Sentiment based Music Player using AFINN Dictionary and Javascript

Shakti Prasad Mishra[1*], Alina Dash[2]

[1,2,]Department of Computer Science and Engineering Veer Surendra Sai University of Technology Burla, India
Email:[1]shaktiprasad98.mishra@gmail.com,[2]alinadash_cse@vssut.ac.in

ABSTRACT

In an individual's life music plays an important role as it is a prime mode of entertainment and can also act as a mental therapeutic approach for those who always remain in anguish and stress. The current psychological state of mind of a person can easily be depicted by their facial expressions. But there are some people who prefer not to show their sentiment on their face but to express it in some text format. In this paper the objective was to design a user intuitive smart music player. This player interpreted the sentiment of the user from the description of their mood provided by them. The music player took into account some key or important words from the description in order to deduce the sentiment of the user. Based on the result an ideal playlist of songs was generated which could boost one's ardour. The person could browse the playlist inorder to play the song of his/her choice which made it more flexible to use. This player made it easier for the users to filter out the songs based on their mood and emotional state without manually creating their own playlist.

Introduction

Music has become an integral part of an individual in today's stressed and busy day to day life. The identity, personality, and sentiment of people can be interpreted through their emotions. Music often communicates passionate qualities and characteristics of human identity like happiness, aggressiveness and sadness etc [7]. But in this society there are many such people who do not prefer to show their proper and actual emotion before others. They prefer to keep their emotions to themselves in a written format, let it be a diary or a register. This app is just for such facial emotion hiding users i.e. who hesitate to show their sentiments on their face. Generally, people tend to listen to music of different genres which match their sentiment or mood at that particular time. Music has now become a significant part of the human culture since it unequivocally shows or brings out emotions and influences social exercises and connections. Few applications can be designed which use the above mentioned wonder where human sentiments assume a notable part.

These applications help the users to diminish their efforts in organizing and sorting substantial playlists proficiently into different genres and themes which is actually a monotonous task, without any actual manual indulgence which in turn saves their valuable time [2,7]. The app developed over here recognizes or rather detects the user's sentiment in a particular instant, from an accurate description of their mood provided by them in a written format and shows them a well managed and filtered playlist with songs of particular theme which matches their emotions. There are six categories in which the mood is categorized in this app, those are anger, aversion, happiness, sadness, neutral and very happy [6]. The description mentioned above is then interpreted or rendered in order to get the mood of the user. In this stage the text is tokenized leaving only splitted words. In the next stage some useless and meaningless words are removed which is followed by rating those words based on the AFINN dictionary an already constructed sentiment dictionary [1]. AFINN dictionary is a list of words rated for valence with an integer between -5 (negative) and +5 (positive). After the rating is done summation of those rates is carried out inorder to get the Total Rate (TR) of the complete description. Based on that rating the mood/sentiment is determined. The player provides the option whether to generate a playlist of four songs based on their mood or if the user wanted to re-describe their mood they can do so. The users can generate a playlist of both English or Hindi language based on their preference. This feature makes the playlist more flexible and adaptable. The playlist may help in improving the users' mood and maximize their efficiency in the task they are performing. These befitting music generated according to the users' sentiment alleviates their mood emancipating them.

The **dataset** consists of 100 songs of different genres and of different languages (English or Hindi) providing the users comfort ability in choosing playlist of their preferred language.

Methodology

The figure "Fig. 1" shows the block diagram of the proposed work.
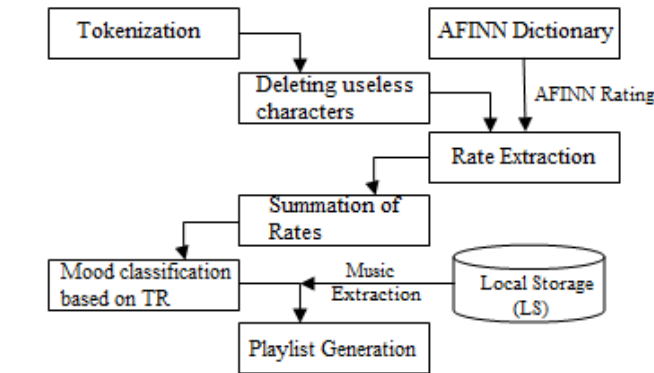

Fig. 1.   Block Diagram of Proposed Project

The project here involves a music player which generates a customized list of songs which may be Hindi or English based on the user's emotional state. The proposed system has in general two phases which includes: Emotion classification phase and Playlist generation from the local storage based on the first phase.

Emotion Classification Phase

Description of mood of the user at a particular instant is taken as input in this phase. As the main purpose of the project was to design a music player website, Hyper Text Markup Language (HTML), Cascading Style Sheets (CSS) and Javascript is used for all the front end operations and for backend Node.js is used. In this phase the user describes his/her sentiment in a written format inside a text area provided. The algorithm suggested here then takes the description as input in order to tokenize it. Tokenizing is a step in which the complete text provided by the user is converted to lowercase and is splitted to different words wherever a white space gets located.

After the successful completion of tokenization in the next step of this phase all the useless characters like meaningless words, special characters like coma, full stops etc are deleted inorder to get an array of perfect meaningful and descriptive words which can best describe the user's mood/ emotion/ sentiment at that particular instant.

After deleting all the useless characters from the tokenized array, rates of those remaining words are extracted comparing those words to those of the AFINN dictionary. AFINN dictionary is a list of words rated for valence with an integer.

Now these extracted rates are then stored in an array which is then mapped to the next step/function for calculating the TR of the complete text given by the user as the description of their mood.

Based on the table below, emotion of the user is classified based on a certain assumption that is if TR is:

Table I. Emotion Classification Based On Tr

TR	Mood
<= -7	Angry
> -7 and <= -5	Aversion
> -5 and <= -2	Sad
> -2 and <= 2	Neutral
>2 and <= 4	Happy
for rest values	Very Happy

An interactive way of representation of this phase is done in the website. A dynamic textarea is used for taking input from the user. Various advanced CSS animations are used in order to make the page more satisfying and attractive. The concept of local storage is used inorder to store the TR generated and show the mood as output based on that TR. Usage of bootstrap to design the User Interface (UI) makes the buttons used in the page much more alluring and makes the web page mobile and tablet responsive. The button here leads us to the next page which shows us the mood of the user and also lets the user generate the playlist.

Playlist Generation Phase

After the completion of the first phase of classifying the mood based on the total rate of the text according to the AFINN dictionary the second phase of playlist generation is carried out. After the emotion is classified the player gives an option to the user whether to generate the playlist or to reclassify the mood. The player can generate a playlist of Hindi or English songs according to the choice of the user. This feature of the music player makes it much more flexible than other players in which the user might have got a playlist of mixed languages. The songs are extracted from the local storage which has got a large dataset of songs and their genres [8].

For designing the webpage for this phase CSS grids are used which shows the emotion in one column and the playlist in another. Various event handlers are used in order to make the webpage much more clarified and interactive. HTML audio tag is used in order to play the songs generated in the playlist with various controls like play, pause, volume up and down and downloading the song. Javascript Random function is used to generate four random songs out of the local music dataset which matches the sentiment of the user.
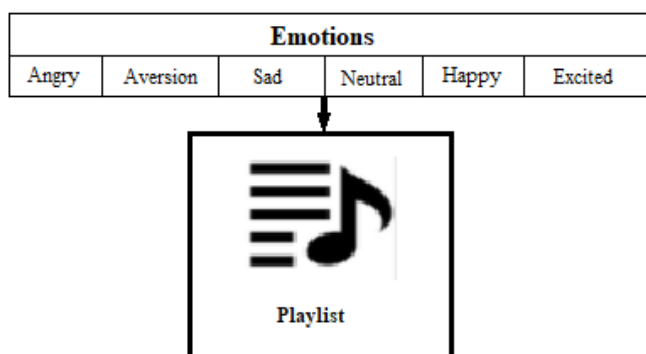
Fig. 2. Generating playlist according to emotions

ALGORITHM PROPOSED

Below mentioned is the algorithm proposed, for the methodology followed to complete the work:

Input: Users' mood's description provided by them in written format.

Step 1: Tokenization of the input and generation of the array which consists of words used in the input which may be meaningful or some meaningless characters.

Step 2: Removal or deletion of meaningless characters from the array.

Step 3: Rate Extraction of the remaining words from the AFINN Dictionary and storing the rates in a different array.

Step 4: Summation of rates to get the Total Rate (TR).

Step 5: Emotion Classification based on the value of TR.

Step 6: Playlist Generation which may be Hindi or English based on the users' choice based on the emotion classified.

Results

"Sentiment based music player using AFINN dictionary and Javascript" is created as a website application using various tools like HTML5, CSS3, Javascript, Bootstrap for front end development and Nodejs and localstorage for backend. It can be implemented using any browser like mozilla,chrome, edge etc. After testing the music player for around 30 times on different test cases the accuracy of the web application to determine or classify the emotion was around **83.33%**.

Table Ii. Accuracy Of Various Classified Emotions

Emotion	Accuracy
Anger	4 out of 5 i.e. 80%
Aversion	4 out of 5 i.e.80%
Sad	4 out of 5 i.e. 80%
Neutral	5 out of 5 i.e 100%
Happy	4 out of 5 i.e.80%
Very Happy	4 out of 5 i.e. 80%
Average Accuracy	83.33%

Here are some glimpse of the web application named "Sentiment based music player using AFINN dictionary and Javascript":
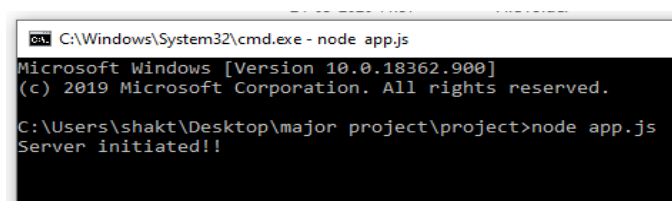

Fig. 3. Server initiated for webapp to work

Fig. 4. Welcome page of webapp
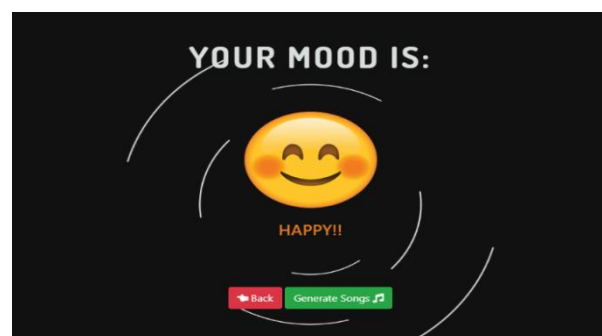

Fig. 5. Text area for description input

Fig. 6. Showing classified mood

Fig. 7. Playlist English or Hindi
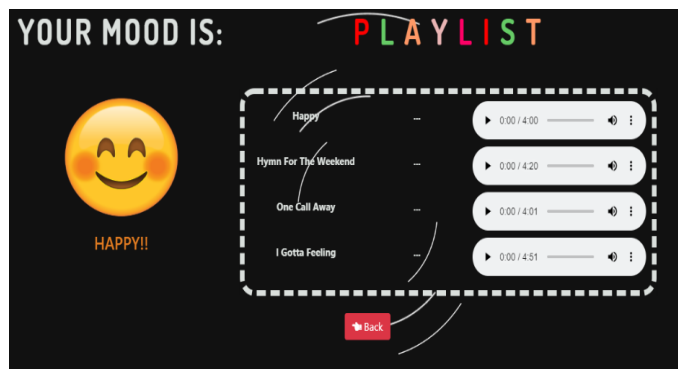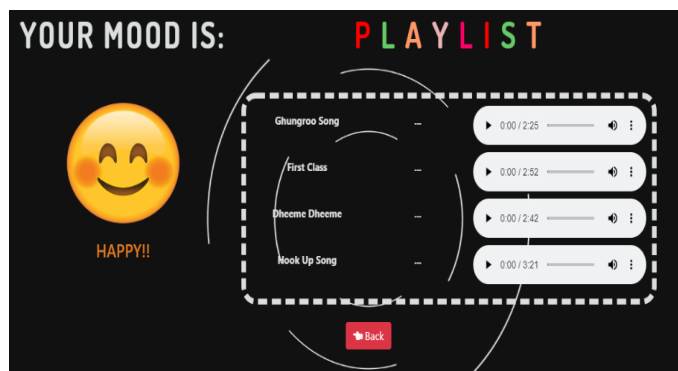

Fig. 8. English Playlist

Fig. 9. Hindi Playlist

Conclusion and Future Perspectives

This music player web application with an accuracy of **83.33%** which classifies the mood of the user just by the description of their mood in a written format can prove to be beneficial in reducing the search time of songs which matches to their mood instantaneously. Moreover the hectic work of sorting a big music playlist is not required in this web app which makes this app much more swift, flexible and time saving.

In future this app's accuracy can increase significantly by just connecting this app to neural network models like LSTM models etc [9,10]. Further addition of face emotion detection in this app will make it a complete application for day to day use. This app can further be re modeled to extract emotions for pre written comments of users on various microblogging sites like facebook and twitter [3,4,5].

Addition of ReactJs and AngularJs will make the website much more interactive and alluring. Even usage of relational or non relational databases to store previous moods would make it much easier to operate for users with the same mood throughout.

References

[1] Godbole, Namrata, Manja Srinivasaiah, and Steven Skiena. "Large-Scale Sentiment Analysis for News and Blogs." *Icwsm* 7, no. 21 (2007): 219-222.

[2] Meyers, Owen Craigie. "A mood-based music classification and exploration system." PhD diss., Massachusetts institute of technology, 2007.

[3] Pak, Alexander, and Patrick Paroubek. "Twitter as a corpus for sentiment analysis and opinion mining." In *LREc*, vol. 10, no. 2010, pp. 1320-1326. 2010.

[4] Agarwal, Apoorv, Boyi Xie, Ilia Vovsha, Owen Rambow, and Rebecca J. Passonneau. "Sentiment analysis of twitter data." In *Proceedings of the workshop on language in social media (LSM 2011)*, pp. 30-38. 2011.

[5] Saif, Hassan, Yulan He, and Harith Alani. "Semantic sentiment analysis of twitter." In *International semantic web conference*, pp. 508-524. Springer, Berlin, Heidelberg, 2012.

[6] Shah, Henal, Purav Shah TejasMagar, and Kailas Devadkar. "An Intelligent Music Player Using Sentimental Analysis." *International Journal of Innovative and Emerging Research in Engineering* 2, no. 4 (2015).

[7] Sen, Arnaja, Dhaval Popat, Hardik Shah, Priyanka Kuwor, and Era Johri. "Music playlist generation using facial expression analysis and task extraction." In *Intelligent Communication and Computational Technologies*, pp. 129-139. Springer, Singapore, 2018.

[8] Lin, Diana, and Sampath Jayarathna. "Automated Playlist Generation from Personal Music Libraries." In *2018 IEEE International Conference on Information Reuse and Integration (IRI)*, pp. 217-224. IEEE, 2018.

[9] Madhok, Rishi, Shivali Goel, and Shweta Garg. "SentiMozart: Music Generation based on Emotions." In *ICAART (2)*, pp. 501-506. 2018.

[10] Ferreira, Lucas, and Jim Whitehead. "Learning to Generate Music With Sentiment." In *ISMIR*, pp. 384-390. 2019.