

Feeling based Music Recommendation System using Sensors

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Abstract: Music decision of a client isn't just reliant to the verifiable inclinations or music substance yet in addition subject to the state of mind of that client. This paper proposes a feeling based music suggestion system that takes in the feeling of a client from the signs got by means of wearable physiological sensors. Specifically, the feeling of a client is more tasteful by a wearable figuring gadget which is incorporated with a galvanic skin reaction (GSR) and photograph plethysmography (PPG) physiological sensors (OR) Force sensor. This feeling data is feed to any community oriented or content based suggestion motor as a valuable information. Along these lines, existing proposal motor exhibitions can be expanded utilizing this information. Our proposed System is feeling acknowledgment issue is considered as excitement and valence forecast from multichannel physiological signs. Play the songs automatically depends upon our user Mood.

Keywords: Music, Emotion based, Wearable sensors, GSR, PPG.

1. Introduction

Fast advancement of cell phones and web has made workable for us to get to various music assets openly. The quantity of tunes accessible surpasses the listening limit of single person. Individuals now and then feel hard to look over a large number of tunes. In addition, music specialist co-ops require a productive method to oversee tunes and help their costumers to find music by giving quality suggestion. Consequently, there is a solid need of a decent proposal framework. In this venture, we have composed, actualized and investigated a tune suggestion framework. We utilized Million Song Dataset given by Kaggle to discover relationships amongst clients and tunes and to gain from the past listening history of clients to give proposals to melodies which clients would like to listen most in future. Because of memory and handling power impediments, we could just explore different avenues regarding a small amount of entire accessible dataset. We have executed different calculations, for example, notoriety based model, memory based shared separating, and SVD (Singular Value decay) in view of idle factors and substance based model utilizing k-NN. Memory based community oriented sifting calculation gave most extreme mean normal accuracy. We trust that substance based model would have worked better on the off chance that we would have enough memory and computational capacity to utilize the entire accessible metadata and dataset. Music is one

of the best relaxations for humans. Music acts as a good company for humans during any kind of emotions. The existing music player system needs the involvement of humans to play the songs according to their interest. An individual in satisfaction dislikes hearing dismal tunes but rather if the music player isn't educated to consequently play music as indicated by audience's state of mind. Emotion of a user is classier by a wearable computing device which is integrated with a galvanic skin response (GSR) and photo plethysmography (PPG) physiological sensors (OR) Force sensor. This emotion information is feed to any collaborative or content based recommendation engine as a supplementary data. Our proposed methodology feeling acknowledgment issue is considered as excitement and valence forecast from multi-channel physiological signs. Play the songs automatically depends upon our user Mood.

In this task, we have planned and executed a melody suggestion based framework. We utilized certain melody list gave to discover connections amongst clients and tunes to learn through their vibrations to give proposals to tunes which clients would want to listen most. Because of memory and preparing power constraints, we could just explore different avenues regarding a small amount of accessible melodies. We have executed different calculations, for example, prevalence based model, and memory based shared separating. Memory based community separating calculation gave most extreme mean normal accuracy. The usage of force sensor reads the value for specific user and converts it into the electrical signal vibrations, which would analyze the force and suggest the songs based on the user interest. Thus Listener's action for playing song is eradicated. Music player is automated to play songs according to the listener's mood.

2. Related work

- Rosalind W. Picard, Senior Member, IEEE, Elias Vyzas, and Jennifer Healey, 2001. The capacity to perceive feeling is one of the signs of enthusiastic knowledge, a part of human insight that has been contended to be considerably more vital than numerical and verbal insights. This paper recommends that machine knowledge needs to incorporate enthusiastic insight and shows results toward this

objective: building up a machine's capacity to perceive human full of feeling state given four physiological signs. We depict troublesome issues remarkable to getting dependable full of feeling information and gather an extensive arrangement of information from a subject endeavoring to evoke and encounter every one of eight passionate states, day by day, over different weeks. This paper displays and thinks about different calculations for highlight based acknowledgment of passionate state from this information. We examine four physiological signs that display risky everyday varieties: The highlights of various feelings around the same time will in general bunch more firmly than do the highlights of a similar feeling on various days. To deal with the everyday varieties, we propose new highlights and calculations and look at their execution. We find that the strategy of seeding a Fisher Projection with the aftereffects of Sequential Floating Forward Search enhances the execution of the Fisher Projection and gives the most noteworthy acknowledgment rates answered to date for arrangement of effect from physiology: 81 percent acknowledgment precision on eight classes of feeling, including nonpartisan.

- Il-hyung Shin, Jaepyeong Cha, Student Member, Gyeong Woo Cheon, Student Member, Choonghee Lee, Seung Yup Lee, Hyung-Jin Yoon and Hee Chan Kim, 2014. This paper introduces a programmed pressure assuaging music suggestion framework (ASMRS) for individual music audience members. The ASMRS utilizes a convenient, remote photograph plethysmography module with a fingertype sensor, and a program that interprets heartbeat signals from the sensor to the pressure record. The sympathovagal balance record (SVI) was determined from pulse fluctuation to survey the client's feelings of anxiety while tuning in to music. Twenty-two sound volunteers took an interest in the trial. The outcomes have demonstrated that the members' SVI esteems are very associated with their prespecified music inclinations. The affectability and explicitness of the good music arrangement additionally enhanced as the quantity of music reiterations expanded to multiple times. In light of the SVI esteems, the framework naturally prescribes great music records to mitigate worry for people.
- Hao Liu, Jun Hu, Matthias Rauterberg, 2009. We present another client heartbeat and inclination mindful music suggestion framework. The framework cannot just prescribe a music playlist dependent on the client's music inclination yet in addition the music playlist is produced dependent on the client's pulse. On the off chance that the client's pulse is higher than the ordinary heartbeat which is 60-100 pulsates every

minutes (over the age of 18) or 70/100 thumps for each minutes (age 6-18), the framework produces a client favored music playlist utilizing Markov choice procedure to exchange the client's pulse back to the typical range with the base time cost; if the client's pulse is typical, the framework creates a client favored music playlist to keep the client's pulse inside the typical range; If the client's pulse is lower than the ordinary heartbeat, the framework produces a client favored music playlist utilizing Markov choice procedure to inspire the client's pulse back to the ordinary range with the base time cost.

- Kyoungro Yoon, Senior Member, Jonghyung Lee, and Min-Uk Kim, 2012. As of late, numerous investigates of demonstrating or estimating human inclination have been led to comprehend human feelings. In any case, inquiries about on music-related human feelings have much trouble because of the abstract view of feelings. We chose lowlevel melodic highlights which may trigger human feelings, in view of TV music program's gathering of people rating data and the relating music. In this program, gathering of people was asked for to rate music of the hopefuls and to choose their favored music dependent on their passionate emotions. Likewise, we actualized customized music proposal framework utilizing chosen highlights, setting data and listening history. In the trial results, we affirmed that chose highlights can be dependable highlights when these highlights are utilized in music proposal frameworks.
- Renata L. Rosa, Demóstenes Z. Rodríguez, and Graça Bressan, 2015. The opinion investigation has been investigated by a few Internet administrations to prescribe substance as per human feelings, which are communicated through casual writings posted on informal organizations. Be that as it may, the measurements utilized in the feeling investigation just arrange a sentence with positive, impartial or negative force, and don't identify estimation varieties as per the client's profile. In this field, this paper shows a music proposal framework dependent on a supposition power metric, named improved Sentiment Metric (eSM) that is the relationship of a vocabulary based opinion metric with an adjustment factor dependent on the client's profile. This redress factor is found by methods for abstract tests, led in a lab domain. In view of the exploratory outcomes, the amendment factor is defined and used to alter the last opinion force. The clients' conclusions are extricated from sentences posted on informal organizations and the music proposal framework is performed through a system of low multifaceted nature for cell phones, which recommends melodies dependent on the present client's notion power. Additionally, the structure was

manufactured thinking about ergonomic criteria of ease of use. The execution of the proposed structure is assessed with remote clients utilizing the publicly supporting technique, achieving a rating of 91% of client fulfillment, beating an arbitrarily allocated melody recommendation that achieved 65% of client fulfillment. Besides, the paper introduces low seen effects on the examination of vitality utilization, system and idleness as per the handling and memory impression of the proposal framework, appearing for the buyer electronic world.

- Dana Lahat, Tu'lay Adali, and Christian Jutten, 2015. The data about a similar wonder can be gained from various kinds of locators, at various conditions, in numerous trials or subjects, among others. We utilize the term "methodology" for each such procurement structure. Because of the rich qualities of regular marvels, it is uncommon that a solitary methodology gives finish learning of the wonder of premium. The expanding accessibility of a few modalities giving an account of a similar framework presents new degrees of opportunity, which bring up issues past those identified with abusing every methodology independently. As we contend, a large number of these inquiries, or "difficulties," are regular to numerous spaces. This paper manages two key issues: "why we require information combination" and "how we perform it." The primary issue is spurred by various models in science and innovation, trailed by a numerical system that exhibits a portion of the advantages that information combination gives. So as to address the second issue, "decent variety" is presented as a key idea, and various information driven arrangements dependent on grid and tensor deteriorations are examined, accentuating how they represent assorted variety over the informational collections. The point of this paper is to give the peruser, paying little respect to his or her locale of source, with an essence of the endlessness of the field, the prospects, and the open doors that it holds.
- Sander Koelstra, Christian Mu'hl, Mohammad Soleymani, Jong-Seok Lee, Ashkan Yazdani, Touradj Ebrahimi, Thierry Pun, Anton Nijholt, and Ioannis (Yiannis) Patras., 2012. We present a multimodal informational index for the investigation of human full of feeling states. The electroencephalogram (EEG) and fringe physiological signs of 32 members were recorded as each watched 40 one-minute long portions of music recordings. Members evaluated every video as far as the dimensions of excitement, valence, similar to/aversion, predominance, and recognition. For 22 of the 32 members, frontal face video was likewise recorded. A tale technique for upgrades choice is proposed utilizing recovery by full of feeling

labels from the last.fm site, video feature location, and an online evaluation apparatus. A broad examination of the members' appraisals amid the investigation is exhibited. Associates between the EEG flag frequencies and the members' appraisals are examined. Techniques and results are displayed for single-preliminary characterization of excitement, valence, and like/hate appraisals utilizing the modalities of EEG, fringe physiological signs, and media content investigation. At long last, choice combination of the grouping results from various modalities is performed. The informational index is made openly accessible and we urge different scientists to utilize it for testing their own emotional state estimation techniques.

- Gianluca Donato, Marian Stewart Bartlett, Joseph C. Hager, Paul Ekman, and Terrence J. Sejnowski, 1999. The Facial Action Coding System (FACS) [23] is a target technique for evaluating facial development as far as part activities. This framework is generally utilized in conduct examinations of feeling, subjective procedures, and social cooperation. The coding is by and by performed by profoundly prepared human specialists. This paper investigates and analyzes procedures for naturally perceiving facial activities in groupings of pictures. These strategies incorporate investigation of facial movement through estimation of optical stream; all-encompassing spatial examination, for example, foremost part examination, autonomous segment examination, nearby element investigation, and direct discriminant examination; and techniques dependent on the yields of neighborhood channels, for example, Gabor wavelet portrayals and neighborhood primary segments. Execution of these frameworks is contrasted with innocent and master human subjects. Best exhibitions were gotten utilizing the Gabor wavelet portrayal and the autonomous segment portrayal, the two of which accomplished 96 percent exactness for characterizing 12 facial activities of the upper and lower confront. The outcomes give merging proof to the significance of utilizing nearby channels, high spatial frequencies, and factual freedom for ordering facial activities.
- Lijanage C. De Silva, Tsutomu Miyasato, Ryohei Nakatsu, 1997. Facial feeling acknowledgment will turn out to be crucially critical in future multi-social visual correspondence frameworks, for feeling interpretation between societies, which might be viewed as closely resembling discourse interpretation. Anyway so far the acknowledgment of facial feelings is fundamentally tended to by PC vision analysts, in light of facial presentation. Additionally, recognition of vocal articulations of feelings can be found in research work done by acoustic specialists. The

majority of these exploration ideal models are dedicated absolutely to visual or simply to sound-related human feeling identification. Anyway we found that it is exceptionally intriguing to consider both these soundrelated and visual data together, for handling, since we trust this sort of multi-modular data preparing will turn into a datum of data handling in future interactive media period. By a few escalated abstract assessment ponders we found that people perceive Anger, bliss, Surprise and Dislike by their visual appearance, contrasted with voice just recognition. At the point when the sound track of every feeling clasp is named with an alternate kind of sound related enthusiastic articulation, still Anger, Happiness and Surprise were video overwhelming. Anyway Dislike feeling gave blended reactions to various speakers. In the two investigations we found that Sadness and Fear feelings were sound prevailing. As an end to the paper we propose a strategy for facial feeling location by utilizing a cross breed approach, which utilizes multi-modular data for facial feeling acknowledgment.

- Anil Jain and Douglas Zongker, 1997. An extensive number of calculations have been proposed for highlight subset choice. Our test results demonstrate that the consecutive forward skimming determination (SFFS) calculation, proposed by Pudil et al., commands alternate calculations tried. We think about the issue of picking an ideal list of capabilities for land use order dependent on SAR satellite pictures utilizing four diverse surface models. Pooling highlights got from various surface models, trailed by an element choice outcome in a generous enhancement in the order exactness. We likewise delineate the threats of utilizing highlight choice in little example measure circumstances.

3. Problem statement

The number of songs available exceeds the listening capacity of single individual. People sometimes feel difficult to choose from millions of songs. Moreover, music service providers need an efficient way to manage songs and help their costumers to discover music by giving quality recommendation.

4. System model

The proposed model of this project is as shown in the figure 1 which consists of three main phases as follows,

- User Interface
- File Uploading Process
- Secret Key Generation
- File Sharing Process
- File Auditing Process

- File Downloading Process
- Mail Alert Process

A. System architecture

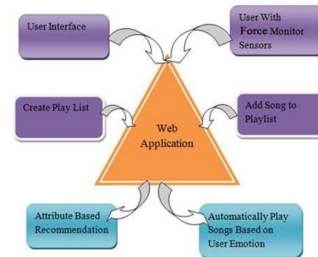


Fig. 1. System architecture design

B. Sensor data acquisition

The sensors receive the input signal. These values are recorded. Sensors used are,

1) Force sensor

- FSRs are sensors that enable you to recognize physical weight, pressing and weight. They are easy to utilize and ease.
- This is a photograph of a FSR, explicitly the Interlink 402 model. The 1/2" breadth round part is the delicate piece.
- The FSR is made of 2 layers isolated by a spacer. The more one presses, a greater amount of those Active Element spots contact the semiconductor and that influences the protection from go down.
- FSRs are essentially a resistor that changes its resistive esteem (in ohms Ω) contingent upon the amount it is squeezed. These sensors are genuinely minimal effort, and simple to utilize yet they're once in a while precise.
- They likewise shift some from sensor to sensor maybe 10%. So fundamentally when you use FSRs you should just hope to get scopes of reaction.
- While FSRs can identify weight, they're an awful decision for recognizing precisely what number of pounds of weight are on them.

C. Preprocessing

To convert the analog values to digital values for displaying the values in html page. The values obtained from the sensors are passed to the microcontroller Arduino UNO. Arduino comprises of both a physical programmable circuit board and a bit of programming or IDE. It used to compose and transfer PC code to the physical board. USB link is utilized to stack another code onto the board. Stick 1 serves a power source.

D. Send data to server

In this module, we are going begin the association between the Arduino to server by tapping the catch occasion, when we begin the server every one of the information will be gotten by the PC from the Arduino.

E. Importing data into database

RxTx is a jar file to retrieve the value from the Arduino in java. Since we need a power source for the Arduino device, we connect the device with the computer. With the help of this jar file we get the values directly from the device and store it our DB The retrieval of the value will be automated process, which repeats the process whenever the device receives the value.

F. Monitoring pressure level

We monitor the pressure level frequently with the help of pressure sensor. The sensor sends the value to the Arduino and from there we store in the DB. In this module, the stored data are used for statistical data analyze. The real-time data are considered to be historical data later to predict.

G. Prediction model construction

The prediction model is used to guide the user to maintain the Human Emotions. With all the historical data we do a prediction like how much the Pressure is taken to deliver the song for the particular human. On the particular Human which Male/Female can used to more profit.

H. Block diagram

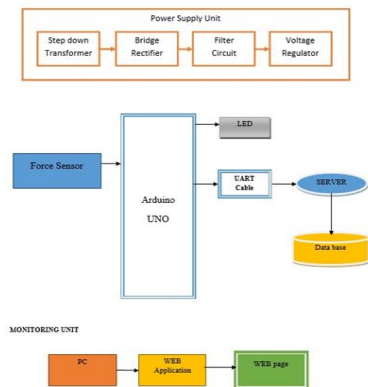


Fig. 2. Block diagram

5. Conclusion

This project explains about a music recommendation system according to the user’s mind. As explained before, the sensors we have provided senses the biological mind signal of the user and convert it into equivalent electrical signal and according to such electrical signal the songs are played in the music player.

References

- [1] R. W. Picard, E. Vyzas, and J. Healey, “Toward machine emotional intelligence: Analysis of affective physiological state,” *IEEE Trans. Pattern Anal. Mach. Intell.*, vol. 23, no. 10, pp. 1175–1191, 2001.
- [2] I. H. Shin, J. Cha, G. W. Cheon, C. Lee, S. Y. Lee, H.-J. Yoon, and H. C. Kim, “Automatic stress-relieving music recommendation system based on photo plethysmography derived heart rate variability analysis,” in *IEEE Int. Conf. on Eng. in Med. and Bio. Soc. IEEE*, 2014, pp. 6402–6405.
- [3] H. Liu, J. Hu, and M. Rauterberg, “Music playlist recommendation based on user heartbeat and music preference,” in *Int. Conf. on Comp. Tech. and Dev.*, vol. 1. IEEE, 2009, pp. 545–549.
- [4] K. Yoon, J. Lee, and M. U. Kim, “Music recommendation system using emotion triggering low-level features,” *IEEE Trans. Consum. Electron*, vol. 58, no. 2, pp. 612–618, May 2012.
- [5] R. L. Rosa, D. Z. Rodriguez, and G. Bressan, “Music recommendation system based on user’s sentiments extracted from social networks,” *IEEE Trans. Consum. Electron*, vol. 61, no. 3, pp. 359–367, Aug 2015.
- [6] D. Lahat, T. Adali, and C. Jutten, “Multimodal data fusion: an overview of methods, challenges, and prospects,” *Proc. of the IEEE*, vol. 103, no. 9, pp. 1449–1477, 2015.
- [7] S. Koelstra, C. Muhl, M. Soleymani, J.-S. Lee, A. Yazdani, T. Ebrahimi, T. Pun, A. Nijholt, and I. Patras, “Deap: A database for emotion analysis; using physiological signals,” *IEEE Trans. on Aff. Comp.*, vol. 3, no. 1, pp. 18–31, 2012.
- [8] Donato, M.S. Bartlett, J.C. Hager, P. Ekman, and T.J. Sejnowski, “Classifying Facial Actions,” *IEEE Trans. Pattern Analysis and Machine Intelligence*, vol. 21, no. 10, pp. 974-989, Oct. 1999.
- [9] L.C. DeSilva, T. Miyasato, and R. Nakatsu, “Facial Emotion Recognition Using Multi-Modal Information,” *Proc. IEEE Int'l Conf. Information, Comm., and Signal Processing*, pp. 397-401, Sept. 1997.
- [10] Jain and D. Zongker, “Feature Selection: Evaluation, Application, and Small Sample Performance,” *IEEE Trans. Pattern Analysis and Machine Intelligence*, vol. 19, no. 2, pp. 153-163, Feb. 1997.