

Emotion Recognition using Artificial Intelligence

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Abstract: *This Paper is intended to explore research done on identifying research done on the identifying the face recognition of users and play music according to the mood of the users by using AI and ML.*

Keywords: Face Recognition, Formatting, Image Processing, Computer Vision, Mood Detection, Emotion Detection

I. INTRODUCTION

Music plays a big role in refreshing the minds of people. Music is known for strongly felt effect on human sentiments and mood. It can be used to evoke feelings of relaxation, excitement, Happiness and depressed. Many of the research proven that music helps in relieving stress by triggering biochemical stress reducers. It also helps in reducing the chances of heart attacks, maintaining low blood pressure. Playing music according to the current atmosphere gives goosebumps to user to enjoying music according to their current state of mind. Every individual has different taste of listening music on behalf of language, mood, region, generation- gap etc. sometimes it becomes complicated and time consuming to play music according to the situation for the person who are less interacted with technology.

As such, music recommendation system that reflects the emotional atmosphere of music can deliver an outstanding experience to the end users. In recent times, The development of music recommendation systems are using Artificial Intelligence technologies. This system uses NLP (Natural language processing) to get expression from users feedback and for music recommendation machine learning algorithm is used based on users face expressions.

In this context, the paper presents a complete assessment of literature with the goal of detecting the face expression of user and play music according to the expressions with help of - High standardized techniques like HOG, LBP and HAAR Cascades and CNN in the identification and classification of faces as database for evaluating the facial expression recognition algorithm and Training the data set using SVM (Support Vector Machine) and is implemented in OpenCV framework.

II. LITERATURE REVIEW

Artificial intelligence (AI)-based music recommendation systems have received considerable attention in recent years due to their potential to improve the accuracy of recommendations and provide more personalized music suggestions. This literature review focuses on the current state of research on AI-based music recommendation systems. One of the most popular techniques used in AI-based music recommendation systems is deep learning. In deep learning, neural networks are trained on large amounts of music data to learn patterns and relationships between songs. For example, a system developed by McFee and Bello (2018) used a convolutional neural network to extract audio features from songs and a recurrent neural network to generate a personalized playlist. Another popular technique is reinforcement learning. This trains the model to make decisions based on feedback and rewards. Li et al. (2020) used deep reinforcement learning algorithms to recommend music based on user preferences and feedback. Other AI techniques such as clustering, association rule mining, and decision trees are also used in music recommendation systems, but deep learning and reinforcement learning are currently the most promising approaches. AI-based music recommendation systems are typically evaluated using metrics such as accuracy, recall, F1 score, and user satisfaction surveys. One of the challenges in evaluating these systems is the lack of standardized datasets and evaluation frameworks. Overall, research on AI-based music recommendation systems has focused on improving the accuracy and personalization of recommendations, as well as exploring new techniques such as deep reinforcement learning. Future research directions

may include incorporating context-based information, improving the interpretability of AI models, and addressing issues related to privacy and bias.

III. METHODOLOGY

The identification and face recognition implementation proposed here is Supervised learning model(SVM) which is used to trained and predict the emotion of the user. Emotion recognition is the process of reading mind and face expression of the users like, sadness, happiness, anger, calm guilt, fear, and shame behind the text and the emojis. Facial expression represents the mental state of human so to analyse the users mindset first we have to read the face of individual. Emotion detection is closely related to Sentiment analysis which uses Natural language processing.

Emotion recognition system used to detect expressions from the face images and then classifying emotion. The emotion recognition using Artificial Intelligence is consist of mainly two main components: emotion extraction and music recommendation.

Emotion extraction is used to apply deep learning technique to extract emotion from users reaction. The pre-trained language model is used to encode the user reaction into a high dimensional vector representation by the system. And then vector is passed through the neural network that is trained to predict the face expression in feedback.

The music recommendation component of system use machine learning algorithm to train a model in recommending songs according to the expression of the user. It is responsible for recommending music tracks based on user preferences. The music recommendation components requires a database of song playlist that are labeled on the bases of emotional states or characteristics. The database of the playlist will help in train models of machine learning that will help in depict emotional states or characteristics of music features.

In this system, there is some popular methodology are used:

Face Detection - High standardized techniques like LBP and HAAR Cascades will be used.

LBP stands for Local Binary Pattern. It is simple and Powerful technique for identification of image based on its pixel. This method's key benefit is that it is going to improve the surface texture of the photos and the edge information thus allowing for easier to extract the required features from the photographs..

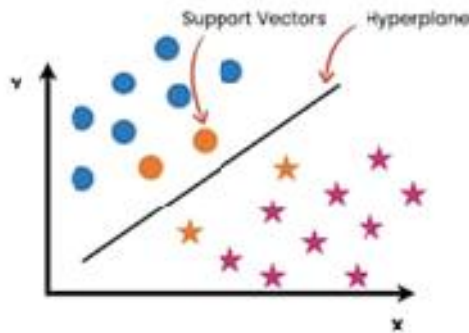
HAAR cascades- The HAAR cascade classifier is a useful tool for object detection. It is an object detection algorithm that classifies faces in live footage or graphics.

Feature Extraction & Face Recognition - LBPH (Local Binary Pattern Histogram) is a popular face recognition algorithm that extracts local features from an image and generates a histogram of those features for use in recognition. When the LBPs of every cells are calculated in the image, a histogram is generated which counts the frequency of each's occurrence LBP pattern. This histogram serves as the feature vector for the face image and can be used for recognition.

Emotion Recognition - CNN (Convolutional Neural Networks) is a type of models for deep learning that have been applied in a variety of computer vision tasks, including face recognition. It is a sort of artificially generated neural network that frequently gets used for object and picture recognition.

Fisher face classifier is also used in emotion face recognition and it can be sensitive to lighting conditions and image quality. Fisher face recognition algorithm is used in many real-world applications, including security systems, video surveillance, and biometric identification.

SVM- Support vector machines, or SVMs, are a class of machine learning method commonly employed for classification and regression analysis. Determining a hyperplane in a high-dimensional space that ideally separates various classes of data points is the foundation of SVMs. Supervised neural networks can be used to divide data into multiple categories when classifying it. The method finds the optimal hyperplane that divides the various data types. The margin that exists between the two nearest points of the various classes is optimised by the hyperplane selection. Natural language processing, bioinformatics, and image categorization are merely some of the numerous domains where SVMs are commonly utilised. They benefit from a number of factors, including their willingness of handling high-dimensional



IV. PROBLEM FORMULATION

We already known that music is the best technique for relaxation ,cooling down the temperament ,and helps in changing irritated mind of people to happier as well as helps in making people emotional. Many of the research have already been done on face recognition system but we are going to develop a system which will use AI as a tool to detect expressions and recommend music to users according image which has been captures through the webcam. The issue being addressed in the creation of a facial recognition and AI-based music recommendation system. The objective is to create a system that which will be accurately suggest music to users based on their emotions and facial expressions.

While developing this system we addressed some issues related to face recognition technology and selecting the music accurately which will matched to the captured image expressions. To addressed these challenges the system should be trained on large data set of face expression and music preferences..

Data collecting is the first and most crucial step in creating a music recommendation system. These data can be gathered from various platforms, user feedback, and social media.

The second step is to Data processing, In data processing data get filtered and it involves data cleaning, Feature extraction and normalization.

The third step is to Model selection, In model selection picking up a suitable machine learning model that can absorb knowledge from the data and provide precise recommendations. Collaborative filtering, content-based filtering, and hybrid models are common approaches for music recommendation systems.

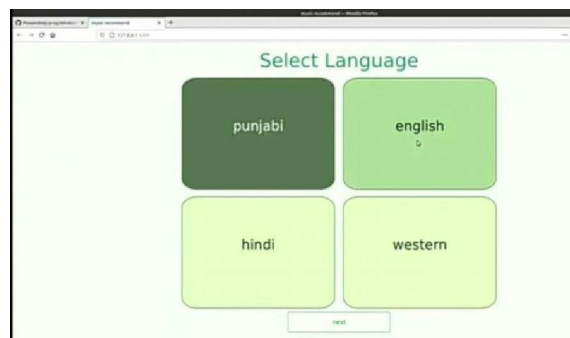
And the next step is model training and model Deployment, after the trained the data, the model get deployed to provide personalized music recommendation to users in real time.

An AI-powered music recommendation system's overall objective is to increase user happiness by making tailored music recommendations that take into account each user's individual tastes and habits.

V. RESULT

There are different slides here which shows in result and explain the interfaces threv screenshot:

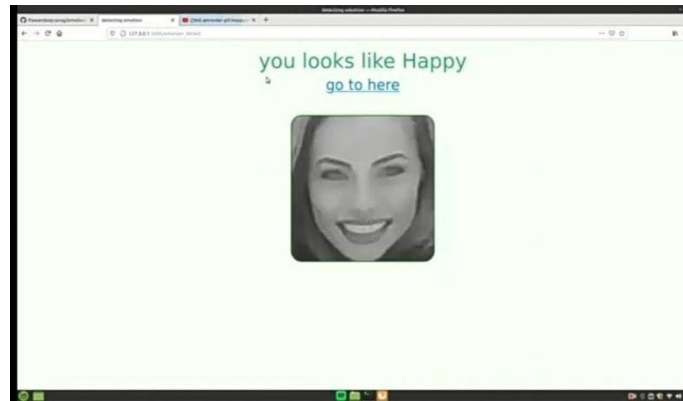
Once the software has been opened on the laptop screen, it represents the user interface for the music player. The user can choose the language for the music by seeing it. After selecting a language using the hover effect, the user can go on to the next button, which is located on the footer side of the website.



After move “Next”, another webpage page opens which have the singer name related to the chosen language. Once user choose singer name, then the web page opens which sense facial expression of the user.



In this step, image detection algorithm it senses user facial expression and show it on the web page, which is related to your expression, these facial expressions are coded in directory and YouTube opens threwh link in image detection algorithm.



VI. CONCLUSION

Music recommendation systems based on artificial intelligence (AI) have become increasingly popular because they can provide more accurate and personalized recommendations. Deep learning and reinforcement learning are the most promising approaches to building these systems because they can learn patterns and relationships between pieces and make decisions based on feedback and rewards. Metrics such as precision, recall, and user satisfaction surveys are commonly used to evaluate these systems, but there is no standardized data set and evaluation framework. Future research directions could include incorporating contextual information, improving the understanding of AI models, and addressing data protection and biases. Despite the challenges and limitations, AI-based music recommendation systems have the potential to transform the music industry, providing users with a more enjoyable and personalized music listening experience and helping artists and music services increase their revenues.

VII. FUTURE SCOPE

The future scope of AI music recommendation system is very vast. Some potential areas of growth are:

- A) Face recognition can be used for authentication purposes.
- B) Gaming and virtual reality: It can be used to provide soundtracks for video games and providing more immersive and personalized experience to user.
- C) Health and wellness: It will be also helpful in medical field where therapy are given by musics it will provide personalized experience to the user.

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