MUSIC RECOMMENDATION SYSTEM USING FACIAL EXPRESSION

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ABSTRACT

Face detection and emotion selection is the one of the current topic in the security field which provides solution to various challenges. Beside traditional challenges in captured facial images under uncontrolled settings such as varying poses, different lighting and expressions for face recognition and different sound frequencies for emotion recognition. For the any face and emotion detection system database is the most important part for the comparison of the face features and sound Mel frequency components. Music is one of the most fruitful media as it can in still deep feelings and marsh listeners with subliminal messages. It skilfully plays with our emotions which in turn influence our mood. Books, movies and television show are a few other means but, in disparity to these, music convey its message in sheer moments. It can aid us when we are feeling low and entrust us. When we listen to sad songs, we tend to feel a downswing in mood. When we listen to happy songs, we feel happier. The sentiment analysis has been explored by several Internet services to endorse contents in line with human emotions, which are expressed through casual texts posted on social network. Music recommendation will mainly work on enhancing user's mood by providing song by detecting the facial expression of the end user and according to its expression it recommend the preferrable song. This paper extract the human expression and suggest the song according to it and if the user accept that song then the song starts to play.

Keyword:- *Clustering, KNN, Machine learning, Recommendation system, Sentiment analysis*

1. INTRODUCTION

Song Recommendation System is used to recommend songs based on factors that have lyrics similarity between songs, lyrics features of songs, metadata of songs using Artificial Neural Network (ANN) and KNN Regression algorithm. Recommendations are also made formed on the same artist.

In this we use sentiment analysis for recommending song to the enjoyer by judging their emotion through the facial expression. For the sake of to discover the correlation between music and the emotion that it may evoke, sentiment have been categorized into many types and pattern recognition procedures have been referred to classify the song [4-5]. Emotions such as pleasure, anger, and sadness have been classified using various emotion models, such as Thayer's model [6], the arousal-valence model [7] Russell's model [8].

Sentiment analysis is starting to be examined in song recommendation systems to suggest a distinct song depending on the psychological state of a person, since the song is totally associated to the current emotion and feelings of the person. There is sentiment analysis research placed on emotional signals [9], [10], subjective emotion estimation [11], tag-based extractions [12], [13], web semantic [14], [15], ML,

such as, Support Vector Machines (SVM) and its derivation [16], and the lexicon-based technique like ANEW [17].

The process of recommending song which is commonly used among users and clustring of data (spotify dataset) is shown the figure (fig.1) given below.

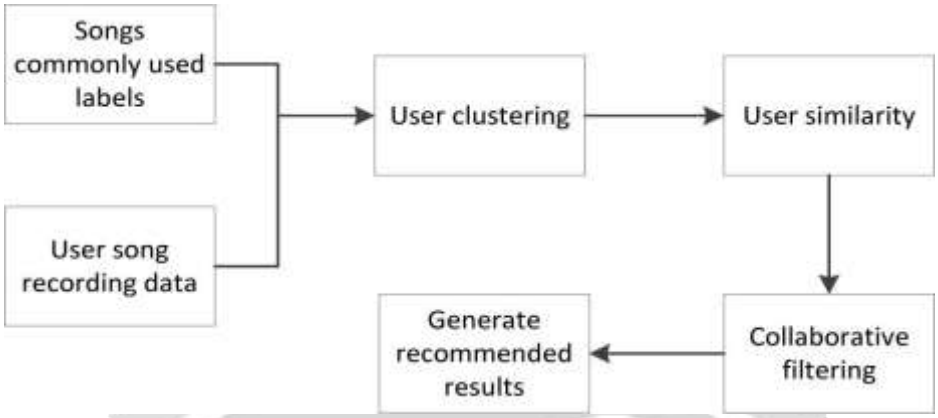

Fig.1- Block diagram of music recommendation system

2. LITERATURE REVIEW

These are the literature survey which is based on different research paper that related to our own project "Music recommendation system using sentiment analysis"-

Author [1] Recommend a music recommendation system, which includes music genre classification, music emotion classification and music similarity query functions. A new tempo feature extraction method is presented and effectively combined with conventional timbre features by AdaBoost algorithm, which significantly improves the accuracy of music classification. Furthermore, an efficient similarity query strategy based on the results of music classification is adopted in our system. The high precision of music classification results in better recall rate and higher query speed than the traditional brute-force searching scheme.

Author [19] Proposed a system 'EmoPlayer', which is an Android based application. It captures an image of the user using camera of his device and detects the face from this image. The application will then identify the emotion from the face detected. In this paper author used approaches like Canny Edge Detection, Viola Jones Algorithm, SVM and so on. In this the simulation has been carried out successfully on multiple Android devices connected to Internet and running on android version 5.0 and above.

Author [20] Proposed system which processes images of frontal and profile face view. Face boundaries have been found using Vertical and horizontal Histogram Analysis. Then, face contour is obtained by thresholding the image with HSV color space values.

Author [22] In this paper "An Efficient Method to Face and Emotion Detection" have detected face from the input image using Viola-Jones face detection algorithm and evaluated the face and emotion detection using K-Nearest Neighbours classifier.

Author [23] Proposed a correlation-coefficient-based approach to find emotional music sequences which may evoke a specific emotion in subjects. The SFFS method is applied to select significant music features from emotional music sequences. The selected features are used to train SVM classifiers for an individual

subject. results show that the proposed method achieves high classification accuracy, and that the recommended music is close to a subject's emotion perception.

Author [24] This paper presents a recommendation system establish on a sentiment intensity metric, named enhanced Sentiment Metric (eSM) that is the corporation of a lexicon-based sentiment metric with a correction factor establish on the enjoyer's profile. Results showed that 78% of end user preferred to listen to a musical genre similar to their current sentimental state, and only 22% preferred to listen to a different musical genre in relation to their current sentimental state.

3. PROBLEM STATEMENT AND SOLUTION

What (The objective of this is to satisfying the users' musical entertainment needs requires taking into account intrinsic, extrinsic, and contextual aspects of the listeners)

Where (the metrics used in the sentiment analysis only classify a sentence with positive, neutral or negative intensity, and do not detect sentiment variations in accordance with the user's profile.)

How (In this arena, this paper presents a music recommendation system based on a sentiment intensity metric, named enhanced Sentiment Metric (eSM) that is the association of a lexicon-based sentiment metric with a correction factor based on the user's profile)

4. WORKING OF PROJECT

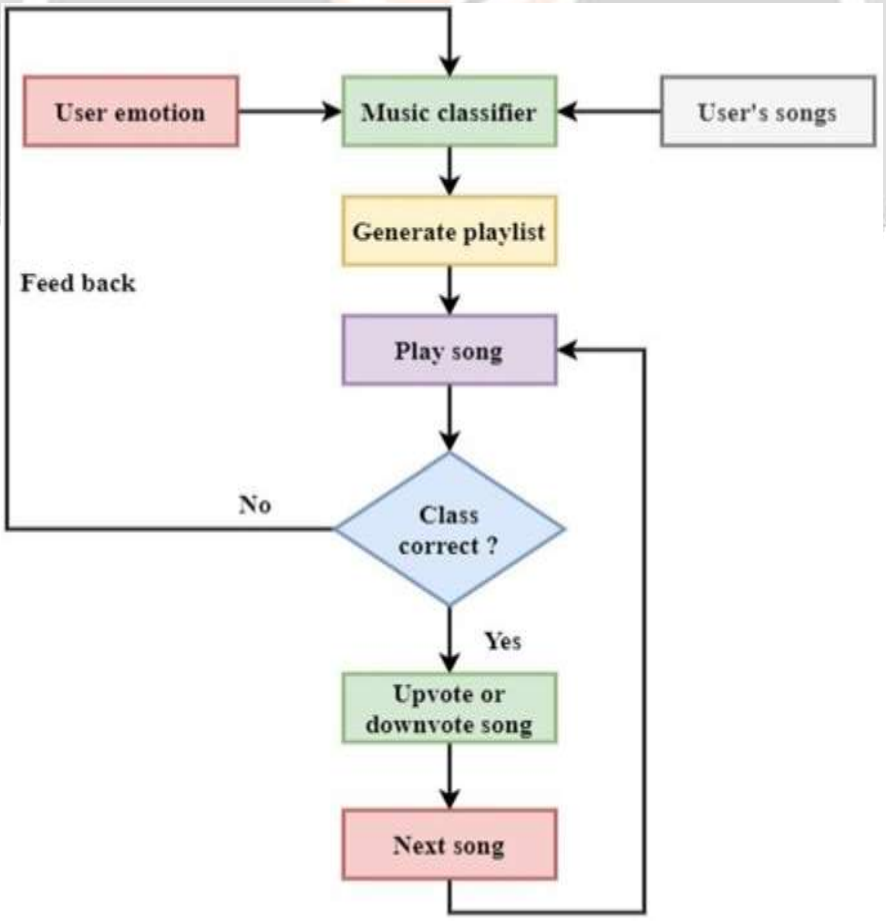

Fig.2- ER diagram of music recommendation system

In our project , the user first come in front of his/her system camera. Then our system detect the face and its

mood using OpenCV(a computer vision technology that helps to locate human faces in digital images. Deals with detecting instances of semantic objects of a certain class in digital images and videos.)

Emotion detected on the basis of facial expression goes into the music classifier KNN(KNN algorithm is used to classify by finding the K nearest matches in training data and then using the label of closest matches to predict. It is a supervised machine learning algorithm i.e. it learns from a labelled training set by taking in the training data X along with it's labels y and learns to map the input X to it's desired output y.)

Then the playlist is generated on the basis of emotion detected from the dataset(Spotify).

Then the song is played. If the emotion and song is correct according to the facial expression, the class is correct or if the class is not correct then it goes to music classifier again.

If the class is correct, the user upvote or downvote the song and then the next song from the playlist is played.

5. PROPOSED MODEL

For this project we use Anaconda Navigator as a platform and Spyder Application on it for run the project. We have used many algoritms and library for our project Following these are:

a. **PYTHON**

b. **KNN**

c. **SUPERVISED LEARNING**

d. **FILTERING APPROACHES**

e. **KERAS**

f. **TENSORFLOW**

g. **OPENCV2**

The main objective of this work is to develop an application for music recommendations. The application allows users to select and listen to the songs available in the device. We have used python with machine learning along with libraries and algorithm. Python supports the Object-Oriented program style or method, encoding the code within objects. The use of KNN allows us to learn a function that can predict if a user will benefit from an item — meaning the user will likely listen to a song. We used K-Nearest Neighbors Algorithm. Whenever a user listens to a particular song, a log is created. In order to suggest songs to the users, we use various strategies to implement recommendation engine. Now Supervised learning algorithms are used when the output is classified or labeled. Traditional music recommendation systems depend on collaborative filtering or content-based filtering to generate recommendations. Hybrid approaches combine the collaborative filtering and content-based filtering together to leverage the strengths and weaknesses of each approach. User modeling aims to develop a better user profile. Context awareness associates users and items in a specific circumstance such as working or dancing. Tag-based recommendation labels items with users opinions. Based on TensorFlow, we built an ML training framework specifically for audio to do feature extraction, model building, training strategy, and online deployment. It leverages many high-level APIs provided by TensorFlow, which is convenient for our algorithm implementation. The main idea was to segregate the emotions into five categories i.e., Happy, sad, anger, neutral and surprised and also provided a highly accurate audio information retrieval approach that extracted relevant information and also OpenCV implements facial recognition algorithms. Recommendation networks introduces some new properties to the recommendation strategies. Playlist generation can be deemed as a variation of top-N recommendations, satisfying the needs specified by users. Group recommendation involves some pre or post processing by either aggregating multiple user preferences into a unit user profile or uniting separate recommendation results into one recommendation list. As recommender systems are machine learning systems which do not follow a specific methodology and are constructed according to the need and the context of application. UML Models generally help in depicting very singular feature of the system for better understanding. Moreover, UML has the object-oriented features best suitable for the current scenario.

6. CONCLUSION

The client's profile were analyzed and the results showed that 68% of enjoyer preferred to listen to a musical category similar to their current emotional state, and only 32% preferred to listen to a different musical category in relation to their present emotional state. Such as, if a person has a state of mood of sadness than this person choose to listen to a more sad song. The solution does not include complex programming languages; therefore, the proposed solution preoccupy low resources from current electronic devices. The add-on evaluated an imperceptible obtrusion regarding the preoccupy resources in the electronic device. The study presents the emotion analysis applied to a song recommendation system; however, sentiment metrics could be put on to many other areas.

7. FUTURE WORK

There are few issue in the current project like that the camera are not able to detect the face in burr or inappropriate lighting difficulty in detecting difference between sad and neutral emotion. So, in future we need to work on that issue. And we also need to improve its recognizing process so that in future it can recognize image more frequently.

8. REFERENCE

[1]. X. Zhu, Y. Y. Shi, H. G. Kim, and K. W. Eom, "An integrated music recommendation system," proceedings of IEEE Transactions on Consumer Electronics, vol. 52, pp. 917-925, 2006.

[2]. B. Shao, M. Ogihara, D. Wang, and T. Li, "Music Recommendation Based on Acoustic Features and User Access Patterns," proceedings of IEEE Transactions on Audio, Speech, and Language Processing, vol. 17, pp. 1602-1611, 2009.

[3]. Lucey, P., Cohn, J. F., Kanade, T., Saragih, J., Ambadar, Z., & Matthews, I. (2010). The Extended Cohn-Kanade Dataset (CK+): A complete expression dataset for action unit and emotion-specified expression. Proceedings of the Third International Workshop on CVPR for Human Communicative Behavior Analysis (CVPR4HB 2010), San Francisco, USA, 94-101.

[4]. Y. H. Yang, Y. C. Lin, Y. F. Su, and H. H. Chen, "A Regression Approach to Music Emotion Recognition," proceedings of IEEE Transactions on Audio, Speech, and Language Processing, vol. 16, pp. 448-457, 2008.

[5]. L. Lie, D. Liu, and H. J. Zhang, "Automatic mood detection and tracking of music audio signals," proceedings of IEEE Transactions on Audio, Speech, and Language Processing, vol. 14, pp. 5-18, 2006.

[6]. R. E. Thayer, The Biopsychology of Mood and Arousal. New York: Oxford University Press, 1989.

[7]. C. E. Osgood, G. J. Suci, and P. H. Tannenbaum, The Measurement of Meaning: University of Illinois Press, 1957.

[8]. J. A. Russell, "A Circumplex Model of Affect," Journal of Personality and Social Psychology, pp. 1161-1178, December 1980.

[9]. J. Healey, R. Picard, and F. Dabek, "A new affect-perceiving interface and its application to personalized music selection," in Proc. Workshop Perceptual User Interfaces, Nara, Japan, pp. 4-6, Nov. 1998.

[10]. S. Koelstra, C. Muhl, M. Soleymani, J. Lee, A. Yazdani, T. Ebrahimi, T. Pun, A. Nijholt, and I. Patras, "DEAP: a database for emotion analysis using physiological signals," IEEE Trans. Affect. Comput., vol. 3, no. 1, pp. 18-31, Jan. 2012.

[11]. K. Yoon, J. Lee, and M.-U. Kim, "Music recommendation system using emotion triggering low-level features," proceedings of IEEE Trans. Consumer Electron., vol. 58, no. 2, pp. 612-618, May 2012.

[12]. C.-M. Chen, M.-F. Tsai, J.-Y. Liu, and Y.-H. Yang, "Using emotional context from article for contextual

music recommendation," in Proc. ACM International Conference on Multimedia, New York, USA, pp. 649-652, Oct. 2013.

[13]. R. Cai, C. Zhang, C. Wang, L. Zhang, and W.-Y. Ma, "MusicSense: contextual music recommendation using emotional allocation modeling," in Proc. International Conference on Multimedia, Augsburg, Germany, pp. 553-556, Sep. 2007.

[14]. A. G. Crespo, R. C. Palacios, J. M. G. Berbís, and F. G. Sánchez, "SOLAR: social link advanced recommendation system", Future Generation Computer Systems, vol. 26, no. 3, pp. 374-380, Mar. 2010.

[15]. Y. B. Fernandez, J. P. Arias, A. G. Solla, M. R. Cabrer, and M. L. Nores, "Providing entertainment by content-based filtering and semantic reasoning in intelligent recommender systems," proceedings of IEEE Trans. Consumer Electron., vol. 54, no. 2, pp. 727-735, May 2008.

[16]. S. Rendle, "Factorization machines with libFM," Proceedings of ACM Trans. Intell. Syst. Technol., vol. 3, no. 3, pp. 1-22, May 2012.

[17]. F. Å. Nielsen, "A new ANEW: evaluation of a word list for sentiment analysis in microblogs," in Proc. Workshop on Making Sense of Microposts: Big Things come in Small Packages, Crete, Greece, pp. 93-98, May 2011.

[18]. Ashleigh Fratesi, "Automated Real Time Emotion Recognition using Facial Expression Analysis", Proceedings of Master of Computer Science thesis, Carleton University.

[19]. Aurobind V. Iyer, Viral Pasad, Karan Prajapati, "Emotion Based Mood Enhancing Music Recommendation" Proceedings of 2017 2nd IEEE International Conference On Recent Trends in Electronics Information & Communication Technology (RTEICT), May 19-20, 2017, India.

[20]. M. Pantic, L. Rothkrantz, "Automatic Analysis of Facial Expressions: The State of the Art", Proceedings of IEEE Transactions On Pattern Analysis and Machine Intelligence, Vol. 22, No. 12, 2000.

[21]. P. Belhumeur, J. Hespanha, and D. Kriegman, "Eigenfaces vs. Fisherfaces: Recognition Using Class Specific Linear Projection," Proceedings of IEEE Transactions on Pattern Analysis and Machine Intelligence. Vol. 19, No. 7, pp. 711-720, 1997.

[22]. Dolly Reney and Dr.Neeta Tripaathi, "An Efficient Method to Face and Emotion Detection", Proceedings of Fifth International Conference on Communication Systems and Network Technologies, 2015.
[23]. Renata L. Rosa, Demóstenes Z. Rodríguez, and Graça Bressan "Music Recommendation System Based on User's Sentiments Extracted from Social Networks".

[24]. Chuan-Yu Chang1*, Chun-Yen Lo1 , Chi-Jane Wang2 and Pau-Choo Chung3" Proceedings of A Music Recommendation System with Consideration of Personal Emotion".

[25]. A. Geetha, V. Ramalingam, S. Palanivel and B. Palaniappan, "Facial Expression Recognition— A Real Time Approach" Proceedings of International Journal of Expert Systems with Applications, Vol. 36, No. 1,2009.