Smart Utility Application through Music Information Retrieval (MIR) Technology

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Abstract: ***With time, we humans have found an immediate need of being calm and relaxed along with completing all our tasks on time. We all find ourselves in the need of being more productive and relaxed at the same instant. We require this in order to get better outcomes and efficiency. Therefore, we need such personal self-help mobile applications that would help us stay calm and keep us on track with our tasks to do. This can be done by analyzing our mood and psychological capacity to do the task while giving an effective feedback and showing us some new innovative ways of accomplishing all our tasks in a simpler and better manner. We propose such a revolutionary service based application that connects the user to the self in a smarter and more efficient way thus enhancing the productivity by making better use of an individual's time and effort. This application works with the disciplines of MIR such as Musicology, Mood Analysis Algorithms and more***

Keywords: **Music Information Retrieval (MIR) Technology, Mood Analysis Algorithm, Music Mood Response, Music Mood Taxonomy**

1. INTRODUCTION

Music Information Retrieval (MIR) is an upcoming domain in the field of Information Technology which started less than two decades ago.As Stephen Downie defines it, "MIR is a multidisciplinary research endeavour that strives to develop innovative content-based searching schemes, novel interfaces, and evolving networked delivery mechanisms in an effort to make the world's vast store of music accessible to all"[1]. The involved disciplines in MIR include computer science, information technology, audio engineering, digital sound processing, musicology, music theory and more. **Mood Analysis Algorithms** are highly applicable to analyse one's psychological interest and level of persistence and determination into doing something [3]. In our application, we will be making use of a Mood Analysis Algorithm which focuses on playing some different variations and genres of music for a fixed short period of time and finally help the user analyse to pick one. This picked musical segment will help our application analyse the user's mood in a nearly accurate and efficient way with the help of Thayer's Psychological Model of Mood [4].Using this information, our application will deliver three major options to the user which are enhancing the current mood of the user, suggesting a small task to do anddelivering quotes and words of positivity. We will focus on these aforementioned aspects in the Design section of this paper further. These things that the application will deliver will beneficially help the user in developing an interest into what they do and would also help them push their limits to the next level, improving their overall productivity and introducing them to a better lifestyle while filling them up with positive energy. We are also working to add more things to the application so that it can help the user achieve more through its revolutionary and smart service. A preface of these upcoming features to the application is mentioned with a short description in the future scope section further in the paper.

2. DESIGN

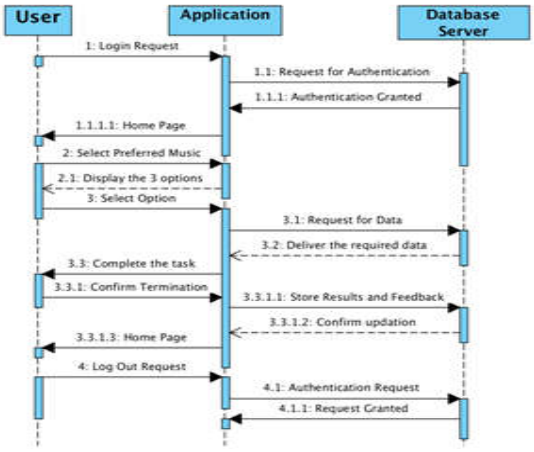

Fig.: Sequence Diagram for Application Architecture

2.1. The Application Architecture

The Application Architecture focuses to help you understand how the application actually works in the real world. In order to use the application, the user must provide some of his or her basic information that is saved into the application's database. It includes general information such as name, age and weight along with some optional domains such as specific interests and hobbies, choice preferences of food and drink, etc. This optional information would help the application to deliver a small task when the user asks for it in a better and more efficient manner. The small tasks that the application will suggest would be related to the hobbies and interests of the user and more options could be given according to the user requirements. This is supposed to be the functioning of the application when the user will register on the application for the first time ever. Multiple accounts can also be registered on this application. After the registration is complete, the home screen of the application would display a "tick" button while playing a different set of songs from either the music library on the device or from the online music database of the application. Each variant would be played for around 8-16 seconds at the least for the user to decide if he or she wants to stick to this type or music or to skip this one and listen to the other one [2]. Once a variant is chosen by the user, the application would analyse the mood of the user into one of the four modes: Exuberance, Frantic, Contentment and Depression. According to the present mood of the user at that particular instant, the application would give three choices: Enhance the current mood, Suggest a small task, Deliver a quote. ***"Enhance the current mood"*** would keep the chosen music variant playing for the full length this time and then keep changing the track which related to the same or similar variant of the initially preferred choice. The application would keep doing this automatically for the next 7 minutes by default. The user will be given a choice to extend it by customising the timer of the feature. **"Suggest a small task"** will show further options to the user. These options would include small tasks of about an average of 10-15 minutes. The application would make use of the user's hobbies and interests, choice preferences of food and drink and with the real time to-do lists saved on the device to deliver better choices to the user. These small tasks may also include some smart exercises. Smart exercises will include full body, upper body and lower body workouts and they would be accustomed according to the physical health stats that the user provides to the application during the time of registration alongside the currently analysed mental conditions of the user. The to-do lists saved on the device would help the application to analyse what small tasks are to be done by the user for that day. The application would then prompt the user and confirm if he or she wants to do it then. For example, one of the tasks in the to-do list is cutting some vegetables and doing dishes for the evening meal. So, the application would suggest you if you want to complete these tasks then. This helps you mark the tasks off your to-do list as well. Often, it happens that we feel or look for someone to keep us motivated throughout the day or at the times when we feel low. For this, **"Deliver a quote"** would deliver a motivational and inspirational quote on positivity read in some different voices by various readers along with a soft and soothing background music to increase the effect. This feature would help a lot to get the user full of energy and ready to get back to work again.

2.2. Model Of Mood and Music Taxonomy

Thayer came up with a two-dimensional mood model in the late 90's which was later applied by Microsoft Research Asia. The two dimensions considered in the model are: Stress dimension (happy/anxious) and Energy dimension (calm/energetic). This model effectively helps us divide the music mood into four clusters, each to fit into one of the quadrants as shown in the figure below. In this model, the four clusters refer to the following: 1. Contentment: Happy and Calm Music. 2. Depression: Calm and Anxious Music. 3.Exuberance: Happy and Energetic Music. 4. Anxious/Frantic: Anxious and Energetic Music. [4]. The **Music Mood Response** will be analysed by the application using Thayer's model of mood and will thus work effectively and more accurately as per the user's requirements at that specific time. This model is the **music mood taxonomy** that we will use for the better working and analysis of the application.

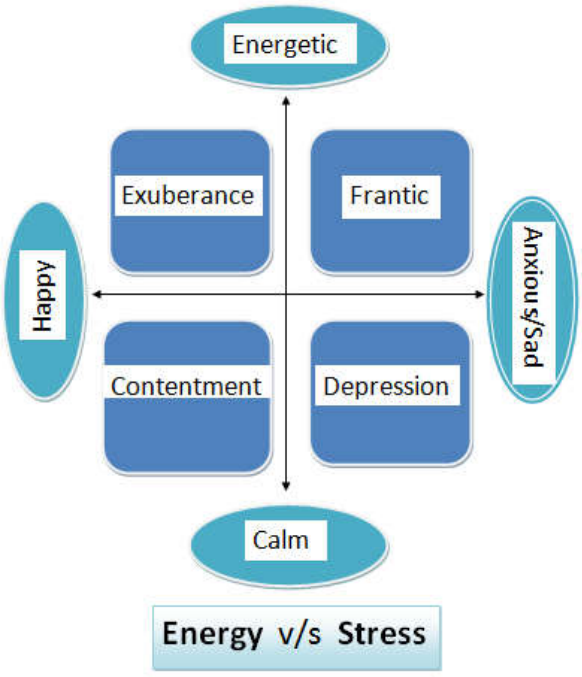

Fig.: Thayer's Psychological Model of Mood

2.3. Addressing the Emerging Challenges

The first and foremost challenge that we faced was about the accuracy and efficiency of Mood Analysis Algorithm. Mood Analysis is based on what kind of music segment the user prefers to listen to at a specific period of time. Also, with a change in the music segment, it is possible that the user's mood may change as well. That is why, Real Time Mood Analysis is done on a prediction basis in which the user picks up a preferred music segment and thus it helps the application to derive the user's current mood by analysis the genre and type of the music segment.

As we are not making use of any external devices along with the application for mood analysis, we have to include the user selection and preference button in the application so that the application can analyse and distinguish the user's mood with the help of the genre/type of the preferred musical segment.

3. Advantages

Listeningto music, getting motivated, getting rewarded and related things have a direct relation with the secretion of dopamine which is. a neurotransmitter in our body alongside the secretion of serotonin which perform various functions in our body involving relaxation of the mind [5]. Our proposed application has an aspiration to promote and evolve a favourable feeling of satisfaction in various sectors such as improve test results, improve learning and analysing habits and hence reduce errors by increasing the brain's working credibility and concentration level.Thus by analysing people's behaviour and their reaction towards different genres of music and traits, we are going to see an enormous boost in an individual's productivity and potential. Users can adapt this application when they are feeling low or demotivated. This app is created for budget conscious individuals, so they can be productive and healthy without misusing their valuable resources. We are aiming to please each and every mind with a revolutionary experience of a new lifestylealong with a whole new level of positive approach.

4. Further Work and Future Scope

Being an interactive multimedia application, it has great future scopes.An emerging trend uses the visual details of the skin, as captured in standard digital or scanned images. This technique, called Skin Texture Analysis, turns the unique lines, patterns, and spots apparent in a person's skin into a mathematical space.

Tests have shown that with the addition of skin texture analysis, performance in recognising faces can increase 20 to 25 percent. Also, today music is considered to be a reliable alternative for treatment of impaired body movementsviz., Parkinson's or Alzheimer's disease. Here, through the application, the imbalanced rotary functions of human body can be given a thrust and a rhythmic pattern to collaborate and carry out chores easily.This in turn will encourage the user to develop a strong physical, emotional, mental, social, aesthetic and spiritual caliber. Further work in musicology represent the possibilities of drone music which would be able to replace the consumption of recreational drugs while creating a similar temporary effect of tranquillisation and brain boosting. This can help rehabilitate a lot of recreational narcotics addicts. There are chances that that music as a result, will radically fetch a new type of language, that is much easier to understand, commute and relate hence bringing together a revolutionary change in the history of mankind forever.

5. Conclusion

Our Smart Music Application will drastically change the face of how people accomplish their tasks while still being calm and relaxed throughout that period. This would promote a better standard of living. It would also increase the potential of an individual. It benefits all kinds of users by helping them and connecting them to themselves on a whole new level.

The proposed approach is a preliminary attempt at mood detection and analysis from music segments and thus finally helping the user with managing his resources well and be more efficient. We hope it can inspire more research works on music analysis.

6. References

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