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Chapter 1

Introduction

Human emotions are divided broadly into: fear, anger, surprise, sadness, happiness and neutral. Various other emotions, namely cheerful (a variation of happy) ,can be classified as emotions. These feelings are subtle. Facial muscles can exhibit subtle variations, which can be challenging to discern. Even small discrepancies can have a significant impact. Also, different or even the same person's instructions may be different for the same mind because thinking depends on many aspects of the context.

Although focusing only on the most prominent areas of the face, such as around the mouth and eyes, how to extract and classify these movements is an important issue. Machine learning and neural networks are applied to these tasks with great results. Machine learning algorithms have proven effective in recognition of patterns and classification. Therefore, they can also be used for cognitive analysis.

Many studies in recent years have confirmed that people react and react to music and that this music has an effect on the human brain. In research to explain why people listen to music, researchers have found that music plays an important role in emotions and feelings. The two most important functions of music are to help participants feel good about themselves and become aware of themselves. Music preferences have been shown to be associated with personality and mood. Rhythm, timbre, rhythm and music are controlled in the area of the brain that affects the mind and emotions. Human interaction can be an important aspect of life. It shows people information in detail and in detail,

whether it's body language, speech, face or emotions.

Between 76

The proposed system detects a person's mood and finds a special list of different types of music that can improve that person's mood if they are depressed. If you are in a good mood, a special list is displayed with different types of music that will make you feel good.

The data we use for insights comes from the Kaggle Insights Framework. Music player dataset consists of Bollywood Hindi songs. The facial recognition application is done using a convolutional neural network with an accuracy of about 83

The main aim in this work is to create a concept of music player that will capture the user's face, recognize current thoughts and then share search results based on the views..

1.1 Overview or background and motivation

The Euphoria is a tool designed to help users find songs that match their current mood or emotions. By analysing the user's input and applying machine learning techniques, the tool generates a search result or recommendations that align with the desired mood. This application aims to enhance the music listening experience by providing personalized and relevant song suggestions tailored to the user's emotional state. Background and Motivation: Music has a profound impact on our emotions and can evoke various feelings such as happiness, sadness, excitement, or relaxation. Often, we seek out music that resonates with our current mood or helps us shift to a desired emotional state. However, finding the right songs to match our mood can be time-consuming and challenging, especially with the vast amount of music available today. The Euphoria addresses this challenge by leveraging the power of machine learning. It takes advantage of the extensive music databases and algorithms capable of analyzing music characteristics and lyrics to extract emotions and sentiments associated with songs. By combining these techniques, the tool can understand the user's mood and preferences

and provide personalized song recommendations accordingly. The motivation behind the Euphoria is to offer a convenient and efficient way for users to discover music that aligns with their emotions. Whether someone is feeling melancholic, energetic, nostalgic, or any other mood, this tool can help them find the perfect soundtrack for their current state of mind. By enabling users to easily explore music based on their emotions, the Euphoria aims to enhance their music listening experience and provide a source of emotional support and enjoyment.

1.1.1 Problem Statement

Older music players require users to manually select songs based on mood. With the advancement of technology, modern music provides many functions such as fast forward, playback, local playback, streaming playback and distribution mode, but users can still manually browse search results to select songs according to their preferences. To solve this problem, Moodify claims to have found the "best path" from the user's initial mood (Es) to the target mood (Et). The optimum trajectory is the trajectory that minimizes the distance between Et and E0t; where E0t is a stage of the song (m1, ..., mN) and reduce the N length of the race. Moodify uses a system based on GoExplore to recommend music based on the best ideas built into the system. A preliminary study was conducted to evaluate this measure.

1.2 Research Questions

- What is the effectiveness of the Mood Based Song Searcher in accurately matching songs to users' desired moods compared to traditional search methods?
- Why is it important to consider emotions and moods when searching for music?
- How does the inclusion of emotional factors, such as mood and sentiment analysis, enhance the user experience and engagement

with the Mood Based Song Searcher?

1.2.1 Research objectives

- To assess the effectiveness of the Mood Based Song Searcher in accurately matching songs to users' desired moods compared to traditional search methods.
- To assess the efficiency of the Mood Based Song Searcher in generating song recommendations based on user input and desired moods, considering factors such as processing time and computational resources
- To investigate the impact of using the Mood Based Song Searcher on user engagement with music and their likelihood of discovering new songs that align with their desired moods.

1.2.2 Research Scope

- Development and implementation of the Mood Based Song Searcher algorithm or tool.
- Selection of a diverse range of music genres and songs to cover a wide spectrum of moods and emotions.
- Gathering user data through surveys, interviews, or user studies to understand their desired moods and evaluate the accuracy of the song recommendations.
- Comparison with traditional keyword-based search methods to measure the effectiveness of the Mood Based Song Searcher

1.2.3 Research Significance

- Improved Music Discovery: By evaluating the accuracy and efficiency of the Mood Based Song Searcher, the research can enhance the music discovery experience for users by providing more relevant and personalized song recommendations based on their desired moods.

- User Satisfaction: Understanding user perception and satisfaction with the Mood Based Song Searcher's song recommendations can contribute to the development of better music recommendation systems that cater to individual preferences and emotions, resulting in higher user engagement and satisfaction.
- Practical Applications: The findings from this research can be applied to various domains such as music streaming platforms, therapy, relaxation, or productivity enhancement tools.

Chapter 2

Literature Survey

A Music Application is a set of songs of people with their emotion [1]. It was observed in a cross-database experiment that raw features worked best with Logistic Regression for testing RaFD (Radboud Faces Database) database and Mobile images dataset. The accuracy achieved was 83 percent and 89 percent respectively for both using CK+ dataset as a training set. The additional features (distance and area) reduced the accuracy of the experiment for SVM (Support Vector Machine) from 89 percent. The algorithm that had been implemented generalized the results from the training set to the testing set better than SVM and several other algorithms. An average accuracy of 86 percent was seen for RaFD database and 87 percent for CK+ database for cross-validation=5.The main focus was feature extraction and analysis of the machine algorithm on the dataset. But accurate face-detection algorithms become very important if there are multiple people in the image.

[2]. One of the works was tested by deriving expression from the live feed via the system's camera or any pre-existing image available in the memory. It has been implemented using Python 2.7, OpenCV and NumPy. The objective was to develop a system that can analyse the image and predict the expression of the person. The study proved that this procedure is workable and produces valid results. There has also been research done on the Music Recommendation System. According to one such research , a preliminary approach to Hindi music mood classification has been described, that exploits simple features

extracted from the audio. MIREX (Music Information Retrieval Evaluation eXchange) mood taxonomy gave an average accuracy of 51.56 percent using the 10-fold cross validation. In addition to this, there is an article [10] that states that the current music recommendation research results from the perspective of music resources description. It is suggested that there is a lack of systematic research on user behaviour and needs, low level of feature extraction, and a single evaluation index in current research. Situation was identified to be an important factor in the music personalized recommendation system. Finally, it was concluded that when the weights given to all the contextual factors were the same, greatly reduced the accuracy of the recommendation results.

[3]. In a particular system , Anaconda and Python 3.5 softwares were used to test the functionality and Viola-Jones and haar cascade algorithms were used for face detection. Similarly, KDEF (Karolinska Directed Emotional Faces) dataset and VGG (Visual Geometry Group) 16 were used with CNN (Convolution Neural Network) model which was designed with an accuracy of 88percent, for face recognition and classification that validated the performance measures. However, the results proved that the network architecture designed had better advancements than existing algorithms. Another system

[4]used Python 2.7, OpenSource Computer Vision Library (OpenCV) CK (CohnKanade) and CK+ (Extended Cohn-Kanade) database which gave approximately 83percent accuracy. Certain researchers have described the Extended Cohn-Kanade (CK+) database for those wanting to prototype and benchmark systems for automatic facial expression detection. The popularity and ease of access for the original Cohn-Kanade dataset this is seen as a very valuable addition to the already existing corpora. It was also stated that for a fully automatic system to be robust for all expressions in a myriad of realistic scenarios, more data is required. For this to occur very large reliably coded datasets across a wide array of visual variabilities are required (at least 5 to 10k examples for each action) which would require a collaborative research effort from various institutions

Chapter 3

Project Design

3.1 Proposed Methodology

Emotion-Based Music Recommendation System is an application that aims to recognize emotions in real time.It is the model of the new product with three main modules, face recognition, mood classification and music search.

- Face detection module: Face detection module of the project involves facial expression detection, which uses computer vision algorithms to analyse and identify emotions based on facial expressions. The module takes input from a live video stream or an image and detects the facial landmarks, such as the position of the eyes, nose, and mouth. It then uses machine learning algorithms, such as Convolutional Neural Networks (CNNs), to classify the emotions based on the movement and position of these facial landmarks

- Mood classification module: Mood classification module of the project involves prediction of the dominant emotion(s) present in the facial expression, such as happy, sad, angry, fear , surprise or neutral. This module is crucial to the project as it forms the basis for selecting the appropriate mood for music recommendation

- Search module: Search module of the project involves searching for songs on YouTube . This module utilizes the predictions made by Mood detection module, based on the predicted mood(s) of the user. The module uses a standardized query for searching songs in

YouTube.

In summary, these three modules work together to provide a seamless and personalized music recommendation experience for the user. Face detection module detects the user's face, Mood classification based on their facial expression, Search module filters the retrieved songs based on the user's mood. Together, these modules leverage computer vision, machine learning.

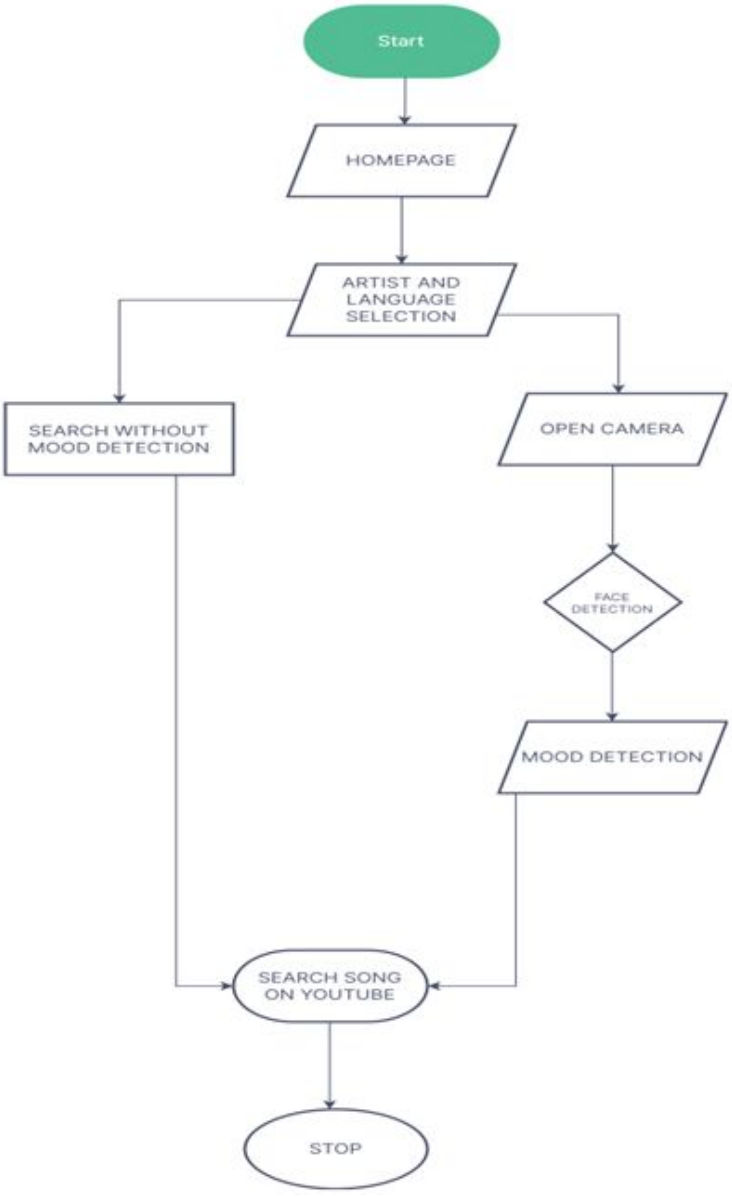

Figure 3.1: Data flow diagram

Chapter 4

Implementation

4.0.1 Hardware Requirements

The most common set of hardware requirements defined by any OS (Operating System) is the physical computing resources. The required hardware for the project are: 4 Gigabyte (GB) RAM or more (for processing), 4MP (MegaPixel) or more resolution camera/Webcam (for testing on Desktop/Laptop) and 23 GB Memory space or more (approx.)

4.0.2 Software Requirements

Software Requirements deal with the defining of pre-requisites and software resource requirements installation on a computer for optimal functioning of the application. These pre-requisites or requirements are generally not included in the software installation package and need to be installed separately before the software is installed. The required software for this project is Microsoft Visual Studio Code, Python version 3 and above and Web Browser like Safari, Google Chrome or Microsoft Edge

4.0.3 Libraries and frameworks

- av: A Python library for manipulating audio and video frames, providing high-level and low-level APIs for understanding, decoding, and managing media
- cv2: Open Source Computer Vision Library (OpenCV) is a com-

puter vision and machine learning tool that provides many image and video functions and algorithms

- mediapipe: A cross-platform, customizable framework for creating machine learning pipelines for image, video, and audio analysis, including prebuilt models and pipelines for face detection, hand tracking, pose prediction, and more.

Chapter 5

Results

The process of accurately detecting human emotions or mood through facial expressions is a complex and challenging task. Every individual's facial features are unique, making it difficult to develop a universal model for detecting emotions. The accuracy of the mood detection system also depends on the quality of the camera used to capture the facial expressions. Low-resolution cameras or poor lighting conditions can adversely affect the system's performance, resulting in inaccurate mood detection. Such conditions reduce the accuracy of the model.to overcome such conditions, The high-resolution cameras ensure that the system can capture clear images of the user's face, further improving the accuracy of the mood detection process. Once the system has detected the user's mood, it displays a curated search result of songs that match the detected emotion. The search result includes songs from different genres, artists, and time periods, ensuring that there is something for everyone. The system fetches the recommended songs from popular music streaming services like YouTube, making it easy for users to access and play their favourite songs. Overall, the proposed system provides a seamless and enjoyable music listening experience for users. By incorporating real-time mood detection and advanced facial expression recognition algorithms, the system can accurately curate search results that match the user's mood, helping them to relax and de-stress. As more and more people are turning to music as a means of coping with stress and anxiety, the system's ability to promote mental health and well-being makes it a valuable addition to the music streaming land-

scape.

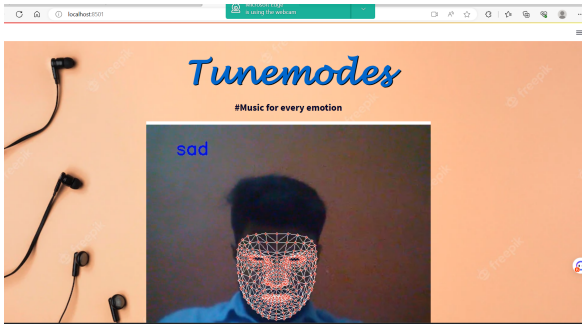

Figure 5.1: User Interface

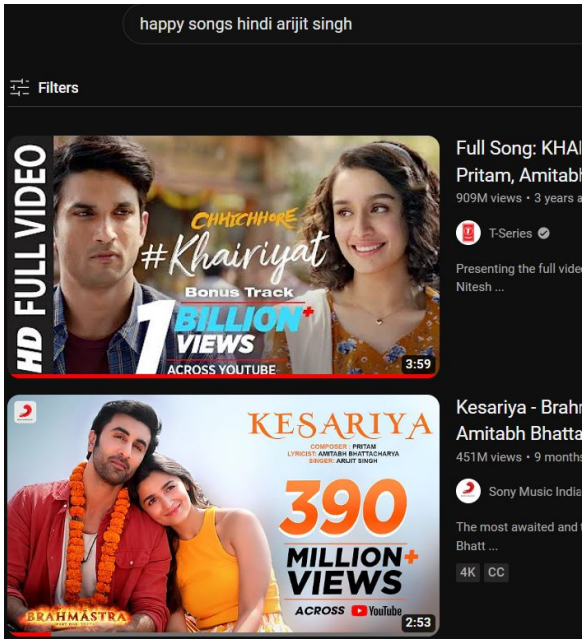

Figure 5.2: output generated

Chapter 6

Conclusion

In conclusion, the emotion-based music recommendation system developed in this project, Viby, successfully combines music therapy with cutting-edge technology to provide apt and helpful music recommendations to its users based on their mood. The model can accurately detect and recognize four different moods, namely anger, happy, sad, surprise, and neutral, with an accuracy rate of approximately 75 percent. However, for more accurate results, additional parameters such as heart rate, body temperature, and blood pressure must be considered along with facial expressions. Moreover, analysing lyrics can further enhance the performance of recommendation models. Future scope of the project includes training the model with more images for greater accuracy and recommending movies and TV series on the basis of mood detection.

APPENDIX A

Program

.

```
import streamlit as st
from streamlit_webrtc import webrtc_streamer
import av
import cv2
import numpy as np
import mediapipe as mp
from keras.models import load_model
import webbrowser
import os


st.set_page_config(page_title="my app")

# Load external CSS file
def import_css(style):
    with open(style) as f:
        css = f.read()
        st.markdown(f'<style>{css}</style>', unsafe_allow_html=True)

import_css("style.css")


def add_bg_from_url():
```

```
    st.markdown(
         f"""
         <style>
         .stApp {{
             background-image: url("https://img.freepik.com/free-phot
             background-attachment: fixed;
             background-size: cover
         }}
         </style>
         """,
         unsafe_allow_html=True
     )

add_bg_from_url()

model  = load_model("model.h5")
label = np.load("labels.npy")
holistic = mp.solutions.holistic
hands = mp.solutions.hands
holis = holistic.Holistic()
drawing = mp.solutions.drawing_utils

st.title("Tunemodes")
st.markdown("<p class='header'>#Music for every emotion</p>", unsafe_

if "run" not in st.session_state:
st.session_state["run"] = "true"

try:
emotion = np.load("emotion.npy")[0]
except:
emotion=""
```

```
if not(emotion):
st.session_state["run"] = "true"
else:
st.session_state["run"] = "false"

class EmotionProcessor:
def recv(self, frame):
frm = frame.to_ndarray(format="bgr24")

##############################
frm = cv2.flip(frm, 1)

res = holis.process(cv2.cvtColor(frm, cv2.COLOR_BGR2RGB))

lst = []

if res.face_landmarks:
for i in res.face_landmarks.landmark:
lst.append(i.x - res.face_landmarks.landmark[1].x)
lst.append(i.y - res.face_landmarks.landmark[1].y)

if res.left_hand_landmarks:
for i in res.left_hand_landmarks.landmark:
lst.append(i.x - res.left_hand_landmarks.landmark[8].x)
lst.append(i.y - res.left_hand_landmarks.landmark[8].y)
else:
for i in range(42):
lst.append(0.0)

if res.right_hand_landmarks:
for i in res.right_hand_landmarks.landmark:
lst.append(i.x - res.right_hand_landmarks.landmark[8].x)
```

```
lst.append(i.y - res.right_hand_landmarks.landmark[8].y)
else:
for i in range(42):
lst.append(0.0)

lst = np.array(lst).reshape(1,-1)

pred = label[np.argmax(model.predict(lst))]

print(pred)
cv2.putText(frm, pred, (50,50),cv2.FONT_ITALIC, 1, (255,0,0),2)

np.save("emotion.npy", np.array([pred]))


drawing.draw_landmarks(frm, res.face_landmarks, holistic.FACEMESH_TES
landmark_drawing_spec=drawing.DrawingSpec(color=(0,0,255), thickness=
connection_drawing_spec=drawing.DrawingSpec(thickness=1))
drawing.draw_landmarks(frm, res.left_hand_landmarks, hands.HAND_CONNE
drawing.draw_landmarks(frm, res.right_hand_landmarks, hands.HAND_CONN


##############################

return av.VideoFrame.from_ndarray(frm, format="bgr24")

#lang = st.text_input("Language")
#singer = st.text_input("Singer")

if  st.session_state["run"] != "false":
webrtc_streamer(key="key", desired_playing_state=True,
video_processor_factory=EmotionProcessor)
```

```
btn =st.button("Get your songs",st.markdown("""
<style>
div.stButton> button:first-child {
background-color: #ffffff;
font-weight: bold;
color:#000000;
}
div.stButton> button:hover {
background-color: #FF0000;
font-weight: bold;
color:#ffffff;
}
</style>""", unsafe_allow_html=True))

if btn:
if not(emotion):
st.warning("Please let me capture your emotion first")
st.session_state["run"] = "true"
else:
webbrowser.open(f"https://www.youtube.com/results?search_query={emoti
np.save("emotion.npy", np.array([""]))
st.session_state["run"] = "false"
  }
```

References

[1] Nitisha Raut. *Facial Emotion Recognition Using Machine Learning.* 2018.

[2] Mood based music recommendation system, international journal of engineering research technology (ijert).

[3] D. Chaudhary S. Kumar V. P. Sharma, A. S. Gaded and S. Sharma. Emotion-based music recommendation system. 2020.

[4] Chen A.P Chen, H.C. A music recommendation system based on music and user grouping. journal of intelligent information systems. `https://doi.org/10.3390/app122111209`, 2005.