

**A PROJECT REPORT ON**  
**“Emotion Based Music Player Using Deep Learning”**

**SUBMITTED TO THE SAVITRIBAI PHULE PUNE UNIVERSITY**  
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**FOURTH YEAR ENGINEERING (INFORMATION TECHNOLOGY)**

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**YEAR 2021-22**

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**Amrutvahini College of Engineering, Sangamner**  
A/P-Ghulewadi-422608, Tal. Sangamner, Dist. Ahmednagar (MS) India  
Year 2021-22



## **CERTIFICATE**

**This is to certify that project report entitled**

**“Emotion Based Music Player Using Deep Learning”**

Is submitted as partial fulfilment of  
curriculum of the B.E. of Information Technology

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Students of B.E.I.T.  
were examined in Project report entitled

**“Emotion Based Music Player Using Deep Learning”**

on .../.../2021

At

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## **Abstract**

The human face is an important organ of an individual 's body and it especially plays an important role in extraction of an individual's behavior and emotional state. Manually segregating the list of songs and generating an appropriate playlist based on an individual's emotional features is a very tedious, time consuming, labor intensive and upheld task. Various algorithms have been proposed and developed for automating the playlist generation process. However the proposed existing algorithms in use are computationally slow, less accurate and sometimes even require use of additional hardware like EEG or sensors. This proposed system based on facial expression extracted will generate a playlist automatically thereby reducing the effort and time involved in rendering the process manually. Thus the proposed system tends to reduce the computational time involved in obtaining the results and the overall cost of the designed system, thereby increasing the overall accuracy of the system. Facial expressions are captured using an inbuilt camera. The accuracy of the emotion detection algorithm used in the system for real time images is calculated.

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# **Chapter 1**

## **Introduction**

The field of science is as big as the universe itself. Every passing day there are new developments; if not big or groundbreaking, but constructive and leading towards a better tomorrow. Sound and Graphics are two vast fields of Science and Engineering that not only intrigue but also attract learners to study them in detail to explore into their depths. Since then many such inventions have propelled us to this time where thinking of various ideas which might not have been possible a few decades back and more over implementing them is now possible.

Now in the present time, where clicking a photo and listening to music “on the go” is just a part of anyone’s daily life, providing any improvements in the working of such technologies that in turn make the user experience better are always appreciated. With the improvements in technology the level of sophistication in software has also increased. Also with the idea of “keeping it simple”, developing sophisticated applications is a challenge.

Facial Expression based Music Player is interactive, sophisticated and innovative mobile (Android) based application to be used as a music player in a different manner. The application works in a different manner from the traditional software as it scans and classifies the audio files present on the device and according to the predefined parameters (Audio Features) present on the application in order to produce a set of mood based playlists. The real-time graphical input provided to the application is classified (Facial expression recognition) to produce a “mood” which will then be used to select the required playlist from the earlier set

### **1.1 Motivation**

- Listening to music is a key activity that assists to reduce stress.
- Facial expression helps to determine the mood of individual.

### **1.2 Aim**

- The system recommends song according to facial expression and mood of person.

### **1.3 Objectives**

1. To detect emotion on face to play songs.
2. To determine the mood from answers obtained and play song.

## **Chapter 2**

### **Literature Survey**

#### **1. Paper Name - Emotion Based Music Player**

Author - K. Chankuptarat, R. Sriwatanaworachai and S. Chotipant

Abstract -

Listening to music is a key activity that assists to reduce stress. However, it may be unhelpful if the music does not suit the current emotion of the listener. Moreover, there is no music player which is able to select songs based on the user emotion. To solve this problem this paper proposes an emotion-based music player, which is able to suggest songs based on the user's emotions sad, happy, neutral and angry. The application receives either the user's heart rate or facial image from a smart band or mobile camera. It then uses the classification method to identify the user's emotion. This paper presents 2 kinds of the classification method the heart rate-based and the facial image based methods. Then, the application returns songs which have the same mood as the user's emotion.

#### **2. Paper Name - An Intelligent Music Player Based On Emotion Recognition**

Author – R. Ramanathan, R. Kumaran, R. Ram Rohan, R. Gupta and V. Prabhu.

Abstract –

This paper proposes an intelligent agent that sorts a music collection based on the emotions conveyed by each song, and then suggests an appropriate playlist to the user based on his/her current mood. The user's local music collection is initially clustered based on the emotion the song conveys, i.e. the mood of the song. This is calculated taking into consideration the lyrics of the song,

as well as the melody. Every time the user wishes to generate a mood-based playlist the user takes a picture of themselves at that instant. This image is subjected to facial detection and emotion recognition techniques, recognizing the emotion. Emotion Based Music Player Using Deep Learning of the user. The music that best matches this emotion is then recommended to the user as a playlist.

3. Paper Name – An Intelligent Music Player Using Sentimental Analysis

Author - Henal Shah, Tejas Magar, Purav Shah and Kailas Devadkar

Abstract –

The images are taken using the camera and they are stored by using OpenCV. The Harr Cascade training is a tool used to accurately detect and recognize the hand gestures. In the Harr Cascade algorithm the data are stored in Xml format. qt is a cross-platform that is widely used is stored in the OpenCV database. The arm controller recognizes the hand gestures and sends to RS232. The RS232 acts as a interface between arm controller and the PC. The songs are sorted in playlist and played automatically according to the hand gesture. Block Diagram for Gesture Recognition Henal et al. proposed intelligent music player according to the user’s mood by using sentimental or emotion analysis.

4. Paper Name – Emotion Based Music Player

Author Name - Nikhil Zaware, Tejas Rajgure, Amey Bhadang, D.D. Sakpal.

Abstract -

Nikhil et al. determines the mindset of the user by using facial expression . Humans often express their feeling by their expressions, hand gestures and by raising the voice of tone but mostly humans express their feelings by their face. Emotion based music player reduces the time complexity of the user. Generally people have large number of songs on their playlist. Playing songs randomly does not satisfy the mood of the user. This system helps user to play songs automatically according to their mood.

5. Paper Name – Accurate Algorithm For Generating A Music Playlist Based on

Facial Expressions.

Author Name – Anukriti Dureha

Abstract -

This paper presents an algorithm that automates the process of generating an audio playlist, based on the facial expressions of a user for rendering salvage of time and labor, invested in performing the process manually. The algorithm proposed in this paper aspires to reduce the overall computational time and the cost of the designed system. It also aims at increasing the accuracy of the designed system. The facial expression recognition module of the proposed algorithm is validated by testing the system against user dependent and user independent dataset. Experimental results indicate that the user dependent results give 100% accuracy, while user independent results for joy and surprise are 100% but for sad, anger and fear are 84.3%, 80% and is 66% respectively.

## **Chapter 3**

### **REQUIREMENTS AND ANALYSIS**

#### **3.1 Problem Definition**

- To Design and Develop a system where the music is played depending about the emotion shown by the facial expression.

##### **3.1.1 Description**

- Image is captured and facial expression is recognised.
- Textual question is asked to user and answer is recognized.
- Song is recommended through facial expression and textual recognition.

#### **3.2 Software Requirement Specification (SRS)**

##### **3.2.1 Introduction**

- **Purpose :** The main purpose for preparing this document is to give a general insight into the analysis and requirements of the existing system or situation and for determining the operating characteristics of the system.
- **Scope :**
  - Stress is reduced.
  - Emotion enlightened.



### **3.3 Functional Requirements**

1. **Facial Expression Recognition** The output of Viola and Jones Face detection block forms an input to the facial feature extraction block. The required features are extracted using the Python library that is imported in the Android Studio folder. This helps in classifying that the input real time image has as its expression i.e. the users expression.
2. **Audio Feature Extraction** In this module a list of songs forms the input. As songs are audio files, they require a certain amount of pre-processing Stereo signals that are obtained from the Internet and are converted to 16 bit PCM mono signal around a variable sampling rate of 48.6 kHz. The conversion process is done using Audacity technique. The pre-processed signal obtained undergoes an audio feature extraction, where features like rhythm toning is extracted.

### **3.4 External Interface Requirements**

#### **3.4.1 User Interfaces**

The user interface for the software shall be compatible to any browser such as Google chrome, Mozilla by which user can access to the system. The user interface shall be implemented using any tool or software package like Java Applet, MS Front Page, and EJB etc.

#### **3.4.2 Hardware Interfaces**

Since the application must run over the internet, all the hardware shall require to connect internet will be hardware interface for the system. As for e.g. Modem, WAN – LAN, Ethernet Cross-Cable.

#### **3.4.3 Software Interface Description**

This system is a multi-user, multi-tasking environment. It enables the user to interact with the server and attain interact with the server by sending the two

locations for meeting and also leaves a record in the inbuilt database. It uses Java and android as the front end programming tool and MySQL as the back end application tool.

#### **3.4.4 Communication Interfaces**

The system shall use the HTTP protocol for communication over the internet and for the intranet communication will be through TCP/IP protocol suite.

### **3.5 Non Functional Requirements:**

#### **3.5.1 Performance Requirements**

- System can produce results faster on 4GB of RAM.
- It may take more time for peak loads at main node.
- The system will be available 100% of the time. Once there is a fatal error, the system will provide understandable feedback to the user.

#### **3.5.2 Safety Requirements**

- The system is designed in modules where errors can be detected and fixed easily.

#### **3.5.3 Security Requirements**

- The system is designed in modules where errors can be detected and fixed easily.

#### **3.5.4 Software Quality Attributes**

- **Usability:**

This relates to how easily people can use your system. A measure of usability could be the time it takes for end users to become familiar with your system's functions, without training or help.

- **Reliability:**

This is the percentage of time that your app works correctly to deliver the desired results, despite potential failures in its environment..

- **Performance:**

This is essentially how fast your system works. A performance requirement for the system could be start in less than 20 seconds.

- **Security :**

Say that your system saves all the previous QR code and lets you reuse a saved QR code.

- **Responsiveness:**

This requirement ensures that your system is ready to respond to a user’s input or an external event no matter what it’s doing currently.

### **3.6 Software and Hardware Requirement**

#### **3.6.1 Minimum Hardware Requirement**

1. **System :** Intel 3 or Above 2.4 GHz.
2. **Hard Disk :** 40 GB (min)
3. **RAM :** 2 GB or Higher.
4. **Camera**
5. **Speakers**

#### **3.6.2 Minimum Software Requirements**

Platform :

1. **Operating System :** Windows 7 and Above.
2. **Programming Language :** Python

### **3.7 Set-up**

Some of the important steps that I have to follow in order to set-up an environment for proposed system:

Task 1- Download and install Python 3.7 or higher

Task 2 - Set up database connectivity. Using JDBC and MySQL bridge drivers.

Task 3 - First go to project properties using right click on project in Python IDLE, select Run Tab, and set main page.

### **3.8 Software Engineering Methodology**

#### **3.8.1 Software Life-cycle used in this Project**

The Waterfall Model was first Process Model to be introduced. It is also referred to as a linear-sequential life cycle model. It is very simple to understand and use. In a waterfall model, each phase must be completed fully before the next phase can begin. This type of model is basically used for the project which is small and there are no uncertain requirements. At the end of each phase, a review takes place to determine if the project is on the right path and whether or not to continue or discard the project. In this model the testing starts only after the development is complete. In waterfall model phases do not overlap.

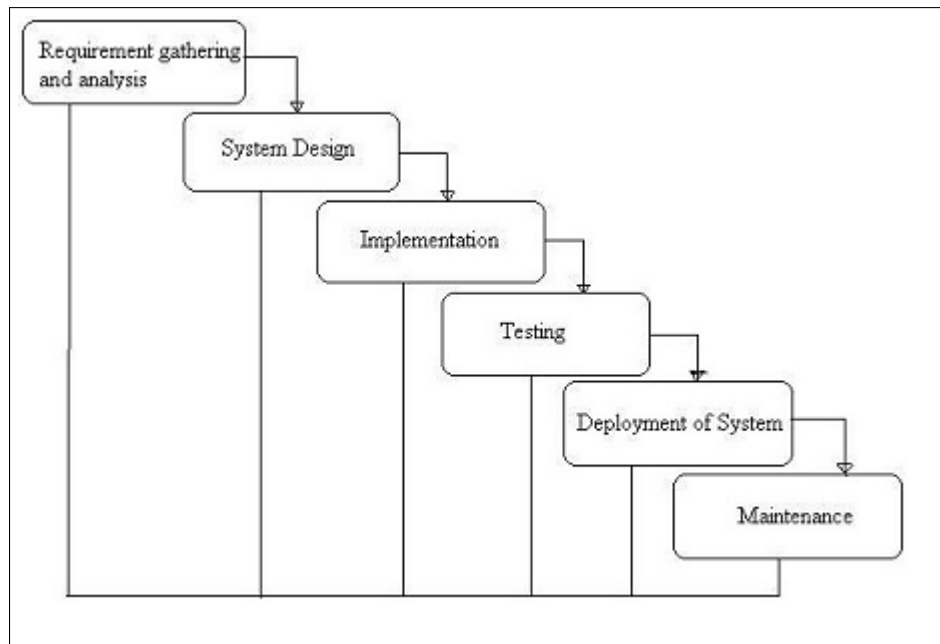


Figure 3.1: Waterfall Model

- **Applications**

1. This model is simple and easy to understand and use.
2. It is easy to manage due to the rigidity of the model - each phase has specific deliverables and a review process.
3. In this model phases are processed and completed one at a time. Phases do not overlap.
4. Waterfall model works well for smaller projects where requirements are very well understood.

## Chapter 4

### Detailed Design

#### 4.1 Introduction

The architecture of our proposed system is shown in figure.

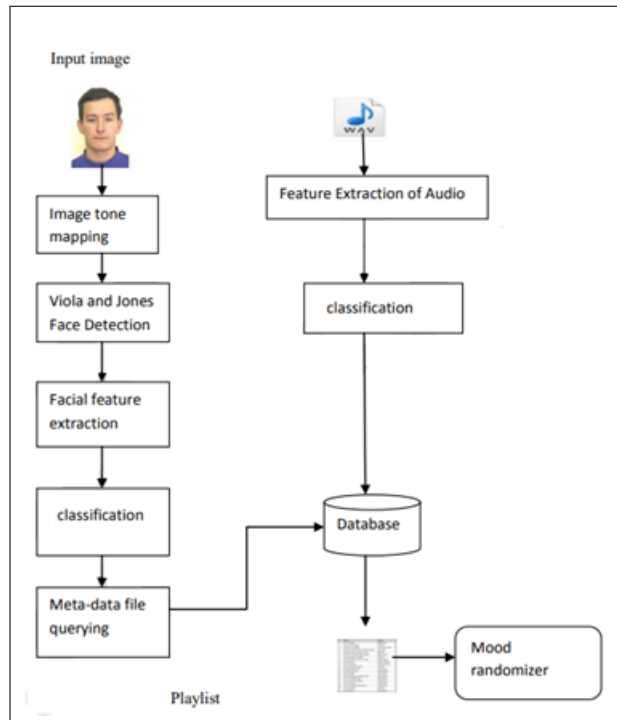


Figure 4.1: Architecture diagram

## 4.2 Data Flow Diagram

A data flow diagram (DFD) is a graphical representation of the “flow” of data through an information system, modeling its process aspects. A DFD is often used as a preliminary step to create an overview of the system, which can later be elaborated. DFDs can also be used for the visualization of data processing.

### 4.2.1 Level 0 Data Flow Diagram

Level 0 DFD diagram shows two entities in whole system. One is user who will enjoy the music. The system which will take image of user as graphical input to recognize emotion.

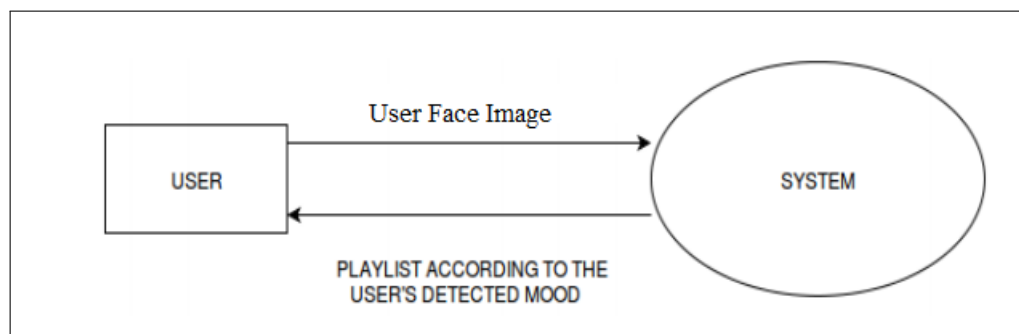


Figure 4.2: Level 0 Data Flow Diagram

#### 4.2.2 Level 1 Data Flow Diagram

Level 1 Data flows from user to utility taking image of user ,classification is done for playlist and emotion recognized by system to give emotion based music from player.

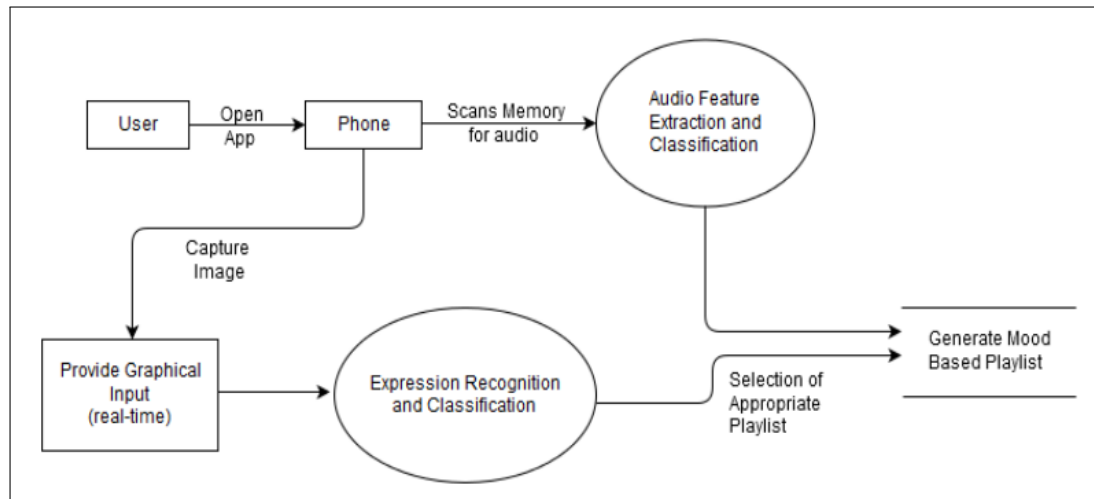


Figure 4.3: Level 1 Data Flow Diagram



## 4.3 UML

### 4.3.1 Sequence Diagram

Sequence diagrams provide a graphical representation of object interactions over time. The diagrams show the flow of messages from one object to another, and as such correspond to the methods and events supported by a class/object.

Sequence diagram shows the flow with song requested by user, system capturing image user, analyzing the emotion of captured and playing the most suited song for that emotion.

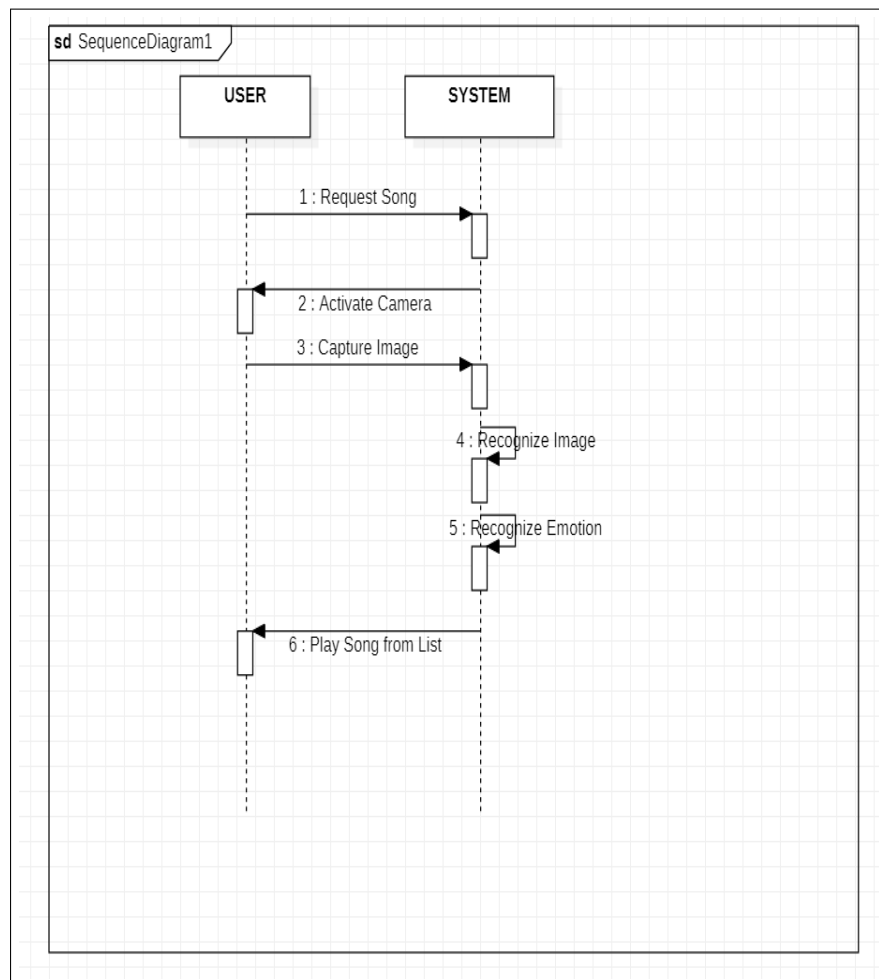


Figure 4.4: Sequence Diagram

### 4.3.2 Activity Diagram

Activity diagram is another important diagram in UML to describe the dynamic aspects of the system. Activity diagram is basically a flowchart to represent the flow from one activity to another activity.

Flow for this system starts with user request with add song button, the system starts camera and captures the image . The system recognizes image and emotion to play suitable song from playlist.

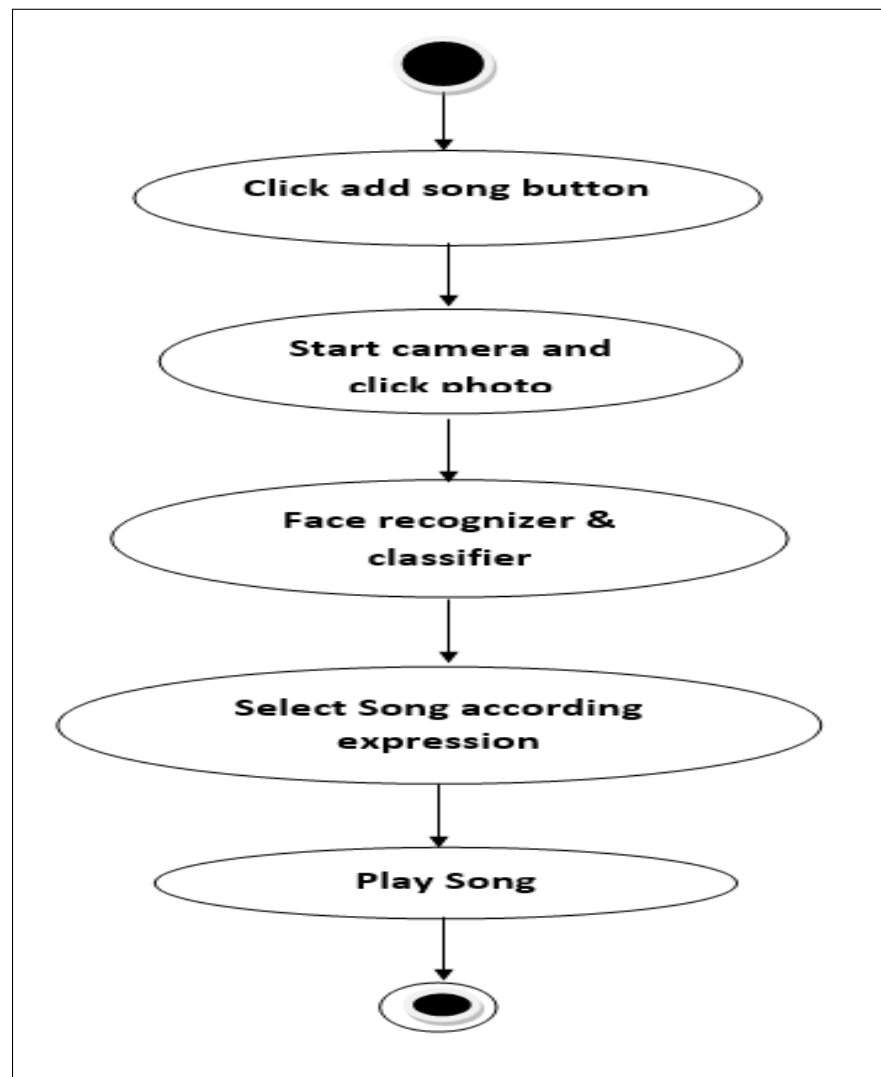


Figure 4.5: Activity Diagram

### 4.3.3 Use Case Diagram

To model a system, the most important aspect is to capture the dynamic behavior. Dynamic behavior means the behavior of the system when it is running/operating. Only static behavior is not sufficient to model a system rather dynamic behavior is more important than static behavior. Use case diagrams consists of actors, use cases and their relationships. The diagram is used to model the system/subsystem of an application. A single use case diagram captures a particular functionality of a system. Hence to model the entire system, a number of use case diagrams are used.

the two actors namely user and system, user request song and system activates camera to take image. Image is recognized for emotion to play song.

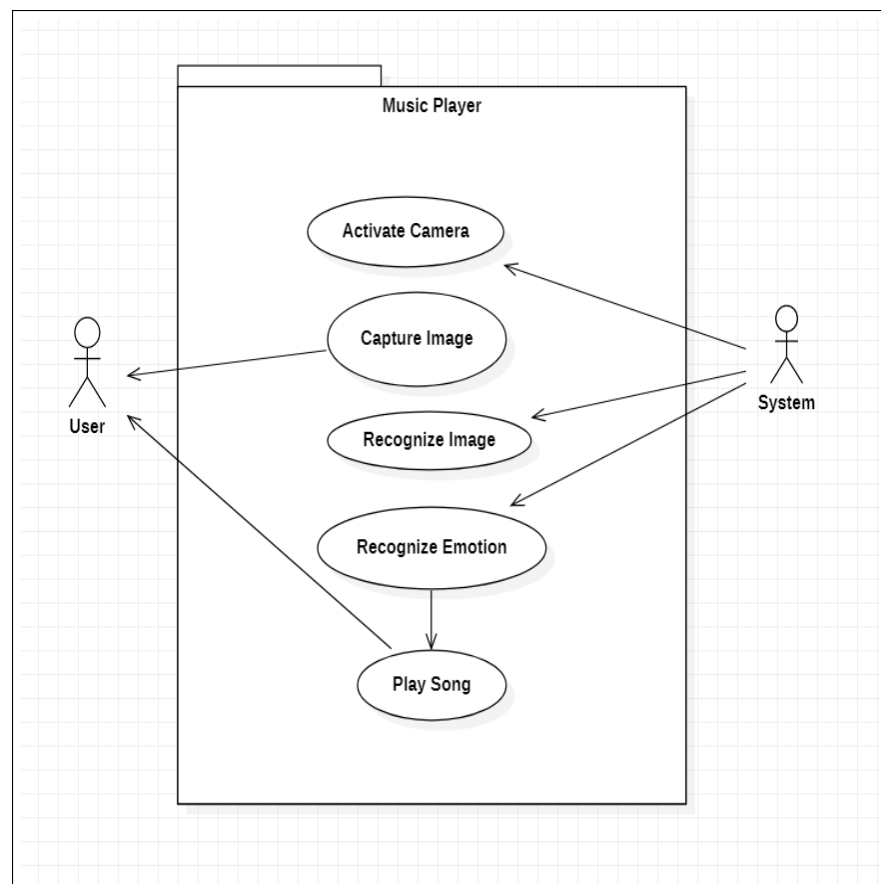


Figure 4.6: Use Case Diagram

#### 4.3.4 Class Diagram

Class diagram represents the static view of application and it shows a collection of classes, interfaces, associations, collaborations, and constraints. In this diagram different classes shows interfacing of different modules.

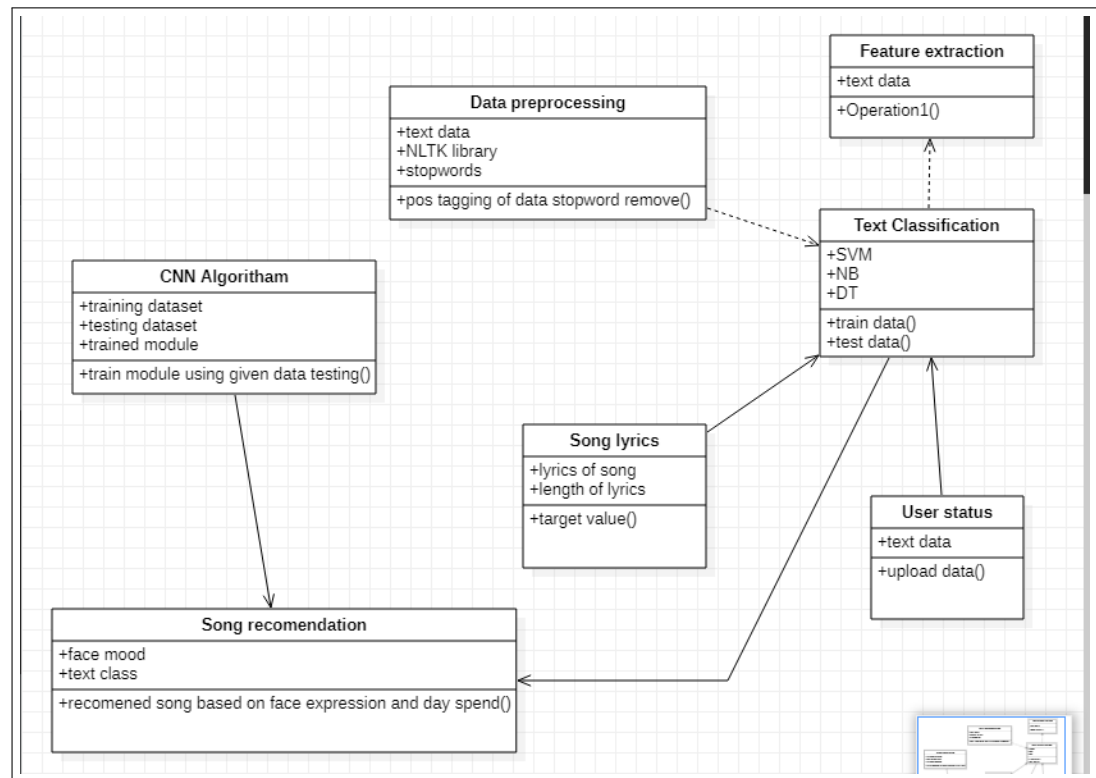


Figure 4.7: Class Diagram

## **Chapter 5**

### **PROJECT PLANNING**

The Project Planning concept is very important. After we selected our project topic, project planning is important. In software engineering and development, project planning is intertwined into the methodology in a way that sometimes it is difficult to separate these subjects from each other. To understand how to prepare a plan for our project, consider the situation that we are standing in. Lack of planning and being careless about scheduling can create an irreversible catastrophic circumstance that puts our entire project in a hazardous situation. The dangerous outcomes can be very different. The extent can be from low quality project delivery, at one extreme, to total failure, at the other. Now, how we can prevent this unwanted scenario? How we can guarantee that our project would provide the requirements to a pass, as a maximum achievement? How we can turn it to a real success? Indeed, taking simple steps can help to overcome with this situation, properly. As a first action, if we are already understanding planning concept then consider the following steps:

- **Main phases of a project plan**
  - Understanding the problem area
  - Literature Review
  - Requirements Management
  - Analysis
  - Design
  - Implementation
  - Test

- Project Report
- Presentation

Using one of the tools, such as Microsoft Project, Microsoft Visio, and OpenProj, Smart draw etc. that can help us to preparing Gantt Chart.

## **5.1 Project Plan**

Project plan in a simple format is a document that explains 4Ws+H, which means What is going to be done? When it is going to be done? Who is going to do it? Where this is going to be done? and How it is going to be done? This concept has rephrased again as below: Questions about Project Plan:

- What are the main steps that the project goes through?
- What is the project timeline(i.e. what happens when)?
- What are the deliverable that the project should deliver?
- What are the quality criteria?
- What are the acceptance criteria?
- How the project would be conducted?

At the first step, the plan seems to be very vague to us. At this stage, do not worry about the details. Simply think about the major steps that we should take and make a list that depicts those major steps, which should be taken. Look at the following example to find out it can be done. As we can realize these may slightly be different in our case, however, the main themes remains similar. this task making a list by breaking down the whole job into specific manageable tasks-is called Work Breakdown and the result which is called Work Breakdown Structure. Work Breakdown Structure(WBS) sample:

- Preparing Problem Statement
- Understanding general requirements

- Meeting with my Guide
- Literature Review
- Implementation
- Testing
- Writing Project Report
- Preparing Presentation

Table 5.1: Time line Chart

Work Task	Description	Duration
Literature Search	Related work done for conceptual data similarity	6 weeks
System analysis	Critical analysis and comparison of technologies studied and results achieved in research	4 weeks
Design and Planning	Modeling and design and dataset searching or creation	8 weeks
Implementation	Divided into phases	
Phase A	Implementation module 1	2 weeks
Phase B	Implementation module 2	2 weeks
Phase C	Implementation module 3	2 weeks
System Testing	Test system quality, fix errors if any and improve if needed. Test system for different data sets	3 weeks
Final Report	Prepare and upload Initial Report	2 weeks
Initial Report	Prepare and upload Initial Report	2 weeks

Now, this list needs two important things, which should be added to it in order to make it a plan: timing and resourcing. By timing, we can say when the task is expected to be started and when it is expected to be accomplished. By resourcing, The human beings and any material/equipment that any specific task of the above list need to have in order to be done.

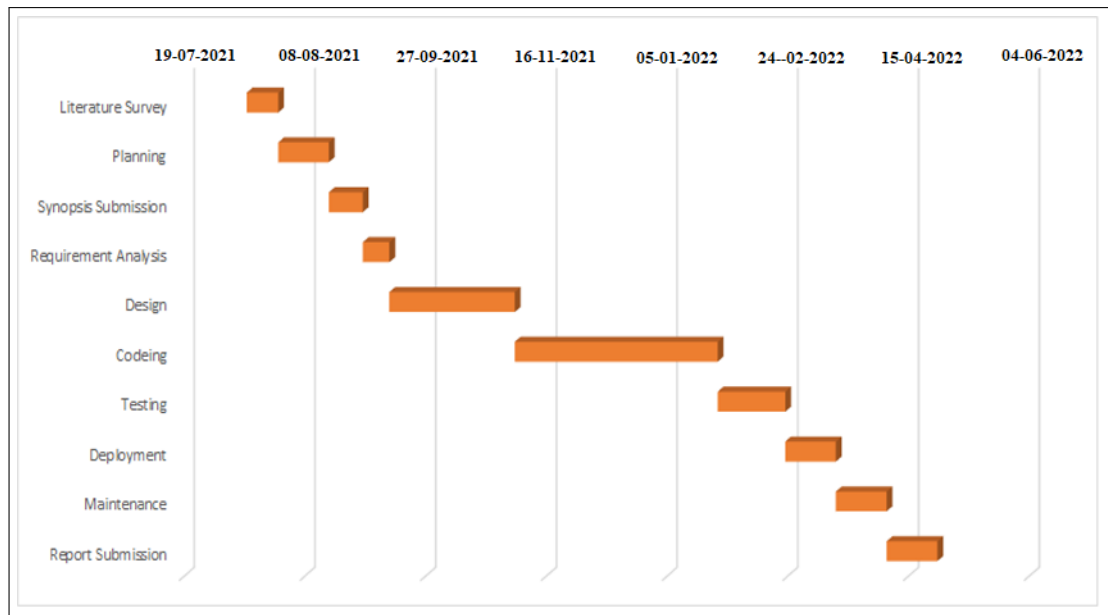


Figure 5.1: Project Plan

## 5.2 Controlling the Project

Project planning, as it was mentioned, is one of the early steps that we should take in order to pave the way to accomplish our project. Suppose that we are at the beginning of the project. we have to prepare the problem statement and we have considered that we should prepare it within 5 days. Again, suppose that based on our estimation it needs 10 hours to be done. Now, it is a good practice to specify how many hours we are going to dedicate to this task in each day of this tasks 5 days period. However, if it seems too detailed and too cumbersome to we to do so, then simply evaluate the task in terms of percentage and evaluate our daily progress. Then write these evaluation and progress down on our schedule as a part of our Project Diary. This evaluation allows to examine our progress and to adapt our efforts based on its outcomes. For instance, finalizing the literature review can be considered as a milestone, which means we have sent our literature review to our supervisor, then we have received her/his feedback, then we have applied changes, and finally we have received the supervisors OK on this task.



### 5.3 Project Diary

Table 5.2: Project Diary template

Item	From	To	Description
1	15/06/21	24/07/21	Discuss about project related topics.
2	01/07/21	08/07/21	Finding Domain and Search IEEE Papers.
3	08/07/21	15/07/21	Discuss about different topics related to domain.
4	25/07/21	22/07/21	Discuss about finalize the title.
5	22/07/21	29/07/21	Show Abstract to guide.
6	01/08/21	05/08/21	Prepare the Literature Survey.
7	15/08/21	26/08/21	We Prepare and give the first presentation
8	27/09/21	07/10/21	We prepare report and presentation for second review
9	14/10/21	14/10/21	We give the second presentation

Some of the departments encourage students to keep a diary for the project that they do. Indeed, in some cases they ask students to attach this diary as an attachment to their final reports on their project. Regardless of whether this is an obligation to do or not, it would be a great habit and practice to keep a project diary for our project. There is no need to record everything in detail, but having simple notes on what we have done, when we have done it, and what have been the main problem that we faced could be sufficient.

### 5.4 Summary

Project planning plays an important role in any project. It is still crucial to have properly schedule plan for it. Using the main steps, which are typical to information technology and computing projects, we were advised to prepare our first-cut schedule. Afterwards, we were shown how to polish this draft version and to revise it to cover our specific situation. The concept milestones and its importance was introduced. Again, we were advised to identify our project's milestones. Keeping diary short and upto the point, whereas recording main items such as date, amount of effort, main problems, and naming related tasks according to the schedule were presented as a good and helpful practice.

## Chapter 6

### Implementation

#### 6.1 Modules

1. **Face Recognition** Image is Captured through Image itself or Video Input. These Images takes in inputs, which are then processed in hidden layers of network using weights that are adjusted during training. Face is detected from image. Locate one or more faces in the image and mark with a bounding box. Feature Extraction. Extract features from the face that can be used for the recognition task. Emotion Recognition. Perform matching of the face against one or more known faces in a prepared database.
2. **Lyrics Classification** Lyrics are classified though the emotion recognized by first module. This feature helps to classify songs which are sad , happy etc.
3. **Songs Recommendations** In this module a list of songs are recommended according to the expression recognized and lyrics classified through same.
4. **Text Classification** n this module text is classified of the answer given by user and accordingly the text is recognized.  
Example: how was your day “The day was nice”..

#### 6.2 Algorithm

##### 6.2.0.1 SVM

SVM (Support vector machine) is one popular algorithm used for many classification problems.

- It is one of the supervised learning models with associated learning algorithms that analyze data used for classification and regression analysis. Given a set of training examples, each marked as belonging to one or the other of two categories, an SVM training algorithm builds a model that assigns new examples to one category or the other, making it a non-probabilistic binary linear classifier.
- An SVM model is a representation of the examples as points in space, mapped so that the examples of the separate categories are divided by a clear gap that is as wide as possible.

```

Input: D dataset, on-demand features, aggregation-based features,
Output: Classification of Application
for each application App-id in D do
  Get on-demand features and stored on vector x for App-id
  x.add ( Get-Features(app-id));
end for
for each application in x vector do
  Fetch first feature and stored in b, and other features in w.
  hw,b (x) = g (z) here z= ( wT x + b)
  if (z > 0)
    assign g(z)=1;
  else g(z)=-1;
  end if
end for

```

Figure 6.1: SVM

### 6.2.0.2 Decision Tree

The decision tree Algorithm belongs to the family of supervised machine learning algorithms. It can be used for both a classification problem as well as for regression problem

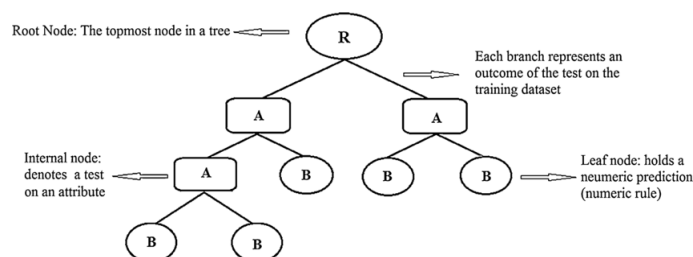


Figure 6.2: Decision Tree

### 6.2.0.3 Random Forest

Random Forest algorithms are used for classification as well as regression.

It creates a tree for the data and makes prediction based on that.

Random Forest algorithm can be used on large datasets and can produce the same result even when large sets record values are missing.

The generated samples from the decision tree can be saved so that it can be used on other data.

In random forest there are two stages, firstly create a random forest then make a prediction using a random forest classifier created in the first stage.

## Chapter 7

### Results And Discussions

#### 7.1 Angry Emotion

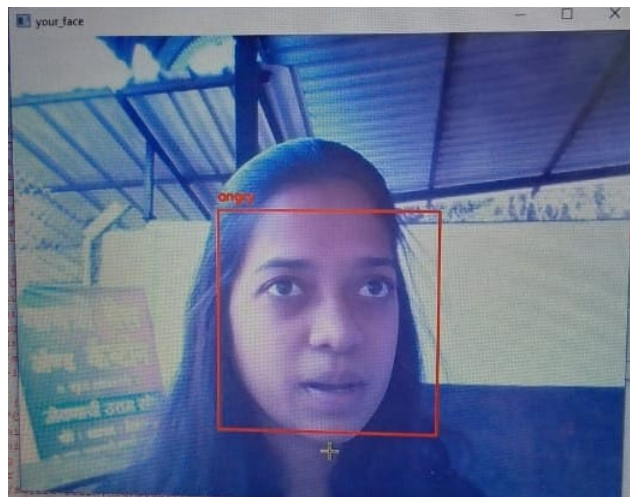


Figure 7.1: Screenshot1 : Angry Emotion

In above figure 7.1 ANGRY emotion is detected using the first module, accordingly to that angry song is recommended to the user.

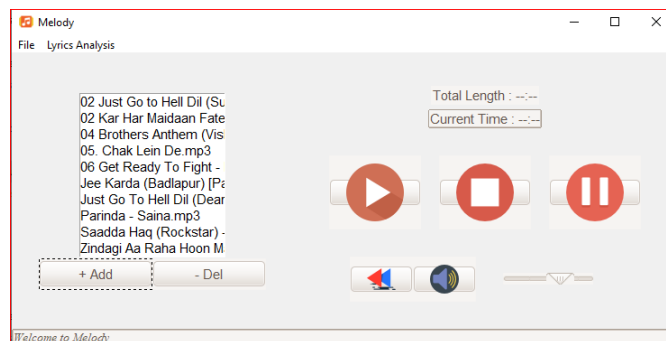


Figure 7.2: Screenshot2 : Selection of Angry Emotion Song

## 7.2 Happy Emotion

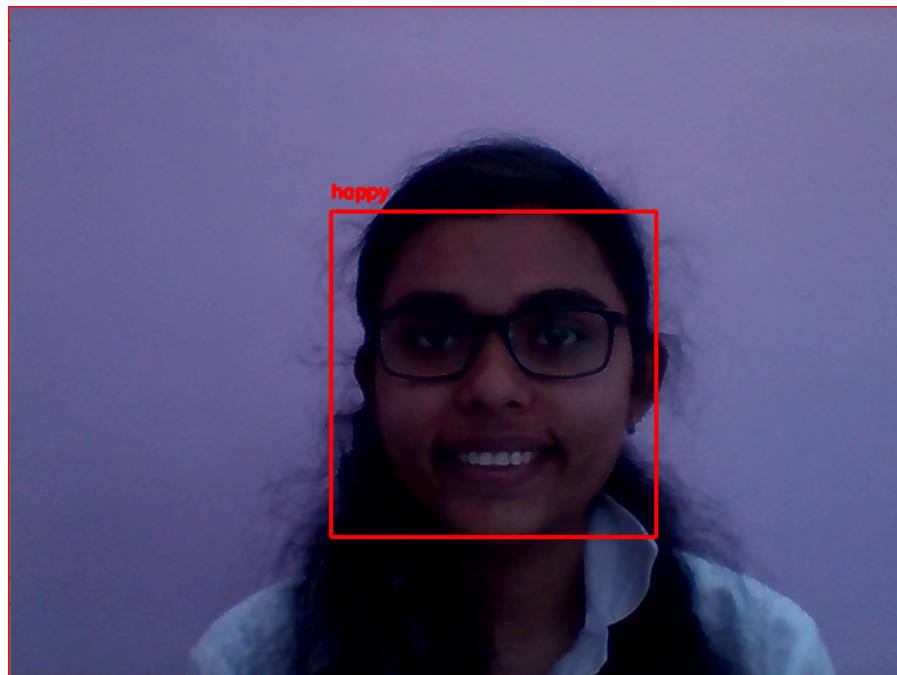


Figure 7.3: Screenshot3 : Happy Emotion

In figure 7.3 happy mood is detected and according to that system recommend the happy song to the user.

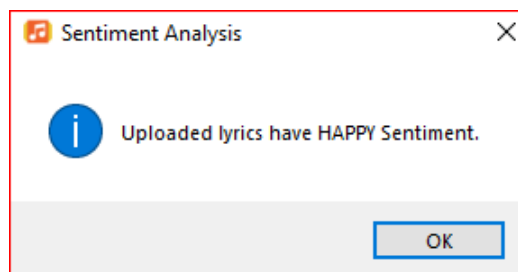


Figure 7.4: Screenshot4 : Uploading Lyrics of Happy Song

## 7.3 Scared Emotion

In figure 7.7 scary mood is detected and according to that system recommend the scary song to the user.

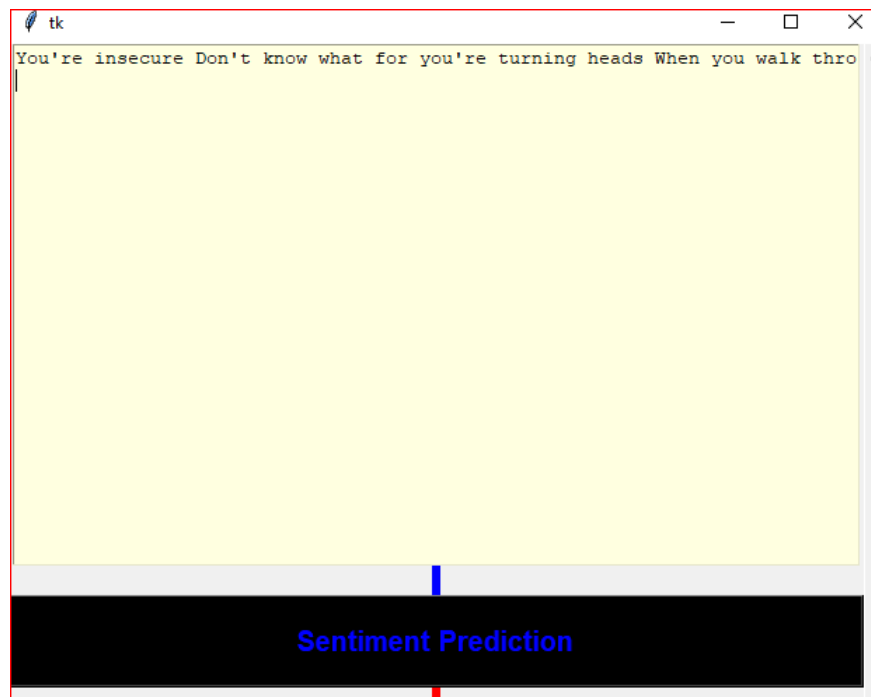


Figure 7.5: Screenshot5 : Happy Song Lyrics Uploaded

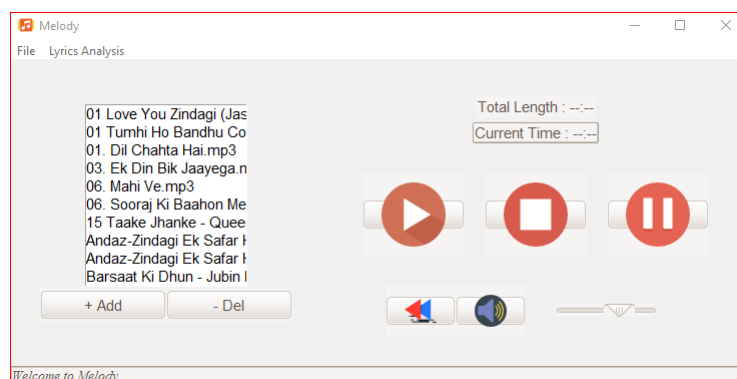


Figure 7.6: Screenshot6 : Selected Happy Song Playing

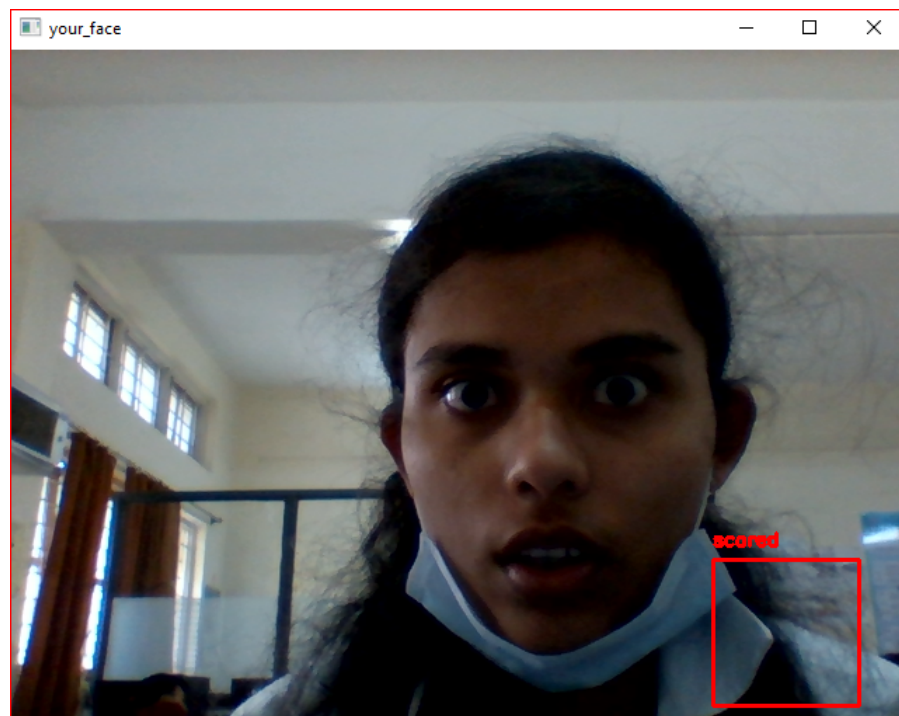


Figure 7.7: Screenshot11

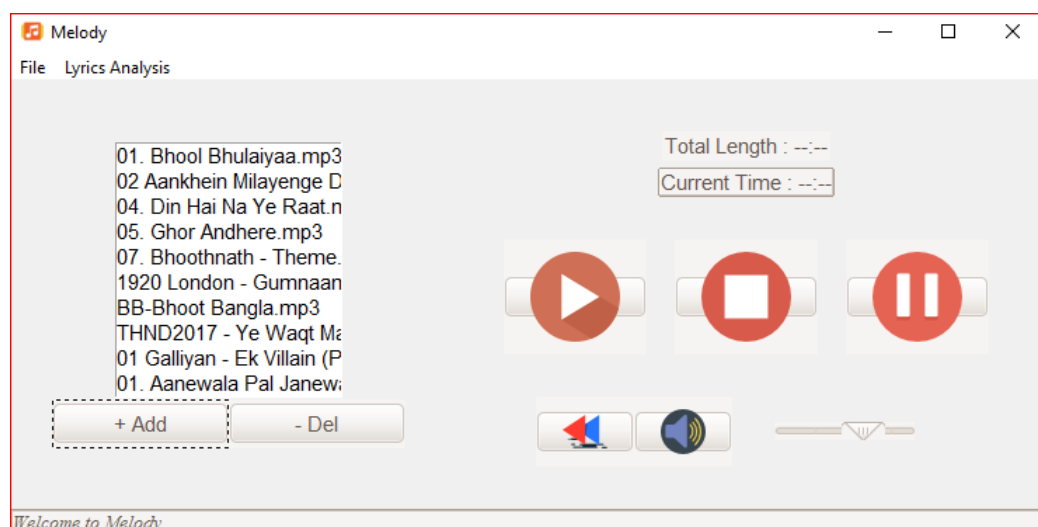


Figure 7.8: Screenshot12



## Chapter 8

### Testing

#### 8.1 Introduction

Testing is a vital part of software development, and it is important to start it as early as possible, and to make testing a part of the process of deciding requirements. Testing is part of a lifecycle. The software development lifecycle is one in which we hear of a need, we write some code to fulfill it, and then we check to see whether you we pleased the stakeholders—the users, owners, and other people who have an interest in what the software does.

We therefore design tests based on the stakeholders' needs, and run the tests before the product reaches the users. Preferably well before then, so as not to waste our time working on something that isn't going to do the job.

- Tests represent requirements. Whether you write user stories on sticky notes on the wall, or use cases in a big thick document, your tests should be derived from and linked to those requirements. And as we've said, devising tests is a good vehicle for discussing the requirements.
- We're not done till the tests pass. The only useful measure of completion is when tests have been performed successfully.

#### **Test Objective:**

The objective of our test plan is to find and report as many bugs as possible to improve the integrity of our program. Although exhaustive testing is not possible,

we will exercise a broad range of tests to achieve our goal.

Following test process approach will be followed :

- Organize Project involves creating a System Test Plan, Schedule and Test Approach, and assigning responsibilities.
- Design/Build System Test involves identifying Test Cycles, Test Cases, Entrance and Exit Criteria, Expected Results, etc. In general, test conditions/expected results will be identified by the Test Team in conjunction with the Development Team. The Test Team will then identify Test Cases and the Data required. The Test conditions are derived from the Program Specifications Document.
- Design/Build Test Procedures includes setting up procedures such as Error Management systems and Status reporting.
- Build Test Environment includes requesting/building hardware, software and data set-ups.
- Execute System Tests – The tests identified in the Design/Build Test Procedures will be executed. All results will be documented and Bug Report Forms filled out and given to the Development Team as necessary.
- Signoff - Signoff happens when all pre-defined exit criteria have been achieved.

### **UNIT TESTING:**

During the unit testing phase, the system is tested while it is developed. Here all the options of the system are validated.

During the first phase of this testing the testing person tests the system by entering the valid data, or by performing the appropriate function which the system requests for. This phase of testing is done to verify whether the system performs all the requested functions.

### **White Box Testing:**

White box testing, sometimes called as glass box testing, is a test case design

method that uses control structure of the procedural design to derive the test cases. Using the white box testing methods, the software engineer can derive the test case that:

- Guarantee that all independent paths within module having exercised at least once.
- Exercise all logical decisions and their true or false sides.
- Execute all loops and within their operational bounds.
- Exercise the internal data structures to ensure their validity.

#### **Black Box Testing:**

We have focused on the Functional requirement and the proceeding of the module to fulfil the requirement the requirement will be appreciated by the module instances and give the desired functionality as per the expectations. Black box testing attempts to find the errors in following categories:

- Incorrect user details
- Interface problems
- Initialization Complexities
- Performance Measurement
- Error in data structures and external database error

#### **INTEGRATION TESTING:**

The integration will be based on the total whole module testing the integration of the module will be categories as follows:

- Checking the module and Data entry status
- Redirectional functionalities
- Checking the Status through ID

- Checking Chart Accuracy
- Error in data structures and external database error

.

### **Top Down Integration:**

Top down integration is an incremental approach to the construction of program structure modules and integrated by moving downwards through the control hierarchy beginning with main control module. Modules subordinates to the main control module are incorporated into the structure in either the depth first or breadth first manner as per the categories:

- Sending data to the database
- Constraint validation
- Updating the further changes in the system
- Looking for the Status
- Perform the Graphical Accuracy Test

.

## 8.2 Test cases

Table 8.1: Test case 1: Input text Absent

No	Behaviour description	Property
1	Unique Test case ID	1
2	Test Case Name	Data Validation
3	Prerequisites	Constraint Type
4	Test Case Description	Enter the data to the fields
5	Input	Name,DoB,Age,Contact Details,Address
6	Output	Constraint based Operation
7	Steps to be performed	Entering Step by step
8	Actual Result	Operational Output
9	Expected Result	Operational Output
10	Pass/Fail	Pass
11	Comment	Done with first stage

Table 8.2: Test case 2: Check For Location

No	Behaviour description	Property
1	Unique Test case ID	2
2	Test Case Name	Location Validation
3	Prerequisites	Location Name
4	Test Case Description	Check the location of complaint
5	Input	Check box
6	Output	Location of ISP
7	Steps to be performed	Select Check Box
8	Actual Result	Location
9	Expected Result	ISP Location
10	Pass/Fail	Pass
11	Comment	Done with second stage

Table 8.3: Test case 3: Login for Unauthorized User

No	Behaviour description	Property
1	Unique Test case ID	3
2	Test Case Name	Login for Unauthorized User
3	Prerequisites	Login Details
4	Test Case Description	Authorization
5	Input	Username And Password
6	Output	Index.Html page
7	Steps to be performed	Enter the username and password
8	Actual Result	Index.html page
9	Expected Result	Index.html page
10	Pass/Fail	Pass
11	Comment	Done with Third stage

Table 8.4: Test case 4: Status Check

No	Behaviour description	Property
1	Unique Test case ID	4
2	Test Case Name	Status Confirmation
3	Prerequisites	Compliant status
4	Test Case Description	Graphical Output Chart
5	Input	Complaints
6	Output	Graph Chart
7	Steps to be performed	Make Complaints
8	Actual Result	Graph with section specified
9	Expected Result	Graphical Output
10	Pass/Fail	Pass
11	Comment	Done with Last stage

## **Chapter 9**

### **OTHER SPECIFICATIONS**

#### **9.1 Advantages**

- Stress is reduced.
- Emotion enlightened.

#### **9.2 Limitations**

- 

#### **9.3 Applications**

- Commercial Playlist.
- Hospitalization services.

## **Chapter 10**

### **Conclusion**

#### **10.1 Conclusion**

The Emotion-Based Music Player is used to automate and give a better music player experience for the end user. The application solves the basic needs of music listeners without troubling them as existing applications do: it uses technology to increase the interaction of the system with the user in many ways. It eases the work of the end-user by capturing the image using a camera, determining their emotion, and suggesting a customized play-list through a more advanced and interactive system. The user will also be notified of songs that are not being played, to help them free up storage space.



## **Appendix A**

### **Details of Paper Publication**

#### **1. Implementation Paper**

Title - An Implementation towards Smart Music Player based on Emotion Recognition Using Machine Learning

Publication - International Journal of Innovative Research in Science, Engineering and Technology

Year - ——— Volume 11, Issue 5, May 2022 —



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# Implementation towards Smart Music Player Based on Emotion Recognition Using Machine Learning

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**ABSTRACT:** The human face is an important organ of an individual's body and it especially plays an important role in extraction of an individual's behaviour and emotional state. Manually segregating the list of songs and generating an appropriate playlist based on an individual's emotional features is a very tedious, time consuming, labour intensive and upheld task. Various algorithms have been proposed and developed for automating the playlist generation process. However the proposed existing algorithms in use are computationally slow, less accurate and sometimes even require use of additional hardware like EEG or sensors. This proposed system based on facial expression extracted will generate a playlist automatically thereby reducing the effort and time involved in rendering the process manually. Thus the proposed system tends to reduce the computational time involved in obtaining the results and the overall cost of the designed system, thereby increasing the overall accuracy of the system. Facial expressions are captured using an inbuilt camera. The accuracy of the emotion detection algorithm used in the system for real time images is calculated.

**KEYWORDS:** Music Player, Machine Learning, Face Recognition, emotion Detection.

## I. INTRODUCTION

The field of science is as big as the universe itself. Every passing day there are new developments; if not big or ground-breaking, but constructive and leading towards a better tomorrow. Sound and Graphics are two vast fields of Science and Engineering that not only intrigue but also attract learners to study them in detail to explore into their depths. Since then, many such inventions have propelled us to this time where thinking of various ideas which might not have been possible a few decades back and more over implementing them is now possible. Now in the present time, where clicking a photo and listening to music "on the go" is just a part of anyone's daily life, providing any improvements in the working of such technologies that in turn make the user experience better are always appreciated. With the improvements in technology the level of sophistication in software has also increased. Also, with the idea of 'keeping it simple' developing sophisticated applications is a challenge. Facial Expression based Music Player is interactive, sophisticated and innovative mobile (Android) based application to be used as a music player in a different manner. The application works in a different manner from the traditional software as it scans and classifies the audio files present on the device and according to the predefined parameters (Audio Features) present on the application in order to produce a set of mood-based playlists. The real-time graphical input provided to the application is classified (Facial expression recognition) to produce a "mood" which will then be used to select the required playlist from the earlier set. Listening to music is a key activity that assists to reduce stress. Facial expression helps to determine the mood of individual.

Paper is organized as follows. Section II describes about the related work done earlier for the system to be developed. Section III presents method used and algorithms used for the detection. Section IV presents experimental results showing results of images tested. Finally, Section V presents conclusion.

## II. RELATED WORK

1) An K. Chankuptarat, R. Sriwatanaworachai and S. Chotipant, "Emotion-Based Music Player," 2019 .

Listening to music is a key activity that assists to reduce stress. However, it may be unhelpful if the music does not suit the current emotion of the listener. Moreover, there is no music player which is able to select songs based on the user emotion. To solve this problem, this paper proposes an emotion-based music player, which is able to suggest songs based on the user's emotions; sad, happy, neutral and angry. The application receives either the user's heart rate or facial



image from a smart band or mobile camera. It then uses the classification method to identify the user's emotion. This paper presents 2 kinds of the classification method; the heart rate-based and the facial image-based methods. Then, the application returns songs which have the same mood as the user's emotion.

2) R. Ramanathan, R. Kumaran, R. Ram Rohan, R. Gupta and V. Prabhu, "An Intelligent Music Player Based on Emotion Recognition," 2017

This paper proposes an intelligent agent that sorts a music collection based on the emotions conveyed by each song, and then suggests an appropriate playlist to the user based on his/her current mood. The user's local music collection is initially clustered based on the emotion the song conveys, i.e. the mood of the song. This is calculated taking into consideration the lyrics of the song, as well as the melody. Every time the user wishes to generate a mood-based playlist, the user takes a picture of themselves at that instant. This image is subjected to facial detection and emotion recognition techniques, recognizing the emotion of the user. The music that best matches this emotion is then recommended to the user as a playlist.

3) Henal Shah, Tejas Magar, Purav Shah and Kailas Devadkar "AN INTELLIGENT MUSIC PLAYER USING SENTIMENTAL ANALYSIS" 2015.

The images are taken using the camera and they are stored by using OpenCV. The Harr Cascade training is a tool used to accurately detect and recognize the hand gestures. In the Harr Cascade algorithm, the data are stored in Xml format. Qt is a cross-platform that is widely used for developing application software using graphical user interface (GUI). The motion of the hand gestures is stored in the OpenCV database. The arm controller recognizes the hand gestures and sends to RS232. The RS232 acts as an interface between arm controller and the PC. The songs are sorted in playlist and played automatically according to the hand gesture. Proposed intelligent music player according to the user's mood by using sentimental or emotion analysis.

4) Nikhil Zaware, Tejas Rajgure, Amey Bhadang, D.D. Sakpal "EMOTION BASED MUSIC PLAYER" 2014. Nikhil et al. determines the mindset of the user by using facial expression. Humans often express their feeling by their expressions, hand gestures, and by raising the voice of tone but mostly humans express their feelings by their face. Emotion based music player reduces the time complexity of the user. Generally, people have large number of songs on their playlist. Playing songs randomly does not satisfy the mood of the user. This system helps user to play songs automatically according to their mood.

5) Anukriti Dureha "AN ACCURATE ALGORITHM FOR GENERATING A MUSIC PLAYLIST BASED ON FACIAL EXPRESSIONS" 2014.

This paper presents an algorithm that automates the process of generating an audio playlist, based on the facial expressions of a user, for rendering salvage of time and labor, invested in performing the process manually. The algorithm proposed in this paper aspires to reduce the overall computational time and the cost of the designed system. It also aims at increasing the accuracy of the designed system. The facial expression recognition module of the proposed algorithm is validated by testing the system against user dependent and user independent dataset. Experimental results indicate that the user dependent results give 100% accuracy, while user independent results for joy and surprise are 100 %, but for sad, anger and fear are 84.3 %, 80 % and is 66% respectively

### III. METHODOLOGY

#### A. Methodology

For these system we give input of user face after that system detect the emotion on user face using the inbuilt python library. Then match the emotion to the audio files which already classify according to the emotions after matching the files then songs will be recommended. In Lyrics classification user will give the input English song lyrics after that system will tell the user which type of this song like happy song, sad song, relax song etc.

## B. System Architecture

The architecture of our proposed system is shown in figure

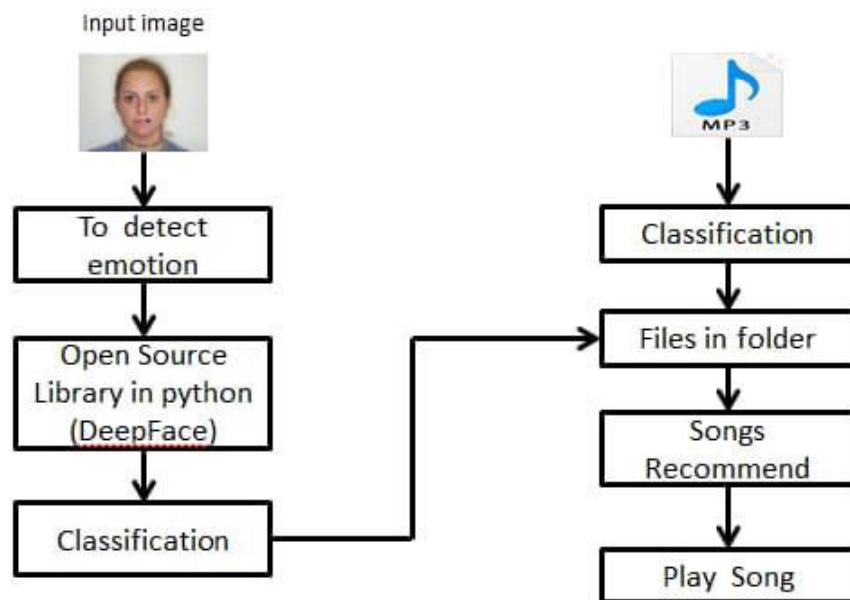


Fig: System Architecture

## C. Modules:

1. Facial Expression Recognition The output of detection block forms an input to the facial feature extraction block. The required features are extracted using the Python library that is imported in the Android Studio folder. This helps in classifying that the input real time image has as its expression i.e. the users expression.
2. Song recommendation: As songs are audio files. And many Songs are Recommend to the user according to the detected emotion. And Play Particular songs
3. Lyrics Classification: In this module user will give the input English songlyrics after that system will tell the user which type of this song like happy song, sad song, relax song etc.

## D. Mathematical Model

No Let S be the Whole system which consists:

$S = \{I, P, O\}$ .

Where,

I is the input of the system.

P is the procedure applied to the system to process the given input.

O is the output of the system.

A. Input:

$I = \{I1, I2, I3\}$

Where,

I1 = Face detection.

I2 = Audio List

I3 = Lyrics



B. Process

$P = \{ p1, p2, p3 \}$

- p1 = Face detection
- p2 = Emotion detection
- p3 = Audio selection

C. Output:

$O = \{ o \}$

o = Audio played on emotion detected.

E. Algorithm

1) Support Vector Machine:

SVM is a machine learning technique to separate data which tries to maximize the gap between the categories. This Algorithm helps to classify the textual feedback and classifies according to emotions.

Input: D Dataset, Semantic of Tokens, Feeds;

Output: Classification of Application

Step1: for each Feed id in D do

Step2: Get on-demand features and stored on vector x for tweet id

Step3: x.add (Get Features (Feed id));

Step4: end for

Step5: for each Feed in x vector do

Step6: Fetch first feature and stored in b, and other features in w

Step7: h w, b (x) = g (z) here,  $z = (w^T x + b)$  Step8: if ( $z \leq 0$ )

Step9: assign  $g(z) = 1$ ;

Step10: else  $g(z) = -1$ ;

Step11: end if

2) Random Forest:

Random forest is a supervised learning algorithm which is used for both classification as well as regression. But however, it is mainly used for classification problems. A forest is made up of trees and more trees means more robust forest. Similarly, random forest algorithm creates decision trees on data samples and then gets the prediction from each of them and finally selects the best solution by means of Twitter. It is an ensemble method which is better than a single decision tree because it reduces the over-fitting by averaging the result.

Working of Random Forest Algorithm

- Step 1: First, start with the selection of random samples from a given Twitter dataset.
- Step 2 : Next, this algorithm will construct a decision tree for every sample. Then it will get the prediction result from every decision tree.
- Step 3 : In this step, Twitter will be performed for every predicted result.
- Step 4 : At last, select the emotion prediction result as the final prediction result.

3) Naive Bayes:

Naive Bayes Classifier is one of the simple and most effective Classification algorithms which helps in building the fast machine learning models that can make quick predictions. It is a probabilistic classifier, which means it predicts on the basis of the probability of an object .

- 1: for Test Class do
- 2: training the classifier naive Bayes
- 3:  $gauss\_nb = gaussianNB().fit(training\ classes)$
- 4: predicting the target variable test classes  $clf.predict(test\ class)$
- 5: import the models of accuracy score
- 6: accuracy score and matrix of test class prediction given
- 7: end for



4) Decision Tree:

1. Check if algorithm satisfies termination criteria
2. Computer information-theoretic criteria for all attributes
3. Choose best attribute according to the information-theoretic criteria
4. Create a decision node based on the best attribute in step
5. Induce (i.e. split) the dataset based on newly created decision node in step 4
6. For all sub-dataset in step 5, call C4.5 algorithm to get a sub-tree (recursive call)
7. Attach the tree obtained in step 6 to the decision node in step 4
8. Return tree

#### IV. EXPERIMENTAL RESULTS

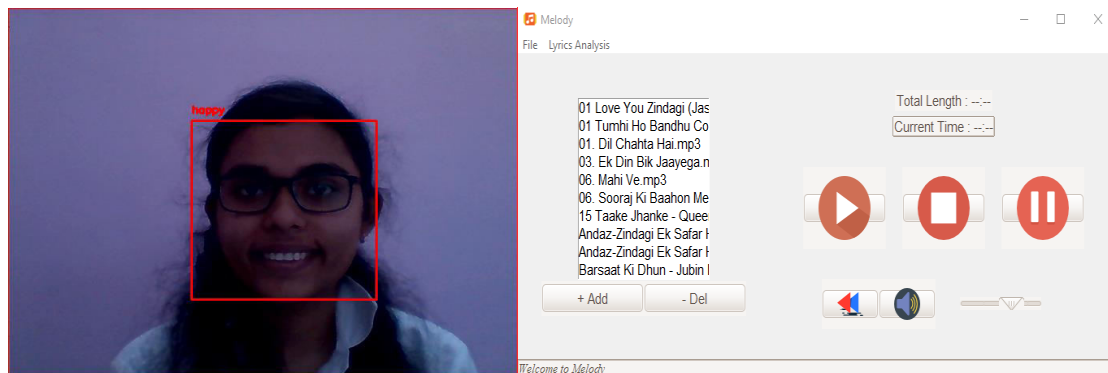


Fig1 : Happy emotion Detected , Happy Emotion Music List

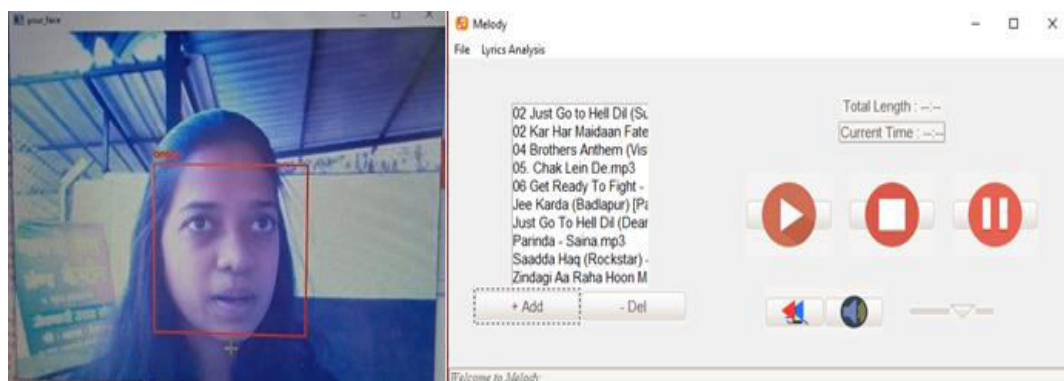


Fig 2 : Angry emotion Detected , Angry Emotion Music List

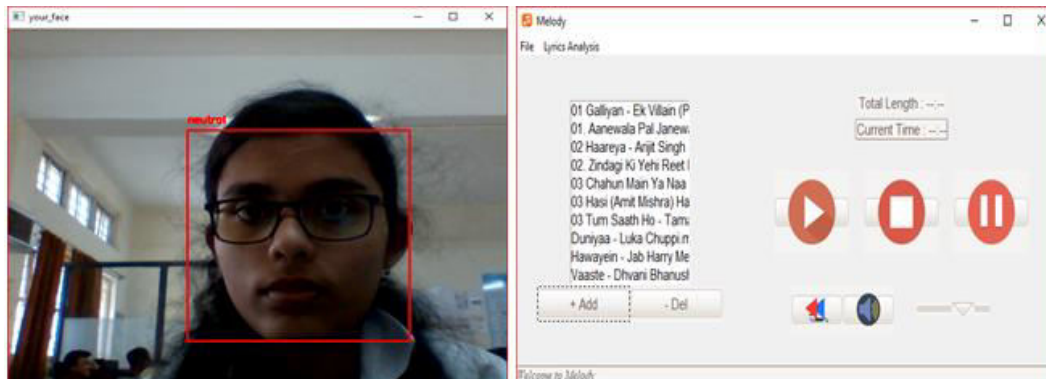


Fig 3 : Neutral emotion Detected , Neutral Emotion Music List

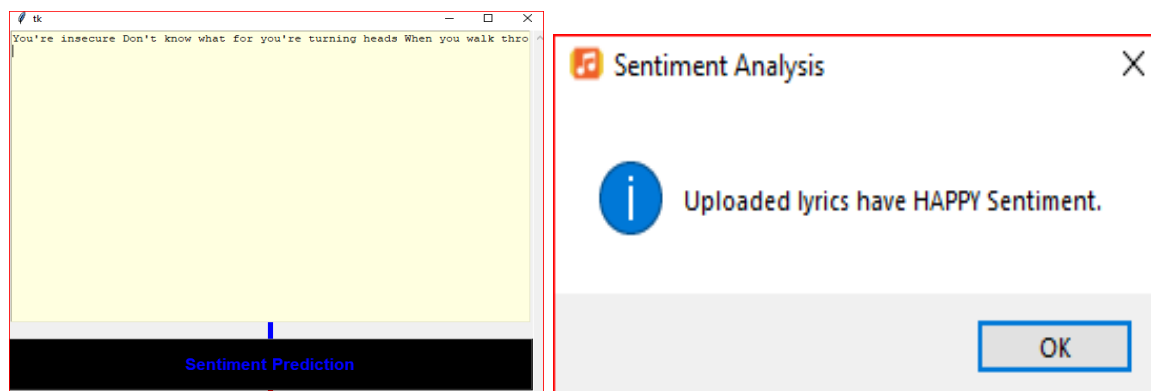


Fig 4: English Song Lyrics , Output of Song lyrics(Happy song)

## V. CONCLUSION

The Emotion-Based Music Player is used to automate and give a better music player experience for the end user. The application solves the basic needs of music listeners without troubling them as existing applications do: it uses technology to increase the interaction of the system with the user in many ways. It eases the work of the end-user by capturing the image using a camera, determining their emotion, and suggesting a customized play-list through a more advanced and interactive system. The user will also be notified of songs that are not being played, to help them free up storage space.

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