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Mood Based Music Recommendation

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Abstract: *Lots of businesses are nowadays using recommender systems for their benefit like Amazon and Flipkart for selling products (e-commerce), wynk music and ganna.com for music streaming, for selling books, for movies, YouTube for videos recommendations. This helps both businesses and users as businesses are getting monetary benefit by attracting customers and users are getting benefitted by getting better services. Everybody is using recommender systems nowadays in various forms and day to day these are getting improved because researchers are researching on making them better and better each day due to high competition in the market for giving better services and attracting customers. This project mainly focuses on only suggestion music for music lovers to help them listen to the songs those they may like. This framework enables clients to find new collections or tunes making the melodic list accessible for tuning in. Music helps us tuning ourselves with the universe and best thing about music is that nothing can relax you more than a pleasing melody. Due to all the good things about music and high demand of recommender systems in the market we have chosen to do this project.*

Keywords: Machine Learning, Artificial Intelligence, OpenCV Application, Sentiment Analysis, LastFM API

I. INTRODUCTION

Music is a universal language. It has been a crucial part of our lives since the beginning of time. We listen to music when we're having a bad day, we listen to it when we have a great day. Music inspires and enlightens us. From Chirping of birds to drum percussion, from harp to riffs of an electric guitar, music has different forms of expression. Music connects people regardless of their religion, caste, and creed. It brings people together and has a huge influence on our lives. Music isn't just an art form or a language, but it also affects the human mind and body. It stimulates our minds. According to studies, music has therapeutic properties, and music therapy programs help with anxiety, dementia, stress management, and self-confidence. According to a paper published in the journal Neuroscience [5], personalized music based interventions is encouraged for the treatment of brain disorders associated with abnormal mood and emotion-related brain activity. Therefore, due to the current music trends, it's not always necessary that the user finds music that he relates to. And as research shows that personalized music can have a positive impact on the human mind, it is important to have access to music based on our moods.

Artificial intelligence, an extensive, prominent and imperative domain that has attracted a lot of researchers and programs in recent times. This particular domain has taken over the world in very short notice. It is incorporated in over daily life in the form of chatbots, digital assistants like Siri and several other technology-based systems. There are many existing systems that could recognize facial emotions. On the other hand, there are systems that recommend music. Bringing together, a system which will recommend music by recognizing the mood of the user from facial emotions is the overall concept described in the paper.

II. PROBLEM STATEMENT

The main goal is suggesting best set of options to the user. For a specific user we had their song history frequency list liked songs. From all this information we had to predict what songs user might like then the question comes: how can we use all this information to achieve our goal. As it not a straight forward task to find the relevance between various songs it might be possible that one song which looks similar to other may be completely different and users may dislike that song or may be that song is not of users taste there are lots of user around the world and lots of songs so making a relevance between songs and users is a tedious task

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III. OBJECTIVES

- To implement an Mood Based Music Playlist Recommendation System using Face Detection.
- To develop a personalized system, where the user's current emotion is analyzed using Machine Learning Algorithm.
- Calculating the overall score, the user input is fed into a model which classifies whether the user's response was 'Happy', 'Neutral' or 'Sad'.
- To utilize the LastFM API for the playlist generation and recommendation.

IV. PROPOSED METHODOLOGY

A. Convolutional Neural Networks

Convolutional Neural Networks (CNN) are feed-forward networks that were developed for image classification problems, and it uses feature learning where it takes 2-D input representing an image's pixels and color channels. This process can also be applied to 1-D sequences of data inputs. The pre-processing needed in a CNN is much lower as compared to other classification algorithms. It can learn the filters/characteristics with enough training given to them. In a CNN model, each input image is passed through a series of convolution layers with filters, also known as Kernals, pooling layers, fully connected layers (FC), and an activation function such as Softmax function is used to classify an object and bring the values within the range [0, 1]. The most important role of a CNN is to take in image inputs and reduce them in size without losing their important features which help with a good prediction of the model.

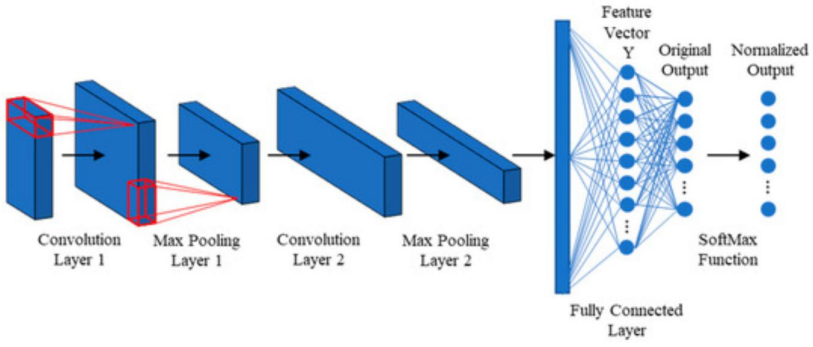

Figure 1: Source: 1D Convolutional Neural Network Architecture

B. OpenCV

Computer vision is a part of Artificial Intelligence (AI), that enables computers to gain meaningful insights from the data provided to it (the data can be in the form of images, videos, or any other visual input) and make relevant decisions based on the knowledge it acquired from the given data. OpenCV stands for Open-Source Computer Vision (Library). It is the most common and popularly used, well-documented Computer Vision library. OpenCV is an open-source library that incorporates numerous computer vision algorithms. OpenCV increases computational efficiency and assists with real-time applications.

Face Feature Extraction Pictures are spoken to as weighted eigen vectors that are consolidated and known as "Eigenfaces". One of the focal points taken by Eigen faces is the comparability between the pixels among pictures by methods for their covariance network. Following are the means required to perceive the outward appearances utilizing this Eigenfaces approach:

Eigen Faces: Not all the parts of the face are important for emotion recognition. This key fact is considered to be important and useful. Face recognition techniques focus on recognizing eyes, nose, cheek and forehead and how the change with respect to each other. Overall, the areas with maximum changes, mathematically, areas with high variations are targeted. When multiple faces are considered, they are compared by detecting these parts of the faces because these parts are the most useful and important parts of a face. They tend to catch the maximum change among faces, specifically, the change that helps to differentiate one face from the other. This is how Eigen Faces face recognizer works.

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Let $X=\{x_1,x_2,...,x_n\} x_i \in R^d$

Here X be a random vector with observations.

1. Calculate the mean μ:

$$\mu=\frac{n}{1}\sum_{i=1}^{n}x_i$$

2. Calculate the covariance matrix S:

$$S=\frac{n}{1}\sum_{i=1}^{n}(x_i-\mu)(x_i-\mu)^T$$

3. Compute the eigenvectors v_i and eigenvalues λ_i of S:

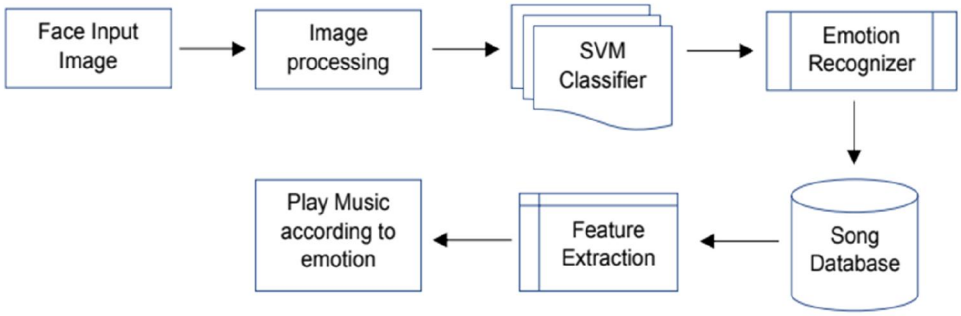
$$Sv_i=\lambda_i v_i,\ i=1,\ 2,...,\ n$$

4. The eigenvectors are arranged by their egeinvalue in descending order:

$$y=W^T(x-\mu)$$

5. Calculate eigenfaces.

V. SYSTEM ARCHITECTURE



The proposed framework is first prepared to distinguish a face from a static picture. When the information picture is perceived, the picture is handled. The picture is exposed to SVM classifiers for subtleties to perceive the feeling displayed by the face. The subtleties recuperated from the image are utilized by the feeling classifier to discover feeling.

The song database and feature extraction module function simultaneously. The songs are disintegrated into several music pieces and the mood of the song is recognized. The songs are stored based on the mood detected. Once the emotion recognizer reports the mood, the songs pertaining to the mood are played by the music player

VI. CONCLUSION

A simple system is proposed here for the music recommendation using face emotion recognition. It suggests music by extracting different facial emotion of a person: Happy, neutral and sad. . Even though human emotions are complex and subtle, it is possible for a machine learning model to be trained to accurately detect a set of emotions which can be differentiated from each other with certain facial expressions. The expression on a person's face can be used to detect their mood, and once a certain mood has been detected, music suitable for the person's detected mood can be suggested.

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