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A Survey Paper on Using Facial Recognition to Propose Music

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ABSTRACT: People have become increasingly stressed due to the bad economy, expensive living expenditures, and so on. Music is a type of art recognized to have a stronger emotional connection with people. It has a unique potential to improve one's mood. It is sometimes difficult for a person to choose which music to listen to from a vast collection of options. More than 60% of users say that at some point in time-motion-based songs in their music collection are so enormous that they are unable to determine which song to play. By creating a suggestion system, it may be possible to aid a user in deciding which music to listen to, hence reducing the user's stress levels. The user would not have to waste time searching for or looking for music, and the best tune matching the user's mood would be identified and displayed to the user. The picture of the user is taken using a webcam. The user's photo is captured, and then, based on the user's mood/emotion, an appropriate song from the user's playlist is shown, suiting the user's requirements.

KEYWORDS: Music recommendation, Facial recognition, Deep Learning(DL)

I. INTRODUCTION

Music recommendation systems have grown in importance in the music streaming market, assisting consumers in discovering new music that matches their preferences. Many systems for music recommendation have been developed throughout the years, including collaborative filtering, content-based filtering, and hybrid algorithms. These technologies, however, have limits in terms of precision and personalisation. Facial recognition technology has recently been presented as a technique for music selection, allowing consumers to have a more customised and engaging experience. We will look at current breakthroughs in the field of music recommendation using face recognition in this literature study.

II. LITERATURE REVIEW

Music recommendation algorithms have evolved into an indispensable component of the music streaming industry. The growing availability of music online has resulted in a multiplicity of music alternatives, making it harder for people to identify songs that match their preferences. Music recommendation systems employ algorithms and data to propose music that a user might like, resulting in a more customised and pleasurable experience.

Facial recognition technology has recently been offered as a music recommendation tool. The practice of recognizing or validating an individual's identification using their facial traits is known as facial recognition. This technology has been employed in a variety of applications, including security and entertainment. We will cover current advancements in music recommendation using face recognition in this literature study.

The present state of research in the field of music recommendation using face recognition will be investigated. The numerous face recognition algorithms and computer vision techniques employed in these systems, as well as the data sets and assessment measures used to assess their performance, will be covered. We will also look at current study findings, such as the accuracy and customization of suggestions, as well as any limitations or issues that need to be addressed. Lastly, we will present a conclusion in which we will summarize the literature findings and analyses the possible implications of this research on the subject of music recommendation.

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Year	Author	Title	Methodologies
2022	Babu, P.A., Abhai, P. and Krishna, S.R. [1]	Music recommendation system based on facial emotion gestures	DeepFace It uses deep CNN trained to classify faces based on a dataset of 4 million examples.
2022	Manoj Sabnis, Bhavesh Bhatia, Laveena Punjabi, Navin Rohra [2]	Music recommendation through face recognition and emotion detection	CNN is used for Facial feature extraction and emotion classification to recognize the emotion after that song playlist is suggested.
2019	James, H.I, Arnold, J.J.A., Ruban, J.M.M, Tamilarasan, M. and Saranya. R.[3]	Emotion based music recommendation system	Emotion classification is performed using a facial feature extraction code trained with a set of images and feature map and PCA and SVM
2019	Hamdy AlDeeb, Ahmed & Hassan, Ghada [4]	Emotion-Bused Music Player Emotion Detection from Live Camera	main algorithm used in the project is the Convolutional Neural Network which is an advanced type of neural network that can classify images based on multiple layers.
2019	Alrihaili, A., Alsaedi, A., Albalawi, K. and Syed, L.[5]	Music Recommender System for users based on Emotion Detection through Facial Features	This paper uses the Viola-Jones algorithm to detect the face, and the PCA method to detect emotions.

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The authors of article [1] employ DeepFace, a face recognition system that considerably minimizes the gap between computer-based and human-based face identification. The authors present a deep learning architecture with numerous processing layers that allows the system to learn from a huge dataset of annotated face photos. The training dataset is used to train the model's parameters, which are subsequently used to determine if two face photos belong to the same person.

The DeepFace architecture is made up of four major components: face recognition, alignment, representation, and classification. The face detection component detects faces in photos using a cascade of convolutional networks. The alignment component employs a 3D model to align the facial photos to a canonical position, which increases the accuracy of the algorithm. A deep convolutional neural network (CNN) is used in the representation component to extract a compact, high-dimensional feature vector that captures an individual's face traits. A linear classifier is used in the classification component to discriminate between pairs of face photos. The authors assess the DeepFace system's performance on the Labeled Faces in the Wild (LFW) dataset, which serves as a standard for face identification. For the LFW dataset, the system achieves an accuracy of 97.35%, a substantial improvement above prior state-of-the-art performance. The authors then compare DeepFace's performance to that of human observers, revealing that the system is just marginally less accurate at detecting faces than humans.

Finally, the DeepFace system shown in this research exhibits cutting-edge performance. The suggested deep learning architecture, which incorporates numerous processing layers, allows the system to learn from a huge dataset of annotated face photos and extract highly discriminative facial traits.

In article [2,] developed a system architecture for producing playlists depending on the user's emotions. The system employs a single-input Convolutional Neural Network (CNN) model to identify emotions from face characteristics. The study examines the application of machine learning algorithms for emotion identification as well as the usefulness of deep learning techniques such as CNN for emotion detection.

The proposed approach employs supervised learning to detect emotions using the FER2013 dataset. The collection contains 38,887 grayscale photos with 48 by 48 face sizes and 7 emotion categories. The article addresses the usage of the OpenCV framework for preprocessing.

The study also goes into how to use convolutional layers, activation functions, and pooling layers for feature extraction, dimensionality reduction, and identifying dominant features. The study also explores the usage of fully linked layers for classification with SoftMax Classification.

The research reports on the usage of 28,709 photos for training the model and the remaining images for testing. The suggested approach is highly accurate in classifying and recognizing facial emotions. The study examines the usefulness of utilizing CNN for emotion detection as well as the advantages of employing unsupervised learning models that incorporate data from clustering and regression analysis.

The research offers a method for emotion-based music selection based on facial expression detection. The research highlights the usefulness of employing deep learning algorithms such as CNN for emotion recognition. The research highlights the usefulness of employing deep learning algorithms such as CNN for emotion recognition, as well as the necessity of understanding the user's feelings while picking preferred music. The study delves into the usage of machine learning techniques and the usefulness of various layers in CNN for emotion detection.

In paper [3], Introduction: Face expression detection is a critical task in many applications, including healthcare, human-computer interaction, and entertainment. The technology proposed in this work seeks to identify emotions in real time using a camera. The system architecture is made up of three major components: face detection, emotion categorization, and music suggestion. The face in the picture is detected using a combination of the image pyramid, histogram of directional gradients, and linear classification in the face detection stage. Emotion classification is carried out using a face feature extraction algorithm trained on a series of photos and feature maps, followed by Principal Component Analysis (PCA) reduction and a multiclass Support Vector Machine (SVM) using a linear kernel.

Lastly, music suggestion is based on the categorization of the framed pictures using hidden Markov models. Even with changes in the face caused by external circumstances, the system attained an effectiveness of roughly 90-95% in emotion categorization. Four emotions are recognized: happy, angry, sad, and surprised, and the melodies associated with each emotion are played in real time.

The suggested system utilizes a camera to provide an efficient and real-time solution for face expression identification. By introducing additional emotions and enhancing the categorization algorithms, the system may be enhanced even more.

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Deep learning approaches are employed in article [4] for music emotion recognition. The study includes an overview of deep learning and how it works, as well as a look at the accuracy rates over time. The Convolutional Neural Network (CNN) is the main method utilized in the project. It is an advanced form of neural network that can identify pictures based on many layers. Face recognition, which is performed using OpenCV, an open-source toolkit for computer vision applications, is the initial stage in categorizing photos into emotions.
In the paper [5,] The suggested system is a music controller that selects appropriate music playlists based on automated emotion recognition. A webcam is used to take photographs of the user's face, which are then rated as "Happy", "Natural", "Sad", or "Surprised". The relevant music playlist is displayed to the user, allowing them to choose from a selection of music clips based on the emotion identified. To detect the face, the system employs the Viola-Jones method and the PCA A way for detecting emotions. The Viola-Jones method is used to scan the pictures in order to determine the characteristics of the face in the image, and the system then cuts the image to include only the face, improving the system's performance. The PCA approach generates the face space and picks the eigenvectors with the greatest eigenvalues, after which the captured picture is projected onto the face space to identify emotions. The system triggers a classical music playlist for joyful feelings, a new-age music playlist for natural emotions, and a designer music playlist for unpleasant emotions (surprised and sad).

The suggested technique was tested by five participants who took a single image for each of the four emotions. The results of the tests revealed that the system recognized emotions correctly the majority of the time. Nonetheless, other findings were discovered during the testing phase, such as the fact that a joyful face without revealing teeth may be labelled as neutral, and a shocked face with teeth may be identified as pleased. The testing photos were real-time photographs, which influenced the system's accuracy, and the accuracy of the findings was dependent on the quantity of the training dataset.
Overall, the suggested system successfully constructed a music controller that detects emotions in collected photos and recommends appropriate playlists to boost the user's mood using the Viola-Jones algorithm and PCA.

III. PROBLEM STATEMENT

People's facial expressions are the finest approach for them to evaluate or conclude on the emotion, sentiment, or thoughts that another person is attempting to communicate.
In rare circumstances, mood modification may also aid in the recovery from conditions such as depression and melancholy. Several health dangers may be avoided, and actions can be done to improve a user's mood.
Spotify, Anghami, and SoundCloud are a few examples. They all give the music itself with some capabilities like pausing, stopping, changing the song back and forth, shuffle, and making playlists.

Recommendation systems are becoming increasingly popular as a means of assisting people in selecting acceptable music for all circumstances.

IV. RESULT AND ANALYSIS

The first paper covers the DeepFace system, which bridges the gap between computer-based and human-based facial identification. The system employs a deep learning architecture with numerous processing layers to deliver state-of-the-art face recognition performance.
The second study presents a facial expression recognition-based system for emotion-based music recommendation. The system detects emotions utilizing supervised learning and a single input Convolutional Neural Network (CNN) model on the FER2013 dataset. The study covers the efficacy of employing deep learning algorithms such as CNN for emotion recognition, as well as the relevance of understanding the user's feelings while picking preferred music.

The third study describes a system that uses a camera to identify emotions in real-time. Face identification, emotion categorization, and music suggestion comprise the system architecture. The algorithm classified emotions with an accuracy of 90-95% and plays the music related to each mood in real time.
The fourth article presents the thesis's recommended solution, which is the creation of an app for music emotion identification utilizing deep learning approaches. The study includes an overview of deep learning and how it works, as

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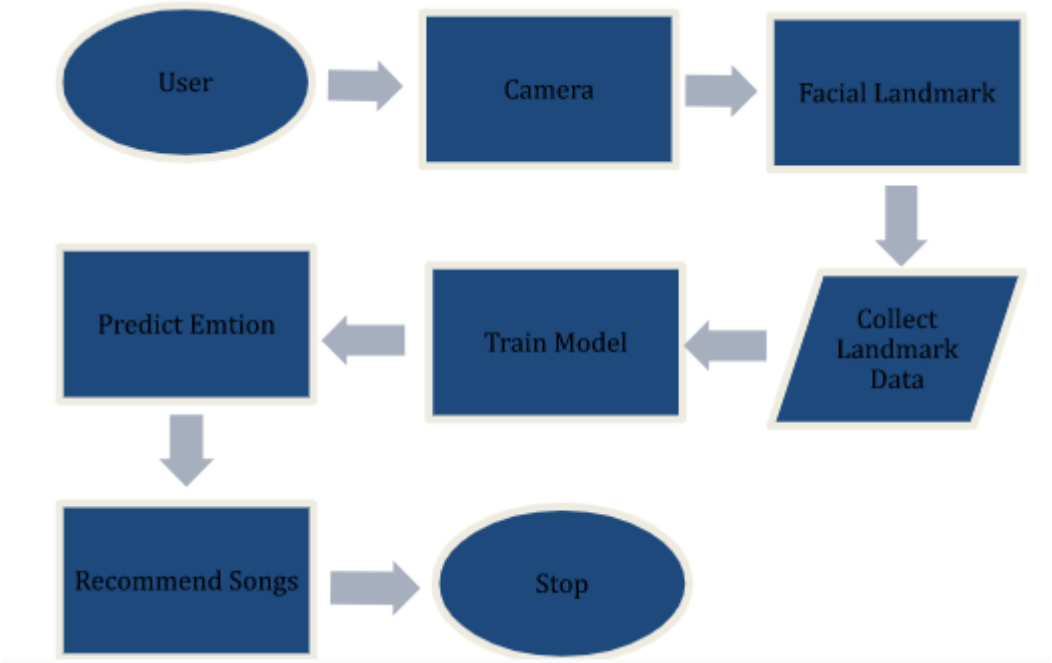
well as a look at the accuracy rates over time. The Convolutional Neural Network (CNN) is the main method utilized in the project. It is an advanced form of neural network that can identify pictures based on many layers.
The fifth paper describes a music controller that selects appropriate music playlists using automated emotion recognition. The system captures photograph of the user's face using a camera, which are then categorized into one of four emotions: "Happy", "Natural", "Sad", and "Surprised". The user is offered with a music playlist based on the emotion identified, allowing them to choose from a selection of music snippets.

Overall, the article presents a high-level review of various techniques and methodologies utilized in face expression identification and music recommendation systems. It emphasizes the significance of deep learning techniques in improving the accuracy of emotion identification systems by extracting highly discriminative features from big datasets.

V. DATA FLOW DIAGRAM



VI. CONCLUSION

To tackle an issue linked to face or emotion identification, all of the articles employ some sort of machine learning, notably deep learning methods. They also employ picture or video input data to train and forecast their models, such as webcam photos or face photographs from databases.
• A basic method for music selection based on facial expression detection is proposed here. It proposes music by extracting a person's facial emotions: happy, angry, surprised, and neutral.
• The suggested technique uses a camera to extract facial landmarks from the user and a trained model to predict the user's sentiment.
• The system will be highly reliable, accurate, and efficient, with shorter processing times, lower error rates, lower costs, and more robustness. Lastly, all publications include experimental findings as well as assessment metrics to illustrate the efficacy of their suggested strategies.

Furthermore, they all explore the usage of different deep learning techniques and components, such as convolutional neural networks, to extract and evaluate characteristics from input data.

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