A PROJECT SYNOPSIS ON

MOOD BASED MUSIC RECOMMENDATION SYSTEM

Submitted by

Ashish(19BCS1124), Marjana(19BCS1884),
Amardeep(19BCS1137),Tanmay(19BCS1120),
Vidushi(19BCS1119)

Submitted to: Payal Thakur

in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE ENGINEERING

Chandigarh University

MAY 2022

INTRODUCTION

1.1 Identification

A user's emotions and moods can be recognized by their facial expressions. These representations can be obtained from a live feed through the system's camera. Much research is done in the fields of computer vision and machine learning (ML), where machines are trained to recognize different human emotions and moods.
Machine Learning offers a variety of techniques that can be used to detect human emotions One such technique of his is using the MobileNet model in Keras. This will generate a small trained model for easy Android ML integration.
Music is a great connection. It connects us across markets, ages, backgrounds, languages, preferences, political leanings and income levels. Music players and other streaming apps are in high demand because they can be used anytime, anywhere and combined with daily activities, travel, sports, etc. With the rapid development of mobile networks and digital multimedia technology, digital music has become mainstream consumer content sought after by many young people.
People often use music as a means of mood regulation, especially to lift bad moods, boost energy levels, and relieve tension. Listening to the right kind of music at the right time also improves mental health. Human emotions are therefore strongly associated with music.
The proposed system creates a mood-based music player that performs real-time mood detection and suggests songs depending on the detected mood. This will be an additional feature to the traditional music player app pre-installed on mobile phones. The main benefit of including sentiment detection is customer satisfaction.
The goal of this system is to analyze users' images, predict users' facial expressions, and suggest songs suitable for the detected mood.
Neural networks and machine learning have been used for these tasks with good results. The machine learning algorithm has proven very useful for
pattern recognition and classification, so it can also be used for
emotion recognition.
With the development of digital music technology, it is essential to develop a
personalized music recommendation system to recommend music to users. Making recommendations from the large amount of data available on the internet is a big challenge. E-commerce giants such as Amazon and eBay provide users with personalized recommendations based on their preferences and history. Meanwhile, companies like Spotify and Pandora use machine learning and deep learning techniques to provide relevant recommendations.
The goal of this work is to create a music recommendation system/player that recognizes the user's face, identifies the current mood, and recommends her
playlists based on the detected mood.

1.2 Identification of Problem

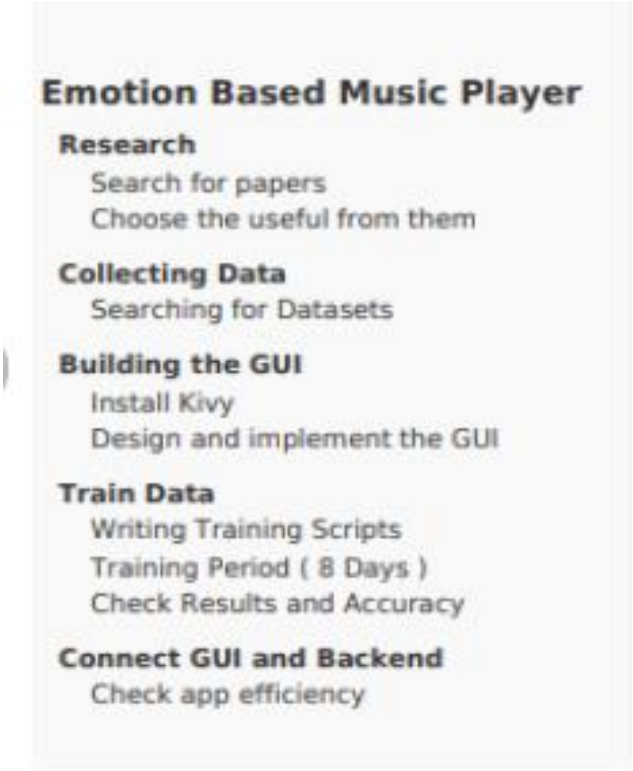
Music plays an enormous role in building and displaying social identity. Few years back, choosing music by genre/artist were effectively the only options available. But that has changed drastically over the years with the availability of custom playlists and personal recommendations on music platforms.
But it is emotional impression on the listener is often underestimated in the domain of music preferences. In today's time we use music as means of mood regulation, that basically changes with our mood whether it's good or bad, with higher energy or low energy.

So listening to right kind of music at the right time helps in improving mental health. Thus our goal is to provide a system that recommends us the music based on our mood.

1.3 Identification of Tasks

For solution to our problem, we are proposing a system, mood-based music recommendation system which detects the mood in real time and recommends songs as per detected mood. This becomes an additional feature to the traditional music player apps that come pre-installed in systems. The objective of this system is to analyze the user's image, predict the expression of the user and suggest songs according to the detected mood. This project will be divided in two main parts:
1.Face Detection Ability to detect the location of face in any input image or frame. The output is the bounding box coordinates of the detected faces. For this we will be using computer vision (OpenCV) library.
2.Mood detection classification based on the emotion provided by the image in the categories of happy, sad, angry, neutral, surprise, fear, disgust. We will use CNN model for image classification.

1.4 Timeline



First, we will search for papers that are related to our project and that can we be useful to our project. Reading papers will help us to understand the approach to our project that will help to make the final output.
After building the proper plan for the project, we will start making the design of the application that we are building. After finalization of the design, we will start implementing the frontend of the project.

1.5 Organization of the Report

This project uses OpenCV to create a music player. Used for image processing tasks. . Identify faces from live webcam streams. Faces are processed and inserted into a trained emotion recognition neural network. This is an open source library that can be used to perform tasks such as face recognition, object tracking, and landmark detection. Some of these routines are fairly pervasive and appear in nearly all computer vision work. This plays an important role in the real-time operations that are critical in today's systems. It can process photos and films to recognize objects, faces and even people's handwriting. Python handles OpenCV array structures for analysis when combined with many other libraries such as NumPy.
The Open Source Computer Vision Library is a library of programming functions focused on real-time computer vision. The library is cross-platform. Its main feature is real-time image processing. Library performance can be improved by installing native Intel performance primitives into the system using self-tuning techniques. The system recognizes your face and offers suggestions based on your mood.

OpenCV (Open Source Computer Vision) is a famous computer vision library founded by Intel in 1999. A cross-platform library focused on real-time image processing. This collection contains over 2500 optimized algorithms and perfectly combines traditional machine vision with cutting-edge machine vision and machine learning techniques.

1) MOOD RECOGNITION
In this module, the system will capture the user's image from the already built-in camera. Also, while taking pictures, the user must meet all the requirements such as: Such as the user needs to be close to the camera. After capturing the user's image, the image is sent for further processing. OpenCV.
We use OpenCV in our project to detect user emotions. There are many different types of moods, such as happy, sad, anxious, excited, and cheerful. Such moods and their associated features are extracted using such techniques. OpenCV is an open source library, and today this library plays a key role in real-time operations, which are important in areas such as technology, UI, and more. Using this library/technique, a person can identify objects and faces by processing images of people. Integrating this with other libraries such as NumPy allows him to parse the OpenCV array structure using Python image processing in OpenCV:
performing certain operations on the provided image as image processing call.
Image processing is used to extract some useful features, providing the necessary information about the image.

Going back to the basic definition of image processing, "This is a mode of signal processing where the input is an image and the output is the image or properties/features associated with that image." Zur Processing an image includes the following three steps:
- Image Import
- Image Analysis and Manipulation
- Output Generated as a Result of Image Analysis

2) MUSIC MODULE
User's mood related songs are something everyone can relate to because music heals everyone in all situations. This module of our system contains different songs categorized by the detected mood. Songs are available in different languages. From now on, we will provide songs to users in her two different languages, Hindi and English. Users can choose songs from a given playlist and spend their time listening to them. This will lift their spirits up again and ensure that they make a second attempt to find their mood and play the song again.

LITERATURE REVIEW/BACKGROUND STUDY

2.1. Timeline of the reported problem

Traditionally, there have been two basic perspectives on how emotions are related to music: emotions that may be noticed in music (cognitivist approach) and emotions that are felt from music (emotivist perspective). In their study, Vempala and Russo compared the relationships between music and these two distinct types of emotions. They used music parameters as inputs to train neural networks for both perspectives, and the models' outputs were arousal and valence. based on psychological input provided by research participants and emotions noted by music analyses. Results revealed that while networks in both situations produced similar outcomes for arousal, the cognitivist perspective networks outperformed them in terms of valence. Even taking into account the fact that it is impossible to distinguish characteristics that have a greater impact on the emotions that are sensed through music from others that correlate more with emotions in music, the research clearly illustrates the possibility of using this method and possibilities for further development. All processes in the human body are closely interrelated, therefore emotions, psychical and psychophysical conditions might have an impact on each other. The cardiovascular system is significantly influenced by stress . Some sorts of music effects on heart rate, blood pressure and other psychophysical conditions as well. Ellis and Thayer draw our attention to the fact that different music attributes such as tempo or beat level can trigger emotional, psychophysiological and behavioral effects.

2.2. Proposed solutions

The positive effects of music on people's wellbeing can be applied in many contexts. It is necessary to have a generalist system that takes into account the unique characteristics of each individual user to address these potential scenarios. This section aims to build a solution that combines well-known generalised methodologies with personal characteristics of the physical and emotional influence of music-related features in varied circumstances.
The main objective of the system is to find the closest music tracks to the abstract etalon one, which is defined by a specific set of music-related criteria, regardless of the actual purpose, whether there is

a need to change a user's emotional state or maintain and keep it the same.
We could point out several action modes of our system.
The first one being a straightforward method where we just mention the final goal - the desired point in the emotional space of a user. This point has a matching vector of different music, person, and context-related attributes with their values in the context of music-driven emotion treatment. In this instance, the system looks for the closest/nearest music tracks using the corresponding distance measuring function. A user's present position in the emotional space is taken into account when the system transitions them to the intended point in a different, more advanced manner that is smoother and less harsh. Systems in this situation gradually close the gap between feature vectors that reflect the current and desired points. This mode is designed to be less annoying and stressful for the user. The calculation of multidimensional (multi-featured) "delta" distance (step), which takes into consideration the personality of each unique user, calls for a more complex algorithm. Therefore, during the data collecting and model construction stages, we must record a Personalized Emotion Transformation Model (PETM) for each user. In both situations, we must continue to update the model to ensure that it continues to reflect the user's current personality.
As a result, on-the-fly model training will be supported by continuous data gathering and analysis of user feedback, which will further enhance recommendation personalization.

2.3. Bibliometric analysis

Research from the previous section is taken into consideration when identifying sets of musical characteristics and their values in relation to the emotional and physiological states that they may elicit or lead to. We will examine the scenarios in which the impact of music on human wellbeing can be used in this part.
1) **Research and intellectual activity:** The effectiveness of intellectual activity and study requires maintaining energy, vitality, spirits, freshness of the brain, and acute attention. According to studies, nearly half of those surveyed think that listening to music while studying helps them focus better. Others said that listening to music keeps their minds quiet and keeps them from nodding off when studying. The work goes more quickly when the person is alert and upbeat. In this situation, listening to music should be done with the intention of raising alertness and aiding in a quicker recovery from fatigue. Fatigue, arousal, satisfaction with the process, and productivity outcomes are important factors to consider while evaluating one's personal status during and after a working session. Our method entails recording indications of the aforementioned criteria before, during, and after the listening session and comparing them to characteristics of the music being listened to. Of course, there may be many other factors that are presented that affect people while they are engaged in intellectual activity. In order to support this process with music effectively, the system must be aware of these other factors rather than allow music curation to distract from tasks being completed to a sufficient level.
2) **Physical work and sport:** Activities may have different demands on speed and endurance. Human performance and well-being are determined by psychological and physical factors. There are well-established, consistent health support practices in sports that include in-depth medical evaluations, measures, and wellbeing monitoring. Our strategy of providing emotional support through music consumption can considerably improve sports regulation approaches by using these activities. While highly rigorous repeated sprint activities may not benefit much from listening to favorite music, it does increase motivation and reduce overexertion. On 1.5 miles of running activities, listening to music had a significant impact on performance but does not reduce perceived exertion. According to the findings of these studies, music has a variety of effects on many types of sport activities. Faster music is used for anaerobic activities, while slower music is preferred for exercises aimed at building strength and stamina. The choice of music is also crucial on an

individual basis.
3) **Personal safety:** People encounter circumstances every day where they must maintain a keen focus on critically important matters in order to prevent hazards to their lives and health. For instance, drivers must pay attention to traffic, and being unwell or drowsy could have negative effects. Jeon outlines the use of music to lessen the emotive impacts of driving in his research. Especially as they cross the street, pedestrians are at risk. Nothing, not even music, should divert attention from driving in either scenario. The recommendation system must support being revitalized, feeling energized, and preventing environmental destruction.

2.4. Review Summary

1. An article about examining changes in the curvatures of faces and the intensities of the associated pixels was proposed by Renuka R. Londhe et al. The author classified the emotions using Artificial Neural Networks (ANN). The author also suggested a number of playlist approaches.
2. In his proposal, Zheng et al. divided facial feature extraction into two major categories: appearance-based feature extraction and geometric-based feature extraction, which comprised the extraction of several key facial features like the lips, eyes, and brows.
3. Nikhil et al. employ facial expression to infer the user's thinking. Humans frequently convey their emotions through facial expressions, hand gestures, and changes in voice or tone, but they mostly do it through their faces. A music player that is based on emotions makes use of less time.
4. In his research on various developments in human affect recognition, Z. Zeng et al. He concentrated on several methods for handling recordings of affective emotions in audio and/or visual form. The study offers a thorough analysis of audio/visual computing techniques. The effect is referred regarded as a prototype for various emotion states, including joy, sorrow, fear, rage, disgust, and surprise. In order to aid in the identification of emotions, this paper discussed the difficulties in developing automatic, spontaneous affect recognizers. Additionally, it pointed out several issues that uni-modal posed emotion recognition had overlooked or avoided.
5. Parul Tambe et al. proposed an approach that automated user-music player interactions, learned every user's preference, emotions, and activities, and provided song selection as a result. The device captured users' numerous facial expressions in order to analyze their emotions and anticipate the musical style.
6. Jayshree Jha et al. presented an image-processing-based music player that is based on emotions. This demonstrated how diverse algorithms and strategies provided by many writers in their research may be used to link the music player and human emotions. As a result, it has assisted in minimising the user's efforts in generating and managing playlists and delivering an amazing listening experience to music listeners by presenting them with the most appropriate song in accordance with the user's current expression.
7. An algorithm was developed by Anukritine et al. that provides a list of songs from the user's playlist based on their emotional state. The technique was developed with the goal of requiring less processing time, which also lowers the cost associated with employing different hardware. The primary concept was to group emotions into five categories: happiness, sadness, rage, surprise, and fear. Additionally, a highly accurate audio information retrieval approach was offered that quickly collected pertinent information from an audio signal.

2.5. Problem Definition

This paper suggests a music recommendation system that uses a camera attached to the computing platform to collect the user's image and extract it. In order to increase the effectiveness of the classifier that is used to detect the face present in the picture, the captured frame of the webcam feed

image is then transformed to a grayscale image. When the conversion is finished, 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 facial traits are extracted once the face has been removed, and they are then submitted to the trained network to identify the emotion the user has exhibited. The HELEN dataset is used to train a classifier that is used to find or extract facial landmarks from the user's face. More than 2000 photos can be found in the HELEN dataset. 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. When this is discovered, the music player chooses a suitable tune that best suits the user's mood. The system's main purpose is to improve the user's experience and, as a result, reduce their tension or improve their mood. The best tune matching the user's mood is recognized and played automatically by the music player, saving the user time from searching or looking up songs. The user's image is recorded with the aid of a camera. An appropriate song from the user's playlist is then played in accordance with the user's mood or emotion after taking the user's photo.

2.6. Goals/Objectives

Statements setting the milestones during the course of project work.

Keeping in mind

- Narrow, specific statements about what is to be learned and performed
- Precise intentions
- Tangible
- Concrete