International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Music Recognition Using Facial Expressions

Dr. N. Moganarangan[1], Mrs. S. Subasree[2], Abhishek Singh Chauhan[3], Karthik Govindaraj A[4], Vignesh Rajan S[5]

[1]Professor, Computer Science and Engineering, Sri Manakula Vinayagar Engineering College, Madagadipet – 605107, Madagadipet-605107, Puducherry, India
[2]Assistant Professor, Computer Science and Engineering, Sri Manakula Vinayagar Engineering College, Madagadipet – 605107, Madagadipet-605107, Puducherry, India
[3,4,5]Computer Science and Engineering, Sri Manakula Vinayagar Engineering College, Madagadipet-605107, Puducherry, India

Abstract:

In daily communication, the identification of fundamental emotions involves interpretating different visual and auditory aspects. The ability to identify emotions is not clearly determined as their presentation is generally very short (micro expressions), whereas identifying itself does not have to be a conscious process. Humans presumptively chose to recognize emotions expressed through music rather than those expressed through facial expressions. We carried out a study with many elementary school pupils and many high school students in order to compare the success rate in recognizing emotions portrayed as facial expressions or in classical music works. Participants were to match eight faces in images representing various emotions with eight classical music compositions representing the same eight feelings. Compared to recognizing emotional facial expressions, the ability to identify emotions portrayed through classical music compositions was noticeably less successful. Girls performed better than boys in the ability to identify facial emotions, with high school students dramatically outperforming primary school pupils in this area.Higher arithmetic grades were related to the success rate in identifying emotions from musical pieces. Because reading facial expressions is one of the first forms of communication in human culture, basic emotions are far easier to discern when portrayed on human faces rather than in music. The need for females to communicate with neonates throughout their early development led to the selection of their advantage in emotion perception. There are certainly some general cognitive abilities like motivation, concentration, and memory that math competency and the ability to recognize the emotional content of music share. Facial expressions and music are processed in the brain in distinct ways, and as a result, they are likely assessed differently as emotional cues.

1. INTRODUCTION

In all human civilizations, facial expressions are a crucial cue that are frequently used in social interactions. 1. Basic emotions including happiness, sadness, fear, contempt, surprise, and wrath are specifically expressed by very brief facial muscle contractions that last from a few dozens of milliseconds to a few seconds. 2. Two distinct pathways—voluntary extrapyramidal connections and/or voluntary pyramidal connections—are used to control the facial muscles. The likelihood is that both circuits are amenable to mirror neurons and lifelong training3-6. Each emotional expression has an involuntary component that gives it a distinctive stamp that can be seen by experienced observers7,8. A

social intelligence includes the capacity for emotion recognition and receptivity to other people's feelings.In right-handed people, it is mainly lateralized to the right hemisphere and is dissociated from facial identity deduction13. Although though only a small percentage of people are expert at reading emotions from facial expressions14,15 and cheating decoding, this ability is a crucial one for learning what others' intentions are16. Those who have survived strokes or other traumatic events that might drastically affect their prior function17,18 demonstrate how helpful it is. Modern imaging methods have provided a new perspective on how to comprehend people's emotions19.Recent research using imaging and post-lesion recording on disgust, anger, and fear revealed that these emotions differ significantly from one another in the distribution of neural activity. Disgust is associated with activation of the insula/operculum and globus pallidus, anger with the lateral orbitofrontal cortex, and fear with the amygdalae20,21. Although surprise has a similar facial expression in both positive and negative unexpected outcomes, its brain underpinnings are rather debatable and intermingled with those of other emotions, particularly fear24. Only one patient with a singular deficiency in surprise recognition had amygdalae lesions that extended towards a parahippocampal gyrus25. Imaging investigations of emotions further show that, in contrast to the earlier findings, the brain activity is diffuse rather than lateralized to one hemisphere19. In this way, social evolution has chosen and honed a variety of brain systems that are used in both the generation and recognition of a certain emotional expression on the face.

The philosopher Aristoxenus26 is credited with introducing the notion that humans judge music primarily based on the emotional responses it elicits in its audience in the fourth century B.C. Steven Pinker believes that music is an evolutionary result of the adaption for human language28, while Leonard Meyer believes that it is a type of emotional communication27. According to different modes of perception, such as melody and rhythm, tonality, synchrony, and perception of distinct tones, listening to music causes activity in numerous brain regions26. The topic of whether or whether music can evoke emotions, however, remains unanswered scientifically since we are unsure of how to distinguish and assess the extensive activity shown in imaging techniques during engaged listening to music29. On the other hand, evidence suggests that basic emotions in music are universally recognized across cultures30,31 and that evidence also supports evidence of impairment following accidental damage or surgical excision32,33.

According to different modes of perception, such as melody and rhythm, tonality, synchrony, and perception of distinct tones, listening to music causes activity in numerous brain regions26. The topic of whether or whether music can evoke emotions, however, remains unanswered scientifically since we are unsure of how to distinguish and assess the extensive activity shown in imaging techniques during engaged listening to music29. On the other hand, evidence suggests that basic emotions in music are universally recognized across cultures30,31 and that evidence also supports evidence of impairment following accidental damage or surgical excision32,33. Higher math scores may be related to a better comprehension of the emotional component of music, which is why musical training is advantageous for mathematical learning35.

2. RELATED WORK

1. Paper Name: An Emotional Symbolic Music Generation System based on LSTM Networks

Author: Kun Zhao, Siqi Li, Juanjuan Cai, Hui Wang, Jingling Wang

Description: Artificial Neural Networks have been applied in the task of algorithmic music creation and have produced noteworthy outcomes as a result of the advancement of AI technology in recent years. Although there are few attempts at intelligent music composition in the arena of communicating various emotions, music is strongly linked to human emotion. In this work, polyphonic music is produced using biaxial LSTM networks, and the architecture is additionally improved by incorporating the look-back concept. Above all, we create a brand-new framework for creating emotional music with a set of controllable parameters for the four fundamental emotions, which are separated by Russell's 2-demonsion valence-arousal (VA) emotional space. A human listening test demonstrates that the different affects represented by the generated emotional samples can be distinguished accurately in the majority of cases, and the evaluation indices of the music created by this model are closer to those of genuine music[1].

2. Paper Name: Algorithmic Music Composition Based on Artificial Intelligence: A Survey

Author: Omar Lopez-Rincon, Oleg Starostenko, Gerardo Ayala-San Martín

Description: Here present a taxonomy of the Artificial Intelligence (AI) methods currently applied for algorithmic music composition. Algorithmic music composition is the area which concerns about research on processes of composing music pieces automatically by a computer system. The use of Artificial intelligence for algorithmic music includes application of AI methods as the main tool for the composition of music. There exist various models of AI used in music composition. They are as follows: generative models, heuristics in evolutionary algorithms, neural networks, stochastic methods, agents, decision trees, declarative programming and grammatical representation. This survey aims to present the trending techniques for automatic music composition[2].

3. Paper Name: Emotion Based Music Player Using Facial Recognition

Author: Prof. Vijaykumar R. Ghule, Abhijeet B. Benke, Shubham S. Jadhav, Swapnil A. Joshi

Description: The face is an essential component of the human body, and it is particularly helpful in determining someone's temperament. It is now possible to directly use a camera to extract the necessary input from each individual face. Thereafter, this information will be applied in a variety of ways. The information from this input can be used, among other things, to examine a person's temperament. A list of songs that fit the "temperament" derived from the input given before can then be obtained using this data. This helps create a decent playlist based on a user's emotional attributes and eliminates the time-consuming and laborious effort of manually classifying or dividing songs into distinct groups. For automating the playlist generation process, various algorithms have been created and put forward. Facial Expression Based Music Tune aims to scan and interpret the data before constructing a playlist in accordance with the given specifications. For the purpose of generating a list of songs in a similar genre or with a similar sound, the scanning and interpreting process also includes the extraction and classification of audio features. Human emotions are crucial for mutual understanding and sharing of sentiments and goals. Verbal and facial expressions serve as vehicles for the emotions. This essay primarily focuses on the approaches available for identifying human emotions in order to create music

composed around those emotions. These approaches will then be used to develop a music player that can not only recognize facial expressions but also create custom musical compositions for each user. Here, we use CNN and Viola Jones to record facial features and identify emotions. The purpose of the paper is to describe the system's operation as well as playlist development based on emotion classification. The application is designed in such a way that it can control the content that users access, evaluate image properties, and ascertain a user's temperament, which will be used to identify mp3 file properties and add them to emotion-based play lists in accordance with the temperament [3].

4. Paper Name: An Accurate Algorithm for Generating a Music Playlist based on Facial Expressions

Author: AnukritiDureha

Description: It takes a lot of time and effort to manually group songs on a playlist and annotate them according to the user's emotional condition at the moment. This procedure has been automated using a variety of algorithms. However, the current algorithms are inefficient, use more hardware (such as EEG devices and sensors), which raises the system's overall cost, and are less accurate. In order to save the time and labor required to complete the procedure manually, this paper offers an algorithm that automates the creation of an audio playlist based on a user's facial expressions. The algorithm put forward in this research aims to cut down on both the system's total cost and calculation time. It also seeks to improve the proposed system's accuracy. The proposed algorithm's facial expression recognition module is tested against user-dependent and user-independent datasets to ensure its accuracy. The findings of the experiment show that user-dependent results are 100% accurate. Although user independent outcomes for happiness and surprise are 100%, they are 84.3%, 80%, and 66%, respectively, for sadness, rage, and fear. The emotion identification algorithm's accuracy for user-independent dataset is 86%. The recognition rates for joy and anger in audio are 95.4% and 90%, respectively, while 100% accuracy is provided for sadness, sad-anger, and joy-anger. The algorithm for recognizing auditory emotions is 98% effective overall. The proposed method is put into practice and tested using a built-in camera. As a result, the suggested approach successfully lowers the system's overall cost. Additionally, the suggested system creates a playlist based on facial expressions at an average time of 1.10 seconds. As a result, it outperforms previous algorithms in the literature in terms of computational performance [4].

5. Paper Name: An AI Based Intelligent Music Composing Algorithm: Concord

Author: Saurabh Malgaonkar, Yudhajit Biswajit Nag, Rohit Devadiga and TejasHirave

Description: Music composing is automated by this algorithm. The major goal while creating incredible music is to make it impossible for the listener to tell if the piece was created by a machine or a real artist. The primary goal of human intelligence is expressed through art, which deals with ideas and emotions at a more granular level. Music is one of the most highly regarded art forms, and it is a rare accomplishment to have a computer make a competent musical composition. The system composes music using a fully automated computational approach. It will require some basic musical understanding, such as scale and chord structures. It will play it after choosing the appropriate/valid notes [5].

3. METHODOLOGY

• **Emotion Extraction Module** -A camera or webcam is used to capture the user's image. In order to increase the effectiveness of the classifier used to identify the face present in the picture after it has been taken, the frame of the webcam feed image that has been captured is transformed to a grayscale image. After conversion, the image is transmitted to the classifier algorithm, which uses feature extraction methods to pull the face out of the web camera feed's frame. Individual features are taken from the extracted face and provided to the trained network to help it identify the user's expressed emotions. These images will be used to train the classifier so that, when a brand-new, unknowable set of images is presented to it, it will be able to extract the position of facial landmarks from those images using the knowledge it had already learned from the training set and return the coordinates of the new facial landmarks that it detected. The vast data set of CK is used to train the network. This is used to determine the user's expressed emotion.

• **Audio Extraction Module** - The user can choose any song from a selection of songs based on the emotion once the emotion of the user has been extracted and the music or audio based on the emotion stated by the user has been displayed to the user. The songs are presented in that order based on how frequently the user would listen to them. Web development tools including PHP, MySQL, HTML, CSS, and JavaScript were used to create this module.

• **Emotion - Audio Integration Module** - On a web page created with PHP and MySQL, the music based on the emotions that were extracted from the songs are shown. For instance, the user gets shown music from the cheerful database if the emotion or facial trait is classified as happy.

4. CONCLUSION AND FUTUREWORK

This study proposes an algorithm that creates musical melodies based on face emotions. According to experimental findings, the suggested algorithm was successful in automating the creation of music tunes based on facial emotions, which reduced the time and labor required to do the activity manually. The usage of a laptop or camera made it unnecessary to employ any additional technology, such as EEG equipment and sensors, which reduced the associated costs. Due to the fact that face emotion detection is not performed in real time, the algorithm's total processing time includes both the time it takes to recognize facial expressions and the time it takes to query the meta data file. As a result, the suggested method outperforms algorithms described in the current literature in terms of computational performance. Additionally, because it only needs 0.0008 seconds to query the Meta data file, the algorithm's overall processing time is proportionate to the time needed to recognize facial emotions. Viola Jones Algorithm accurately identify the user's face. The convolutional neural network then receives this as input, and this produces emotions.

5. REFERENCES

1. Pawar DV and Londhe RR Statistical analysis of facial expression and recognition from 2012 Journal of Soft Computing and Engineering International 2
2. Emotion-based music player developed by Kabani H, Khan S, Khan O, and Tadvi in 2015. The third issue of the International Journal of Engineering Research and General Science is 750–76

3. Emotions Based Music Player-XBeats International Journal of Advanced Engineering Research and Science 3 236854 by Gupta A, Nagarayanan A, and Krishna M
4. [4] Learning individual specific facial dynamics for face identification from videos: Hadid A, Pietikäinen M, and Li SZ 2007 International Symposium on Face and Gesture Analysis and Modeling, pp. 1–15 Heidelberg Berlin Springer
5. Huang TS 2008; Zeng Z, Pantic M, Roisman GI, An analysis of affect recognition techniques spontaneous, auditory, and visual manifestations 31 39–58 IEEE Transactions on Pattern Analysis and Machine Intelligence
6. Yadav S, Patel AR, Vollal A, Kadam PB, Samant RM, and Yadav S (2016) Int. J. Comput. Appl. 141 0975-8887 describes MoodyPlayer as a mood-based music player.
7. Improved Music Player with Integrated Facial Recognition Mechanism: ParulTambe, Yash Bagadia, Taher Khalil, and Noor UlAin Shaikh International Journal of Advanced Research in Computer Science and Software Engineering 5
8. The 2010 study by Lucey P, Cohn JF, Kanade T, Saragih J, Ambadar Z, and Matthews I The cohnkanade extended dataset (ck+) an entire set of action unit and emotion-specific expressions Workshops 94–101 from the 2010 IEEEE Computer Society Conference on Computer Vision and Pattern Recognition IEEE
9. Complete database for facial expression analysis was described in Kanade T, Cohn JF, and Tian Y 2000 InProceedings Fourth IEEE International Conference on Automated Face and Gesture Recognition 46–53. IEEE
10. Liu HY, Luoh L, and Huang CC 2010's year for emotion identification via image processing International Conference on System Science and Engineering in 2010 IEEE, pages 491-494
11. In their 2017 study, Vivek JD, Gokilavani A, Kavitha S, Lakshmanan S, and Karthik S 2017 International Conference on Innovations in Information, Embedded and Communication Systems, 1–5, A revolutionary emotion recognition-based mind and soul-relaxing technology. IEEE
12. [12] Kanwal Garg and Jyoti Rani 2014 International Journal of Advanced Research in Computer Science and Software Engineering 4 article titled "Emotion Detection Using Facial Expressions A Review"
13. Joshi A. and R. Kaur, "A Study of Speech Emotion Recognition Methods," International Journal of Computer Science and Mobile Computing, 2, 28–31.
14. 2017 Shoaib, Hussain, Mirza, and Tayyab A thorough overview of the research on the use of information and cutting-edge technology in the rehabilitation of children with autism 2017 IEEE 1-10 17th International Conference on Computational Science and Its Applications
15. Automated emotion recognition using facial expression: a review, Dubey M. and Singh L. 2016, IRJET 3 488–92 International Research Journal of Engineering and Technology
16. Real-time intention recognition, Anwar S, Milanova M, Bigazzi A, Bocchi L, and Guazzini A 2016, The IEEE Industrial Electronics Society's 42nd Annual Conference (IECON 2016) was held from 1021 to 1024.
17. International Journal of Advanced Research in Artificial Intelligence, Volume 4, Issue 4, Pages 20–7, Rázuri JG, Sundgren D, Rahmani R, Moran A, Bonet I, and Larsson A (2015) Speech emotion identification in emotional feedbackfor human-robot interaction
18. 2014 for Dureha a reliable facial expression-based music playlist generation algorithm 100, 33-9, International Journal of Computer Applications

19. Emotions Based Music Player-XBeats International Journal of Advanced Engineering Research and Science 3 236854 by Gupta A, Nagarayanan A, and Krishna M
20. ninavin, A. habibzad, and Mir Kamal Mirnia a novel particle swarm optimization technique for classifying facial expressions based on features of the lips and eyes The 2012 edition of the conference is titled "Computer Modeling and Simulation."
21. Emotion Based Music System by Rabashette MD, Tale MR, Hinge MA, Padale MK, Chavan MR, and Deshmukh N
22. P. Lucey, J. F. Cohn, T. Kanade, J. Saragih, Z. Ambadar, and I. Matthews 2010 The cohnkanade extended dataset (ck+) an entire set of action unit and emotion-specific expressions Workshops 94–101 from the 2010 IEEEE Computer Society Conference on Computer Vision and Pattern Recognition IEEE
23. EEG signal analysis for BCI interface: A review by Vaid S, Singh P, and Kaur 2015 will see the fifth international conference on cutting-edge communication and computing technologies. 143-147 IEEE
24. Design of a video feedback by Liu C, Xie S, Xie X, Duan X, Wang W, and Obermayer K (2018) Based on an enhanced MUSIC approach, the SSVEP-BCI system for vehicle control The 2018 BCI 1-4 6th International Conference will be held. IEEE
25. 2018 IOP Conf. Ser.: Mater. Sci. Eng. 402 012182 by Uma M and Sheela T
26. Customized GUI for Differently Abled Intelligent Automation & Soft Computing 29: Uma M. and Sheela T. 2017 Analysis of Collaboration Brain Computer Interface (BCI) based