**Emotion-aware Smart Music Recommendation System**

**Shraddha Kale Shamal Vairagar Aishwarya Shinde Vaishnavi Mhaske**

**(2243055) (2243008) (2243052) (2243073)**

Dept. of Information Technology, Vidya Pratishthan's kamalnayan Bajaj Institute of Engineering and Technology, Baramati, India – 413102.

**Abstract**

Human emotions play an important role in recent times. Emotions are based on human emotions that may or may not be expressed. Emotion expresses human behavior which can take different forms. The project aims to extract features from human faces and detect emotions and play music based on the detected emotions. Music plays an important role in improving and elevating one’s mood as it is an essential source of entertainment and motivation to move forward. In this system, emotions are determined using computer vision components through facial expressions and chat-bot interactions. The system suggests a song for the emotion that is recognized. This saves a lot of time for users to select and play songs themselves.

**Keywords** – Emotion Recognition, Emotion Recognition in Conversation (ERC), Music Player, CNN, Facial Expressions, Semantic Analysis.

**Introduction**

Over the years, the percentage of people suffering from stress has increased significantly. Stress can be relieved in many ways. For example, through working out, watching movies, meditating and listening to music. A large body of research suggests that music can help people reduce stress and focus more. If the music does not fit the listener’s current feelings, then listening to the music will not be useful. To reduce stress, one should choose music that has the right mood. Although there are many music player applications, there is no application that can select songs based on the user’s emotions. This paper presents a CNN based approach for music recommendation by examining multi model emotional information captured by the user’s facial activities, thus sharpening the system’s judgment on emotions recognized in real-time. Then, it suggests songs whose moods correspond to that user’s mood. User and song emotions are divided into different categories like neutral, happy, sad and angry.

**Motivation**

Nowadays, music platforms provide easy access to a large amount of music. Recommendation systems gain more and more popularity and help people choose the right music for all occasions. Music has a great influence on humans and is widely used for relaxation, mood regulation, relief from stress and disease, and maintenance of mental and physical function. It is important to maintain energy, vitality, vitality and brain freshness and focus for the productivity of intellectual work and study. Music improves concentration during studies, while others highlight that music helps them calm their minds and prevent insomnia. This music recommendation system is driven by listeners’ feelings, emotions, and activity contexts. With a combination of artificial intelligence technology and generalized music therapy methods, the recommendation system is targeted to help people choose music for various life situations and maintain their mental and physical well-being.

**Literature Survey**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| Sr. No. | Paper Name | Author Name | Technology Used | Architecture | Pros | Cons | Future Scope |
| 1) | [C:\Users\DELL\Desktop\Project BE\Emotion Based Music Player(Research paper 1).pdf](file:///C:\Users\DELL\Desktop\Project%20BE\Emotion%20Based%20Music%20Player(Research%20paper%201).pdf) | Krittrin Chankuptarat | Face Detection API, Heart Rate Detection | [C:\Users\DELL\Desktop\Project BE\Architecture\Emotion-Based Music Player.png](file:///C:\Users\DELL\Desktop\Project%20BE\Architecture\Emotion-Based%20Music%20Player.png) | Music Player able to suggest songs according to user emotions.  This paper has 2 kind of classification methods that is Heart Rate based and Facial image based. | An arbitrary environment greatly affects the accuracy of heart rate detection. | This application can be improved by exploring more techniques and expanding the song database to support more users’ interest. |
| 2) | [C:\Users\DELL\Desktop\Project BE\An Efficient Real-Time Emotion Detection Using Camera and Facial Landmark(Research paper 2).pdf](file:///C:\Users\DELL\Desktop\Project%20BE\An%20Efficient%20Real-Time%20Emotion%20Detection%20Using%20Camera%20and%20Facial%20Landmark(Research%20paper%202).pdf) | Binh T. Nguyen,  Minh H. Trinh, Tan V. Phan and Hien D. Nguyen | Facial Features, SVM | [C:\Users\DELL\Desktop\Project BE\Architecture\An Efficient Real-Time Emotion Detection Using.png](file:///C:\Users\DELL\Desktop\Project%20BE\Architecture\An%20Efficient%20Real-Time%20Emotion%20Detection%20Using.png) | Extract Corresponding  Facial landmark and Achieve a very good performance in speed and accuracy. | In this system they consider only three types of emotions including negative, empty and positive emotions. | We will generalize our approach to other types of emotions. |
| 3) | [C:\Users\DELL\Desktop\Project BE\Geometric Approach For Human Emotion Recognition Using Facial Expression(Research paper 3).pdf](file:///C:\Users\DELL\Desktop\Project%20BE\Geometric%20Approach%20For%20Human%20Emotion%20Recognition%20Using%20Facial%20Expression(Research%20paper%203).pdf) | S. S. Bavkar,  J. S. Rangole,  V. U. Deshmukh | Geometric Method, Anthropometric model, SVM, RBFNN and LK Tracker | [C:\Users\DELL\Desktop\Project BE\Architecture\Geometric Approach for Human Emotion Recognition using Facial Expression.png](file:///C:\Users\DELL\Desktop\Project%20BE\Architecture\Geometric%20Approach%20for%20Human%20Emotion%20Recognition%20using%20Facial%20Expression.png) | SVM and RSFNN used as classifier.  Average Recognition rate is 91%. | The proposed combination method for feature extraction does not correctly extract the feature parameters if there is hair on the face. | Developing a hybrid approach for facial feature extraction and recognition accuracy can be further improved using NN approaches and hybrid approaches such as ANFIS. |
| 4) | [C:\Users\DELL\Desktop\Project BE\Music Mood Detection Based on Audio and Lyrics with Deep Neural Net(Research Paper 4).pdf](file:///C:\Users\DELL\Desktop\Project%20BE\Music%20Mood%20Detection%20Based%20on%20Audio%20and%20Lyrics%20with%20Deep%20Neural%20Net(Research%20Paper%204).pdf) | Remi Delbouys,  Romain Hennequin,  Francesco Piccoli,  Jimena Royo-Letelier | Support Vector Machine (SVM) | [C:\Users\DELL\Desktop\Project BE\Architecture\Music Mood Detection Based on Audio and Lyrics with Deep Neural Net.png](file:///C:\Users\DELL\Desktop\Project%20BE\Architecture\Music%20Mood%20Detection%20Based%20on%20Audio%20and%20Lyrics%20with%20Deep%20Neural%20Net.png) | Deep Learning Based models achieve better results than classical approaches on arousal detection. |  | Rely on a database with labels indicating the degree of ambiguity of the mood of a track. |
| 5) | [C:\Users\DELL\Desktop\Project BE\Multi Model Emotion Recognition on IEMOCAP Dataset using Deep Learning(Research paper 5).pdf](file:///C:\Users\DELL\Desktop\Project%20BE\Multi%20Model%20Emotion%20Recognition%20on%20IEMOCAP%20Dataset%20using%20Deep%20Learning(Research%20paper%205).pdf) | Samarth Tripathi,  Homayoon Beigi | Deep Learning | [C:\Users\DELL\Desktop\Project BE\Multi Model Emotion Recognition on IEMOCAP Dataset using Deep Learning(Research paper 5).pdf](file:///C:\Users\DELL\Desktop\Project%20BE\Multi%20Model%20Emotion%20Recognition%20on%20IEMOCAP%20Dataset%20using%20Deep%20Learning(Research%20paper%205).pdf) | Multiple modes of data offered by IEMOCAP for more robust and accurate emotion detection. |  | We could use transfer learning from ASR model and fine tune for emotion detection. |

**Conclusion**

In this project, we presented a music recommendation system based on emotion detection. The system uses a two-layer convolution network model to recognize facial emotions. The model classifies 7 different facial emotions from the image dataset. The model has comparable training accuracy and validation accuracy indicating that the model is the best fit and generalizes to the data. We also recognize room for improvement. It would be interesting to analyze how the system works when additional emotions are taken into account .User preferences can be collected to improve the overall system using collaborative filtering. We plan to address these issues in future work.

**References**

[1] Emanuel I. Andelin and Alina S. Rusu,” Investigation of facial microexpressions of emotions in psychopathy - a case study of an individual in detention”, 2015, Published by Elsevier Ltd

[2] Paul Ekman, Wallace V Friesen, and Phoebe Ellsworth. Emotion in the human face: Guidelines for research and an integration of findings. Elsevier 2013.

[3] F. De la Torre and J. F. Cohn, “Facial expression analysis,” Vis. Anal .Hum, pp. 377–410, 2011.

[4] Bavkar, Sandeep, Rangole, Jyoti, Deshmukh,” Geometric Approach for Human Emotion Recognition using Facial Expression”, International Journal of Computer Applications, 2015.

[5] Zhang, Z. Feature-based facial expression recognition: Sensitivity analysis and experiments with a multilayer perceptron. International Journal of Patten Recognition and Artificial Intelligence.

[6] Krittrin Chankuptarat, etal, “Emotion Based Music Player”, IEEE 2019 conference

[7] Tripathi, S., Beigi, H.: Multi-Modal Emotion recognition on IEMOCAP Dataset using Deep Learning. In: arXiv:1804.05788 (2018).

[8] Teng et al.,”Recognition of Emotion with SVMs”, Lecture Notes in Computer Science, August 2006.

[9] B.T. Nguyen, M.H. Trinh, T.V. Phan, H.D. Nguyen An efficient realtime emotion detection using camera and facial landmarks , 2017 seventh international conference on information science and technology (ICIST) (2017)