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Musically Yours - Implementation of Music Playlist using Machine Learning and Music Therapy

[1]Keerthana.K.M, [1]Sanjana.V, [1]Aishwarya.S, [1]Aishwarya.B Nagesh, [2]Vallabh Mahale

[1]Dept. of Computer Science Engineering, Jyothy Institute of Technology, Bangalore, Karnataka, India, PIN – 560082

[2]Assistant Professor, Dept. of Computer Science Engineering, Jyothy Institute of Technology, Bangalore, Karnataka, India, PIN – 560082

Abstract - The disciplines of music therapy and music technology are relatively recent, having emerged late in the 20th century. Because of this, combining the therapy with the technology is still considered novel. Recently, as patients are able to gain access to a wide range of complementary therapies, also as computers have reached a stage where real-time audio-visual interaction is possible, projects that address therapeutic issues with multiple media technology have started to emerge. Music is known to have positive effects on human beings, where it enhances learning and aids the healing process. This paper presents how one can manage their stress levels by using music therapy. Mental stress is caused due to various reasons, which spreads across different age groups as well. To overcome the efforts spent on searching music relatable to their mindset, we decided to come up with an application which custom designs a music playlist for the people. It will be focused on one's present emotion and made sure that he/she feels after listening to the music recommended by our application.

Key words: Music therapy, Chatbot, Natural Language Processing, Machine Learning, Neural Networks.

1.INTRODUCTION

1. EMOTION AND MOOD

Emotion is an affective state of consciousness in which joy, sorrow, fear, hate or the like is experienced, as distinguished from cognitive and volitional states of consciousness. Mood is a feeling or a person's specific state of mind at any particular time, it is a mix of feelings and emotions.

2. ABOUT MUSIC

A pattern of sounds made by musical instruments, voices, computers, or a combination of these, intended to give pleasure to people listening to it. Numerous scientific and psychological studies have shown that music can lift our moods, combat depression, improve blood flow in ways similar to statins, lower levels of stress-related hormones such as cortisol, and ease pain. Music can improve the outcomes for patients after surgery.

3. NATURAL LANGUAGE PROCESSING

Natural Language Processing (NLP) is about the interface between human language and machine language. This can mean taking a writing sentence – just like this one – and extracting the key information from it, such as the semantic ideas, or the intent in the case of a command like left, right, open, close, for example. Going in the opposite direction, NLP can mean taking data and generating a human readable text from it.

4. NATURAL LANGUAGE TOOLKIT

The Natural Language Toolkit (NLTK) is a platform used for building Python programs that work with human language data for applying in statistical natural language processing (NLP). It contains text processing libraries for tokenization, parsing, classification, stemming, tagging and semantic reasoning.

In Spyder, we can use the PYTHONPATH manager to add the path to NLTK module.

5. CHAT-BOT

Chat-Bot is a natural language understanding framework that allows us to create intelligent chatbots for any service. With the help of sophisticated NLP algorithms chatbots can process the received text: interpret, infer, and determine what was meant and then define a series of appropriate actions.

2.LITERATURE REVIEW

We have surveyed some 10 -15 papers, along with some books to get to know more about what is music, concept of music therapy, adaption of music therapy in different fields, chatbot, implementation of music therapy using Machine Learning Algorithms. Below are the few papers listed, and the inferences drawn from the same.

[1]*The Healing Power of Indian Ragas – A Book by Rajam Shanker*

[2]*What is the best segment duration for the Music Mood Analysis?*

Music is a connected series of sounds which are invested with harmony, melody, and a definitive pitch. Music is a form of art, which enables one to either sing, or perform along with an instrument. It is evident that music is involved in one's life very deeply, where one can be a listener, or one can be a learner. A listener is normally open to any kind of music, irrespective of the genre, who chooses to listen to one type of music after going through lot many choices. A learner usually prefers to listen to the genre of music that he/she is learning, pertaining themselves to only that kind of music, which is of their learning interest. One thing that everyone should remember is that music can never be negative! It cannot induce any negative thoughts that cause sadness, anger, disgust, but only impose positive thoughts on one's mind, that keeps a person happy, calm and at peace.

[3]*A Preliminary Study on the Effects of Music on Human Brainwaves*
[4]*Music Listening, Music Therapy, Phenomenology and Neuroscience*

Music therapy is an established healthcare profession that uses music to address physical, emotional, cognitive, and social needs of individuals of all ages. From a small kid, till an old aged person, it is very essential for one to get along with the people around them, in the society. Some people, due to various factors, might find it difficult to communicate with people around them, like others do. These people face many problems, which comes with some disabilities and nervous breakdowns. In the recent days, music therapy has proved to show some effective results on these kinds of people. Inactive people are made to listen to some chirpy music, to elevate their minds, parallelly, hyperactive people are made to listen to some relaxation music, to bring them to normal state of activeness. It is inevitable that music can alter the state of a person's mind to such an extent that one can become healthy, being able to overcome the abnormal conditions of body and mind. It is proven that different types of instruments, different types of rhythm patters with varying speed, different types of tunes can vary a person's speed of processing things, synchronizing one's mind speed to the speed of the beat. Music therapy can help a person only with some clinical supervision. A person cannot be cured only with music, but a combination od medication and music can cure a person at a very fast rate. Not only a person's behavioral traits, but also several physical symptoms of a person can also be cured using medication and music therapy. It is still a wonder, yet proven by research that music can not only be an art form, but the same can also be used for the betterment of one's mental health.

[5]*Therapy … Through Music*
[6]*Stuttering and Music Therapy*
[7]*Sleep Pattern Analysis and Improvement using Artificial Intelligence and Music Therapy*

Many institutions in major cities like Bangalore, Chennai, New Delhi have implemented the education of music therapy, helping thousands of people all over the world to live a better life. Some institutions have achieved successful results in curing some disorders like Parkinson, hypertension, autism, stuttering, sleep pattern etc., with the help of medication, along with music therapy. The following are some reputed institutions that provide music therapy.

- Indian Institute of Medical Music Therapy (IIMMT), Chennai – A unit of Apollo Hospital
- Meera Centre for Music Therapy, Education and Research, Bangalore
- Chennai School of Music Therapy, Chennai
- Pinnacle Blooms Network, Bangalore
- Nada Centre for Music Therapy, New Delhi
- Indian Association of Music Therapy, New Delhi
- IHIF Rehab Centre, New Delhi
- Taal Musics, Bangalore

The above institutes, hospitals and many other places have adapted the music therapy for treating people in a better, faster and an efficient way.

[8]*The Effect of Emojis when interacting with Conversational Interface Assisted Health Coaching System*
[9]*Design and Development of CHATBOT: A Review*
[10]*Virtual Assistant Using Artificial Intelligence*

Amazon Alexa, iPhone Siri, Google assistant are some of the trendiest chatbots we come across in these days. Chatbots are mainly needed when we want the user to feel comfortable, and chat with ease, just like he/she would chat with any other person. Chatbots are highly influential when we deal with some patients with mental disorders. These people might find it really difficult to speak with other people, and this is where chatbots prove to be useful. Simple text processing or emoji processing can tell us what the user desires, but it might also be that the user is not true to his/her words. Use of audio processing like Alexa, Voice assistants, Siri, prove to be very useful, as the robot can be built intelligent enough to identify the tone of speech, to find a match between the words and the tone. Video processing is another high-level processing, where a user's video is considered for validation. An initial implementation text processing is done to help the user find the right playlist of their choice.

[11]*Towards Effective Music Therapy for Mental Health Care using Machine Learning Tools: Human Affective Reasoning and Music Genres*
[12]*Robust Sound Event Classification using Deep Neural Networks*
When Music Therapy itself is a rare field of research, implementation of the same using ML is quite new in the field of Computer Science. A dataset of factors like age, mood of the user, likes and dislikes for a type of genre is taken, which in turn is mapped into a list of songs, which is custom made for each and every user, based on one's preferences and mood. Algorithms like Gaussian Mixture Models, K-nearest neighbor (KNN), Random Forest, Support Vector Regression etc., prove to be helpful in the implementation of the above. A script of musical notations is retrieved for the user's song of choice, if he/she wishes to sing or play that particular song, for which, the classification of signals is done using Neural Network.

3.PROPOSED METHODOLOGY

- We initially identify which type of songs affect people of different ages in what ways, and create a dataset that consists of some common emotions, and songs corresponding to that particular emotion.
- A chat-bot is used in the application to fetch the required details of the user, so that an accurate prediction of songs, based on the ragas, can be made.
- An algorithm is used to predict the songs based on the emotions, from which a music playlist is displayed in the application.
- This playlist will contain the files of musical notes, which may be used by the user, who wishes to sing or play the song for better effects.
- The files (preferably in .pdf format) are provided based on the user's choice of song in the playlist.

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