College　　　　　　: GOVERNMENT ENGINEERING COLLEGE, SECTOR - 28, GANDHINAGAR
Department　　　　: Information Technology
Discipline　　　　: BE
Semester　　　　　: Semester 8
Project Name　　　: Real-time Behavior Analysis
Team ID　　　　　: 127518

# Form 1 – APPLICATION FOR GRANT OF PATENT

Applicants :

| Sr. No | Name | Nationality | Address | Mobile No. | Email Id |
|---|---|---|---|---|---|
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| 3 | Thakkar Poojaben Ashokbhai | Indian | Information Technology , GOVERNMENT ENGINEERING COLLEGE, SECTOR - 28, GANDHINAGAR , Gujarat Technologycal University. | 9664603750 | pathakkar01@gmail.com |

Inventors :

| Sr. No | Name | Nationality | Address | Mobile No. | Email Id |
|---|---|---|---|---|---|
| 1 | Chaudhary Pinky Satbirsingh | Indian | Information Technology , GOVERNMENT ENGINEERING COLLEGE, SECTOR - 28, GANDHINAGAR , Gujarat | 7567168211 | pinkychaudhary@gecg28.ac.in |

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|---|---|---|---|---|---|
| | | | Technologycal University. | | |
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I/We, the applicant(s) hereby declare(s) that:

Following are the attachments with the applications :

# Form 2 - PROVISIONAL/COMPLETE SPECIFICATION

1 . Title of the project/invention :
Real-time Behavior Analysis

2. Preamble to the description :
Provisional

3. Description
a) Field of Project / Invention / Application :

The present invention relates to a system for recommending music tracks to a user, and specifically to a system for analyzing user mood through facial expression and recommending music tracks based on the analysis.

b) Prior Art / Background of the Project / Invention :

Music recommendation systems and services such as PANDORA, RINGO AND SPOTIFY are becoming an increasingly popular way for users to find and listen to music that may be of interest to them.
Most of these music recommendation systems use four broad categories of inputs for their recommendations: (1) metadata such as artist, album, genre, etc.; (2) acoustic features such as beats, melody, etc.; (3) direct feedback from the users such as rating, manual selection or some other type of affirmative user action indicating the users preferences (e.g., "like"); and (4) collaborative feedback such as information obtained from other users including purchasing patterns, listening patterns, and the like. A typical music recommendation system uses all or some of these inputs in various combinations.
The most advanced recommendation systems typically use all of the above inputs and weigh their contribution to the music recommendation process. Nevertheless, these systems suffer from many disadvantages and shortcomings. Liking or disliking a song is an expression of human mind. Since mood is an emotional state of human mind, it has an immense role in deciding when a person likes or dislikes something.
The primary objective of a music recommendation system is to predict songs that a listener would like and

hence it would be beneficial for a recommendation system to consider the mood of the listener when recommending songs. However, a major disadvantage of most prior art music recommendation systems is that they fail to consider a listeners mood. Thus, a need exists for recommendation systems that overcome the above shortcomings.

c) Summary of the Project / Invention :

Our Project uses facial emotions of user and generate a personalized audio playlist. Here, we build a model to detect human face and categorize human emotion in 7 different emotions angry, depressed, happy, excited, sad, fear, disgust. We have Considered human Facial Points (Landmark) which will give an accurate description of the Data Points for Emotion Classification. These Emotions will help in generating an automatic Music playlist using Spotify APIs. Our project lets user to play the generated playlist in browser.

d) Objects of Project / Invention :

The aim of the application is to eliminate the time-consuming and tedious task of manually segregating or grouping songs into different playlists. This app helps in generating an appropriate playlist based on an individual's emotional features.

e) Drawings :


f) Description of Project / Invention : (full detail of project) :

Our Project is about analysis by predicting the current emotional state of user based on which the music recommendation system which it plays songs.
The process of the project is split into two phases: Detection of user's emotion by capturing the facial features. Integrate the python code into the Spotify API and play the music based on the facial expression. The face of the user is captured using built-in System's Camera. After performing preprocessing, the Feature Extraction is done and based on that the Emotions are classified as Happy, Angry, Sad, Disgust, Fear and Surprise. The emotions are used as input for recommender system and the music is played for the emotions detected.
Modules:
•FACE DETECTION
The Image input from Camera is taken in Frames and can have lots of noise which can degrade the quality input. Thus, the objective of Face detection is to reduce the external noise and other effects in image. Image undergoes feature enhancement, where tone mapping is applied to images with low contrast to restore the original contrast of the image.
Our Project uses Deep learning Multi-Task Cascaded Convolutional Neural Network (MTCNN) for face detection. The proposed CNNs consist of three stages. In first it will create a frame of the captured image of user. Then it will reject the non-face frames or the frames which more than 50% frame is empty. By having the frames with required image, we preprocess that and generate landmarks on frame. These facial Landmark positions will help us further in emotion Detection.
•EMOTION CLASSIFICATION
Facial landmark points from previous step are saved in an array. Next, the data stored in the features array will be put in as an input into a reduction code that will reduce the size of data and eliminate any correlated points and preserve only relevant points. That will be an input into a predictor (Classification model) which is already trained for recognizing 7 different set of Emotions. The output will be a value which is defined for that particular emotion.
•MUSIC RECOMMENDATION
For each user the songs based on their data are collected and stored in database. Emotion classified in previous module is used to create a personalized playlist from the songs stored in database. Then these songs are played using in browser music player.

g) Examples :

h) Claims (Not required for Provisional Application) / Unique Features of Project

A method for providing music track recommendations for predicted user emotion.
A method for permanently storing the recommended track in Playlist on Spotify.

4. Claims

5. Date and signature

6. Abstract of the project / invention :

Music plays a very important role in humans daily life and in the modern advanced technologies. Usually, the user has to face the task of manually browsing through the playlist of songs to select. Our Project purposes an efficient and accurate model, that would generate a playlist based on current emotional state of the user. Our Project is based on real-time extraction of facial expressions as well as extracting audio features from songs to classify into a specific emotion that will generate a playlist automatically.

# Form 3 – STATEMENT AND UNDERTAKING UNDER SECTION 8

| | |
|---|---|
| Name of the applicant(s) : | I/We, Chaudhary Pinky Satbirsingh ,Darji Honey Nileshkumar ,Thakkar Poojaben Ashokbhai |
| | Hereby declare : |
| Name,Address and Nationality of the joint applicant : | (i) that I/We have not made any application for the same/substantially the same victim invention outside India. |
| | (ii) that the rights in the application(s) has/have been assigned to |

| Name of the Country | Date of Application | Application Number | Status of the Application | Date of Publication | Date of Grant |
|---|---|---|---|---|---|
| N/A | N/A | N/A | N/A | N/A | N/A |

(iii)That I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within three months from the date of filing of such application.

Dated this 5 day of April 2021

| | |
|---|---|
| To be signed by the applicant or his authorised registered patent agent : | Signature................. |
| Name of the Natural Person who has signed : | Chaudhary Pinky Satbirsingh ,Darji Honey Nileshkumar ,Thakkar Poojaben Ashokbhai |

To,
The Controller of Patents,
The Patent Office,
At Mumbai