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# Facial Recognition Based Music Recommendation and Demographic Analysis

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***Abstract:** Age The human face comprises the most essential bio-metric traits, making it an indispensable component in many situations for gender and emotion prediction based on facial photos. This work presents the definition of a robotic real-opportunity system that can estimate a person's gender and age from a collection of initial picture sequences captured by various electronic equipment.*

*The importance of mechanical neuter and age categorization has grown in tandem with the development of user-friendly media sites. It is the goal of this program to use a person's frame to determine their gender, mood, and age. This makes use of deep learning and OpenCV, both of which are capable of processing frames in real-time. The inputs are the anticipated gender and age, and the outcome is this frame. Facial expressions, lighting, cosmetics, and other variables make it difficult to tell someone's true age from just one picture.*

*Consequently, a variety of age brackets are used, with the expected age fitting neatly into one of them. Also, with the proliferation of social media and other platforms, categorizing users by age and gender has become useful for many more things than ever before. But, particularly when it comes to human elements, there is still a fundamental gap in applying current methodologies to real-world photographs. This research shows that by training a Convolutional Neural Network (CNN) using relevant educational data, we may achieve striking similarity.*

## I. INTRODUCTION

One of the most dynamic subfields in computer vision and deep learning is facial feature recognition, which focuses on identifying age, gender, and emotion. The extraction and classification of face traits has been very successful using techniques like Convolutional Neural Networks (CNNs) and Artificial Neural Networks (ANNs). A person's facial expressions provide a window into their inner feelings, which might shift depending on their mental state or their surroundings. Though people show a broad variety of emotions, psychologists have identified six main ones: joy, sorrow, anger, fear, disgust, and surprise. The muscles of the face, particularly those that surround the eyes, lips, eyebrows, and nose, are vital for expressing these emotions. Because of their great accuracy in extracting and classifying variables related to age, gender, and mood, CNNs are among the most successful models for face analysis.

### *A. Gender and Age Classification*

Access control, demographic analysis, surveillance, and human-computer interaction are just a few of the many real-world applications that rely on facial picture age and gender recognition.

### *B. Emotion Detection*

Computers can now react to human emotions more effectively thanks to emotion detection technology, which allows systems to understand facial expressions. For uses in healthcare, education, security, and social media analytics, it is critical to understand the emotional content in face pictures.

## II. LITERARURE SURVEY

Countless research have tackled the problem of facial expression detection, with a particular emphasis on age, gender, and emotion categorization in real-time. The CNN-based approach suggested by Md Jashim Uddin et al. [1] achieved 95% accuracy for gender and age identification on the IMDB-WIKI dataset and 66% accuracy for emotion recognition on the FER dataset. To achieve an accuracy of 70.5%, Kalansuriya and Dharmaratne [2] used ANN with the FERET and FGNET datasets.

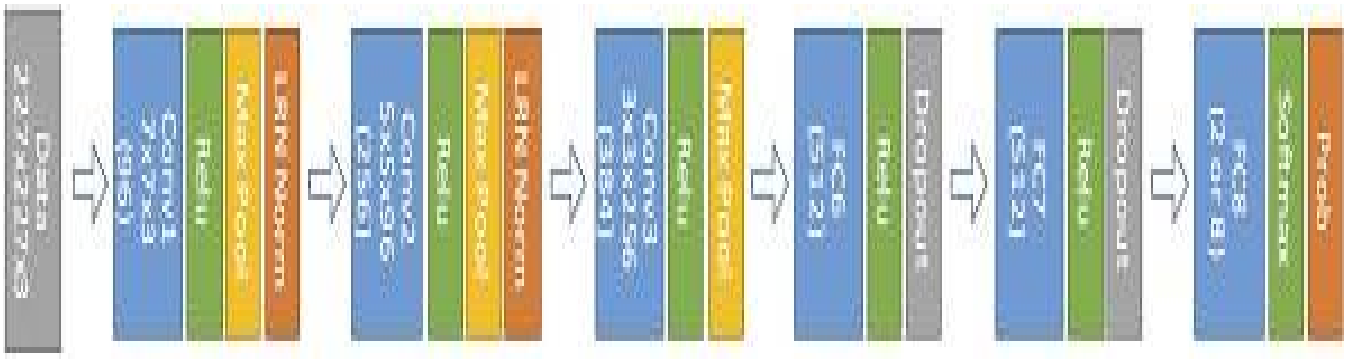
 

With the use of neural networks and sigma control limits, Dileepa and Dantib [3] were able to get a 95% accuracy rate. Gabor filters were used to enhance feature extraction by Sepidehsadat et al. [4]. For the purpose of emotion identification, Imane et al. [5] used a hybrid model that included HAAR cascades, CNN, and SVM.

With the use of a 9-layer CNN, Rajesh et al. [6] were able to achieve 90% accuracy across seven different emotions. Using CNN, Abdullah-al-Imran et al. [7] were able to replicate earlier findings. When applied to the CK+ dataset, LBP achieved an accuracy of 94.39% (Happy et al., 2008). The accuracy rate that Azarmehr et al. [9] achieved using EDA and SVM was 99%. Age was reported at 72.53% and gender at 98.90% by Yoo et al. [10]. Using CNN, Arriagal et al. [11] were able to classify gender 95% of the time and emotions 66% of the time. Other models [12–16] used methods such as LBP, PCA, HOG, and deep learning architectures, and they achieved accuracy levels between 50% and 97% on different datasets.

## III. MODULES

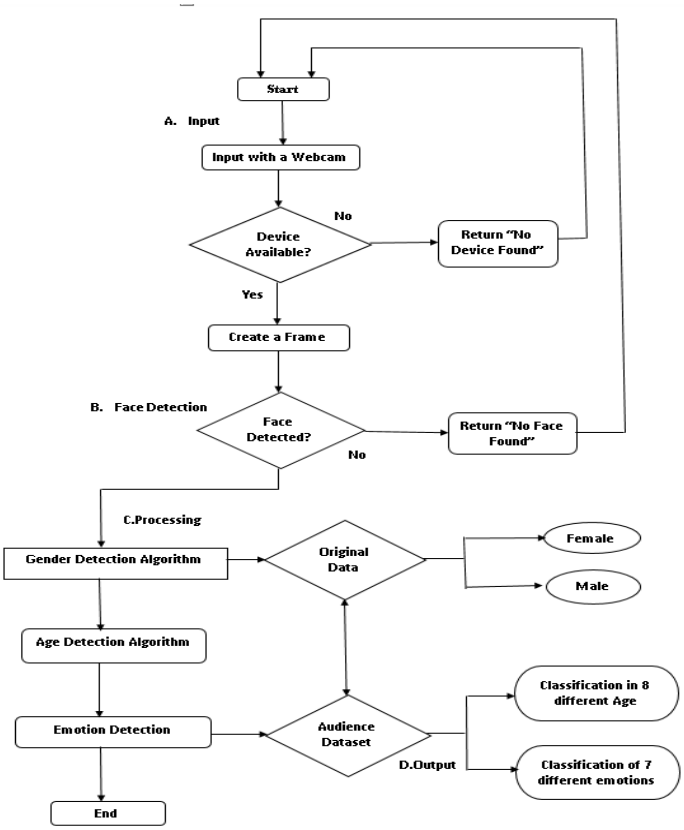
1) Input and Preprocessing Module: Takes pictures of faces in real time using a webcam. To improve the quality of the images for precise detection, they are grayscaled, shrunk, normalized, and filtered.
2) Face Detection Module: Makes use of integral pictures and the Haar Cascade classifier to recognize patterns in grayscale intensity in order to identify faces. Next, the faces that have been detected are removed and made ready for further analysis.
3) Age and Gender Detection Module: Uses a convolutional neural network (CNN) model trained on Caffe data to make gender and age predictions. The result is shown with bounding boxes and labels giving anticipated values after features from the identified face are examined.
4) Emotion Detection Module: Classifies facial expressions into fundamental emotions (e.g., happy, sad, surprised) using a trained convolutional neural network (CNN). Distances between features (such as the eyes and the lips) and landmarks on the face aid in the refinement of forecasts. A smart system for face analysis and tailored interaction is made possible by these components working in tandem.




## IV. ALGORITHMS

1) CAFFE Model: To classify people based on their age and gender, we employ the CAFFE deep learning framework using prototxt files that have already been trained. The process of creating and training CNN models is made easier with less code. The algorithm predicts the gender and age range from a cropped 227×227 face picture, which is originally 256×256 pixels in size. The gender classifier returns a binary answer (1 with a value of 0 for males and 1 for females, and an output from the age classifier indicating one of eight possible ages (0–7). Despite the time and privacy concerns associated with data collecting, CAFFE's strength is in its ability to use big, well-labeled datasets for precise estimate.
2) Haar Cascade: For facial recognition, Haar Cascade is used. Applications like surveillance, advertising, and HCI that need real-time performance might benefit from it. Using Haar characteristics, this approach analyzes grayscale pictures in search of faces. When used to detect face areas, it quickly and reliably passes them on to the CAFFE model. Efficient feature extraction using form, color, and orientation is crucial for enhanced accuracy.

## V. SYSTEM ARCHITECTURE




## VI. RESULT AND ANALYSIS

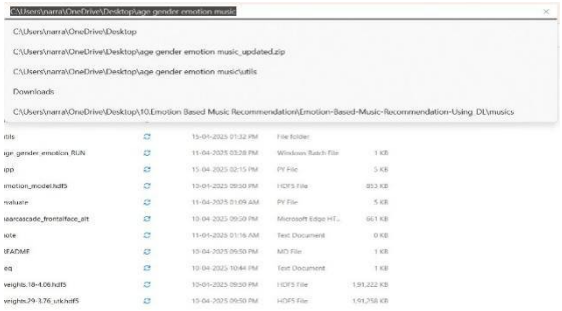


Fig – 1

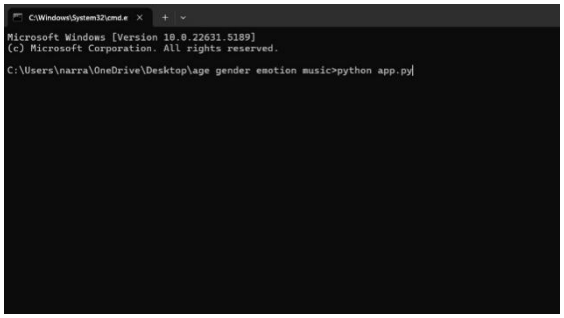



Fig – 2

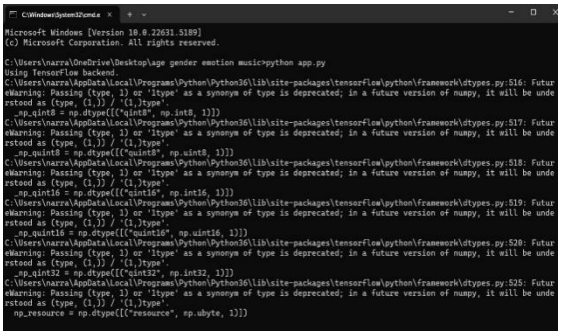



Fig – 3


Fig - 4

## VII. CONCLUSION

In order to provide consumers with a more tailored music experience, the face recognition-based technology analyses their facial expressions to ascertain their mood. This fresh method improves user involvement and might be used in music streaming platforms, for therapeutic purposes related to mental health and mood control, and other similar areas.

## VIII. FUTURE SCOPE

Perspectives for the Future Integrating with major music streaming sites is on the list of next upgrades that will allow users to access vast music with the use of facial expressions, which may greatly increase accuracy. In addition, consumers will have a more customized and emotionally engaging music experience with personalized playlists generated from their listening history, preferences, and current mood.

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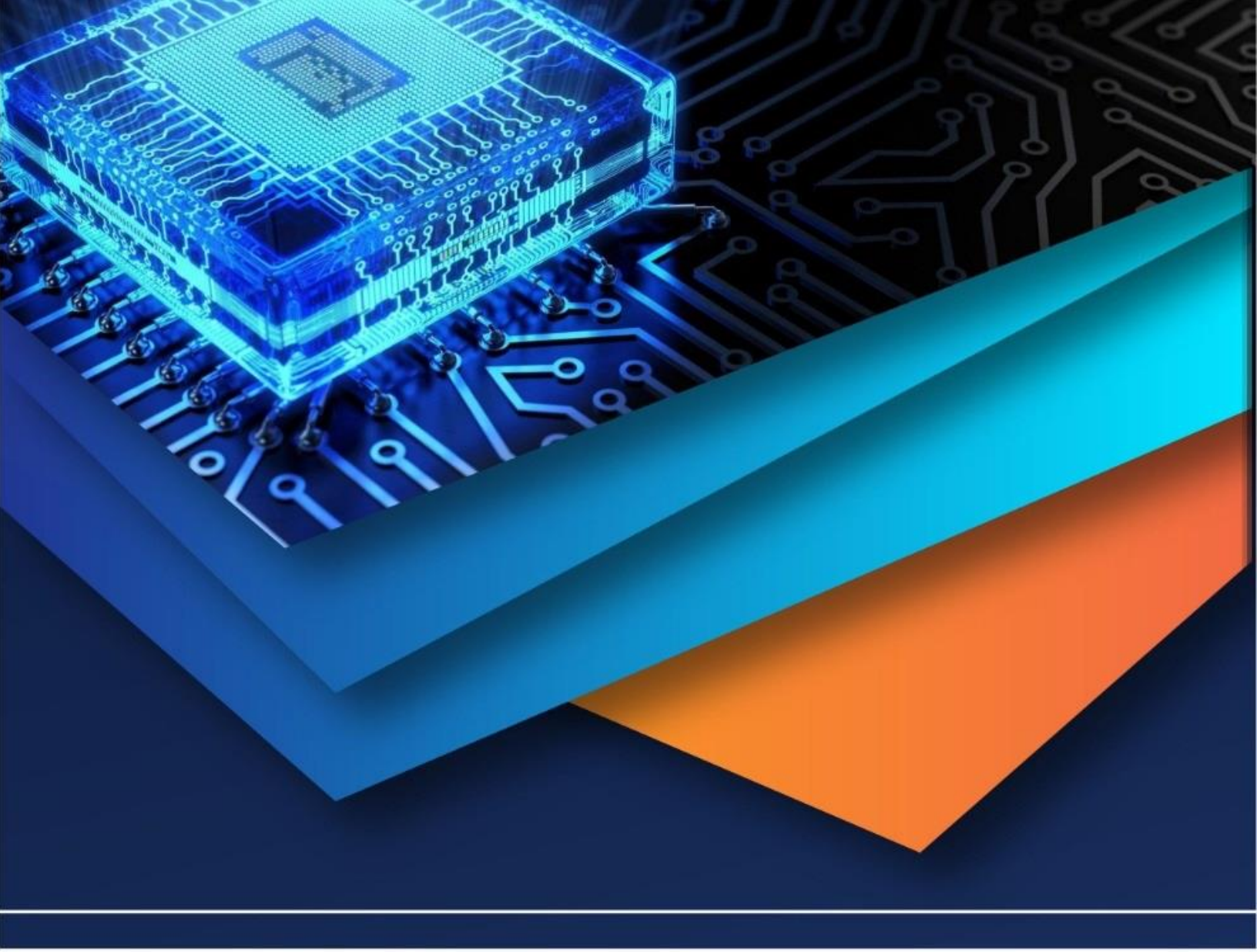

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