing them to discover more personalized and new music.

Method

1.Emotion Analysis

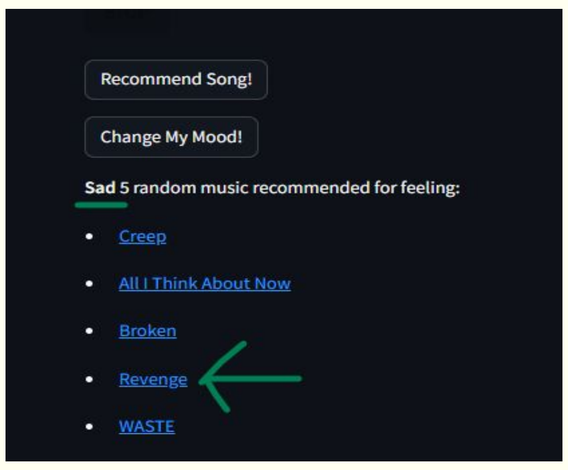
This process begins after users log in to the system and scan their face on the camera. First, the user's facial expressions are detected in real time with the ‘Mediapipe’ library. This data is processed to perform emotion analysis. The processed data is then analyzed by a neural network model trained using deep learning libraries such as ‘Keras’ and ‘TensorFlow’. This model determines the user's current emotional state by classifying among predefined emotion classes. Then, our pre-trained model provides the necessary training data for the model to recognize different emotional expressions, thanks to the datasets kept in the files. Using this data, the model accurately classifies emotional states.

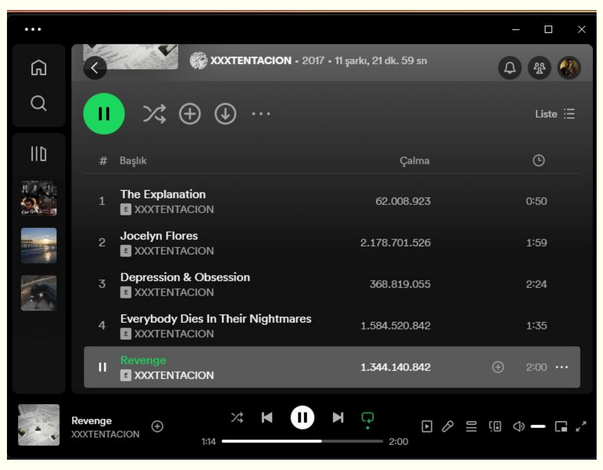




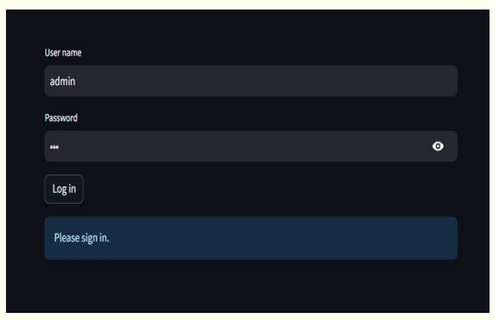
2. Music Recommendation System

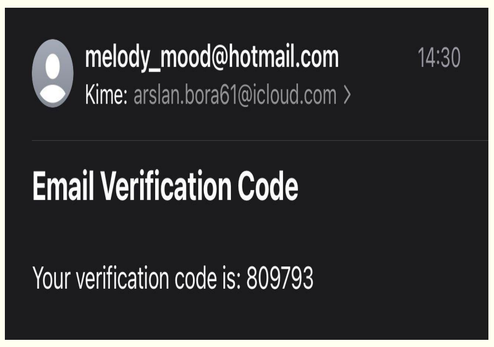
Spotify API is used via the 'Spotipy' library to recommend music to users whose emotions are analyzed. The system matches the playlist ID with the 'playlist_mapping' structure created according to the emotional states of the users. The ids here are actually keys that represent people's emotional states. IDs contain keys that represent unique identifiers of Spotify playlists that match those emotions. Thus, songs are selected from the playlist selected through the emotion playlists corresponding to these ids, thanks to the “Spotipy” library. are presented to the user as Spotify links. Users choose from five recommended songs.





Application Interfaces





Results

The steps we aimed for in our project have been successfully completed. We have two critical analyses. One is emotion, situation analysis and the recommendation of the suggested music according to the analyzed emotion or situation. Our emotions and situations are; happy, sad, surprised, angry, rocrock and natural.

Emotion Analysis

TARGET / OUTPUT	Happy Face	Sad Face	Surprised Face	Angry Face	Rocrock Face	Natural Face	SUM
Happy Face	36 17.48%	1 0.49%	2 0.97%	1 0.49%	2 0.97%	1 0.49%	43 83.72% 16.28%
Sad Face	0 0.00%	18 8.74%	0 0.00%	2 0.97%	0 0.00%	1 0.49%	21 85.71% 14.29%
Surprised Face	2 0.97%	0 0.00%	26 12.62%	2 0.97%	4 1.94%	0 0.00%	34 76.47% 23.53%
Angry Face	1 0.49%	5 2.43%	1 0.49%	35 16.99%	3 1.46%	2 0.97%	47 74.47% 25.53%
Rocrock Face	1 0.49%	0 0.00%	3 1.46%	2 0.97%	29 14.08%	1 0.49%	36 80.56% 19.44%
Natural Face	4 1.94%	4 1.94%	0 0.00%	3 1.46%	0 0.00%	14 6.80%	25 56.00% 44.00%
SUM	44 81.82% 18.18%	28 64.29% 35.71%	32 81.25% 18.75%	45 77.78% 22.22%	38 76.32% 23.68%	19 73.68% 26.32%	158 / 206 76.70% 23.30%

In our project, we will first talk about the tests we conducted in the emotion and situation analysis section and the results we obtained. As seen in the matrix, different numbers of tests were conducted for our 6 situations. As a result of these tests, we achieved a success rate of 76.70% by reaching a success rate of 158 in a total of 206 trials.

Music Recommendation Analysis

TARGET / OUTPUT	Happy Music	Sad Music	Surprised Music	Angry Music	Rocrock Music	Natural Music	SUM
Happy Music	42 14.00%	1 0.33%	0 0.00%	2 0.67%	4 1.33%	1 0.33%	50 84.00% 16.00%
Sad Music	2 0.67%	43 14.33%	1 0.33%	2 0.67%	1 0.33%	1 0.33%	50 86.00% 14.00%
Surprised Music	4 1.33%	4 1.33%	32 10.67%	2 0.67%	6 2.00%	2 0.67%	50 64.00% 36.00%
Angry Music	2 0.67%	0 0.00%	1 0.33%	42 14.00%	5 1.67%	0 0.00%	50 84.00% 16.00%
Rocrock Music	2 0.67%	0 0.00%	0 0.00%	2 0.67%	46 15.33%	0 0.00%	50 92.00% 8.00%
Natural Music	6 2.00%	4 1.33%	0 0.00%	3 1.00%	2 0.67%	35 11.67%	50 70.00% 30.00%
SUM	58 72.41% 27.59%	52 82.69% 17.31%	34 94.12% 5.88%	53 79.25% 20.75%	64 71.88% 28.13%	39 89.74% 10.26%	240 / 300 80.00% 20.00%

Secondly, there are trials that we conducted to test the accuracy of the result obtained in the emotion and situation analysis section regarding the content of the suggested music. As seen in the matrix, 50 separate trials were conducted for 6 situations, a total of 300. Among these situations, the emotions with the highest success rate are happy, sad, angry and rockrock music suggestions that vary between values. The ones with lower success rates than the others are natural and surprised music. However, when we look at the total, we have a system that successfully suggests music in 240 out of 300 trials. This corresponds to a success rate of 80%.

Conclusion

Application design and operation successfully has been carried out. The sentiment analysis algorithm and music recommendation system yielded highly successful results. The application has been tested by users and received full marks with a high rate of appreciation. In the future, it is aimed to increase the success rate and reach a large number of users by improving these algorithms.

Acknowledgements

We would like to thank all our teachers, especially Yücel Çimtay, who helped us during this graduation project.

References

- https://www.demandsage.com/spotify-stats/
- https://backlinko.com/spotify-users
- https://developer.spotify.com/documentation/web-api