FACIAL AGE AND EMOTIONAL ANALYSIS

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ABSTRACT:

Using a neural convolution network, this research presents an automatic system for recognising age gender and emotions based on a person's face. In recent years, one of the most effective research subjects has been collecting information from a person's face. The human face has facial features such as eyes, ears, nose, chin, and other aspects that can be examined based on our requirements. The detection of age gender and emotions begins with facial recognition. Detection is the process of identifying many features based on a single input. Our system makes use of OpenCV and includes a few deep convolutional emotional networks that have been trained to detect faces from inserted images and predict their age, gender and emotions using either a webcam or an image. Not only are deep neural convolutional networks costly, but they are also difficult to implement.

KEYWORDS:Age Estimation, Gender Detection,Emotionsdetection, Deep Learning, Webcam, Convolutional neural network, OpenCV.

INTRODUCTION:

Facial age and emotional analysis are crucial tasks in understanding human behavior, cognition, and psychology. The ability to estimate a person's age, gender and recognize their emotional state from facial expressions plays a significant role in various applications, including human-computer interaction, affective computing, security systems, and healthcare. Importantly, presenting facial emotional stimuli is a valid and reliable approach in order to activate brain areas crucial for emotion processing (Fusar-Poli et al., 2009) and emotion identification tasks have been used in studies assessing emotional processing (Ebner & Johnson, 2009; Goncalves et al., 2018; Grady et al., 2007; Mienaltowski et al., 2011; Williams et al., 2006).

In recent years, significant advancements have been made in the fields of facial age and emotional analysis, mainly due to the proliferation of deep learning techniques and the availability of large-scale annotated datasets. Deep learning-based methods have shown remarkable performance improvements in tasks such as age& gender estimation and facial emotion recognition.

Importance of Human Emotion:

Emotions play a crucial role in decision-making, moral judgments, and other cognitive processes. They are not just individual experiences; they are also shaped by culture and history. Different cultures might prioritize, understand, or even name emotions differently. While there may be some universal emotional experiences, the way they are interpreted and expressed can vary widely.

Emotions are linked to physical health outcomes, mental well-being, and motivation. For instance, anger can motivate social change, while fear can drive individuals to avoid danger.

Can an AI-Accelerated System Detect Human Emotions?

For humans, the process of seeing and interpreting the world around us is intuitive and seemingly effortless. Our eyes capture light, our optic nerves transmit this data to our brain, and within milliseconds, our brain processes this information to form a coherent picture of our surroundings.

AI systems can also be trained to recognize emotions from facial expressions. They analyze features such as eye movements, mouth shape, and overall facial muscle activity. These systems can detect emotions like happiness, sadness, anger, fear, surprise, disgust, and neutrality.

Effects of Age on Emotion Recognition:

Research has shown that the ability to recognize facial emotional expressions declines with age. Older adults tend to less accurately identify emotions such as anger, sadness, fear, surprise, and happiness compared to younger adults1. This decline may be associated with differential age-related looking patterns.

Age Estimation from Facial Features:

Facial age analysis involves estimating the age of a person from their facial features. It involves analyzing landmarks such as the location of pupils, eye corners, lip boundaries, and other facial characteristics. It has applications in age-specific marketing, age progression. Algorithms trained on large databases of different faces can estimate a person's approximate age based on these features. The accuracy of age estimation depends on conditions like lighting and head pose, but it can be accurate up to +/- 5 years2. This has applications in affective computing, human-robot interaction, and mental health diagnosis and treatment.

Emotion Estimation:

Emotion estimation detects facial expressions from images or videos and returns the probability distribution of each of the six universal emotions: happiness, sadness, anger, fear, surprise, and disgust, along with neutrality. More complex emotion estimation is also possible upon request2.

Gender Estimation:

Certain common features in human faces distinguish male faces from female ones. Advanced machine learning techniques can provide real-time gender detection. Gender estimation can be useful for targeting products, content, or ads to specific genders.

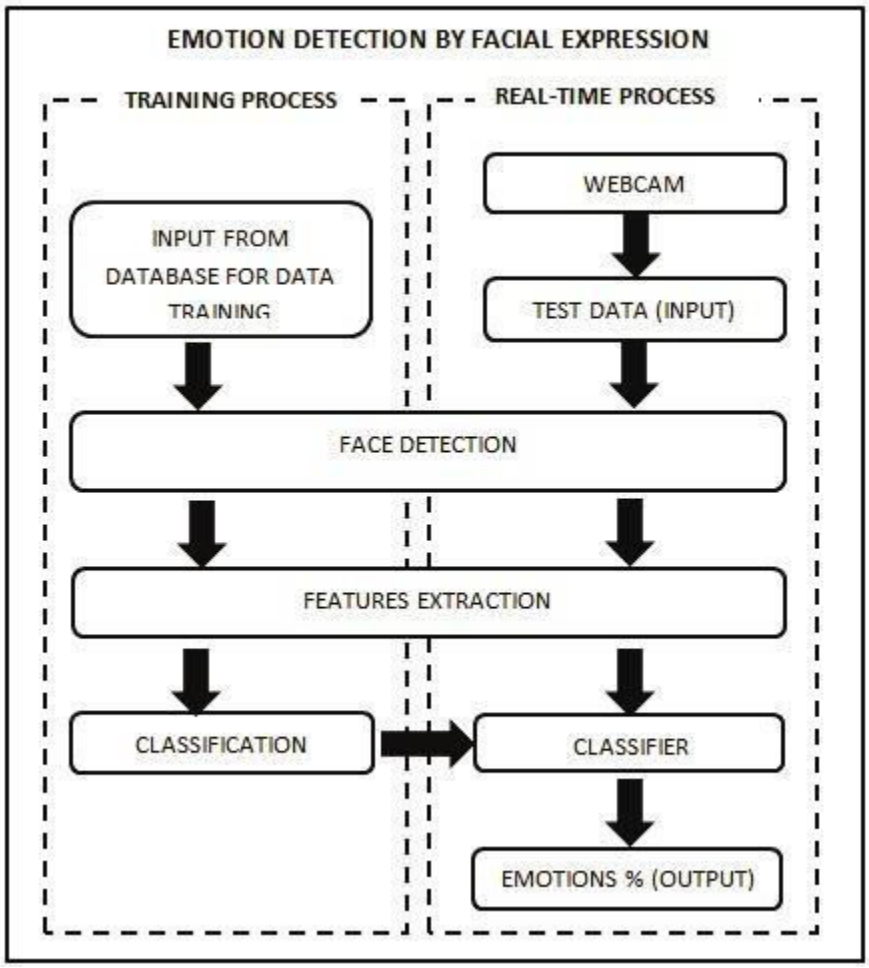
Related Work:

An individual behavior is unpredictable, it is often laid low with emotions or the encircling environment. It was very difficult to grasp an individual behavior and to perform an automated face detection keeping in mind that an individual behavior changes frequently but a way was introduced to do that work. This technique is used to stop any future crime by investigating any suspicious/abnormal happening. Here Transfer Learning concept has been introduced which mainly depends on the deep learning and machine learning. The features of face are extracted and is passed to support vector machine classifier. As the provision is very low of the data, a dataset was build and the proposed method was applied on dataset. Very good results were achieved from the proposed method as it was very sturdy. Talking about accuracy for age detection, an accuracy of 80.16% was achieved and for gender detection, an accuracy of about 90.32% was achieved which was considered great on comparison with other technologies.

METHODOLOGY:

There are some basic requirements this project includes system with Webcam, Visual Studio Code(or any other supporting editor), Python 2.7-3.6 is used to code, Open CV2 a computer vision library. Deep learning and Machine Learning are used in this project,in which a model is trained to identify age gender and emotions of the human face images accurately provided. Deep leaning is about how a machine thinks and acts like a humanbrains, it mimics the human mind's working and thus called as an AI program. Computer Vision is used to make this possible, through this computer can see digital images and identify them as how human brain sees and understands it. It involves processing, analysing and then understanding the images so that data could be extracted from the real world and from this data required information could be generated and used further in many applications without involving human intervention this will be beneficial in many perspectives as a lot of data can be fetched in less time which helps in solving major issues. This majorly includes live video. Motion estimation, image restoration and most importantly object recognition which further includes facial recognition. Our project uses Computer Vision to detect a person's age and gender. The model is trained using deep learning by feeding it various human face pictures to learn the features and then through the classification model gender and age can be detected. OpenCV which stands for Open Source Computer Vision it is a machine learning python library which allows processing real time image supporting analytical capabilities. This library supports other Deep learning frameworks. Convolutional Neural Network a deep neural network is used to train the model. It can detect objects, faces, expressions, and characters from random data sets.

WorkFlow:



TESTING:

To ensure the effectiveness of the method we have taken some pictures from the dataset. Below is the performance comparison:

Randomly Selected Without-Mask Images

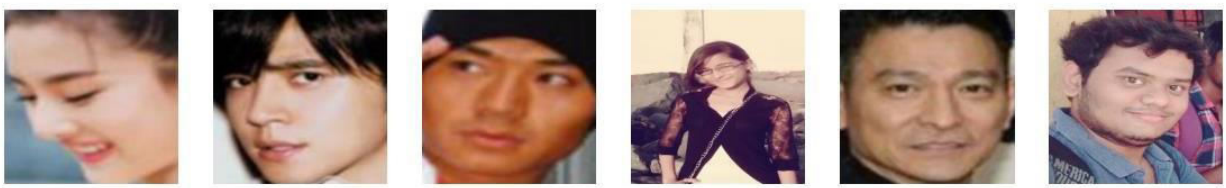


Fig:0.1 Input data

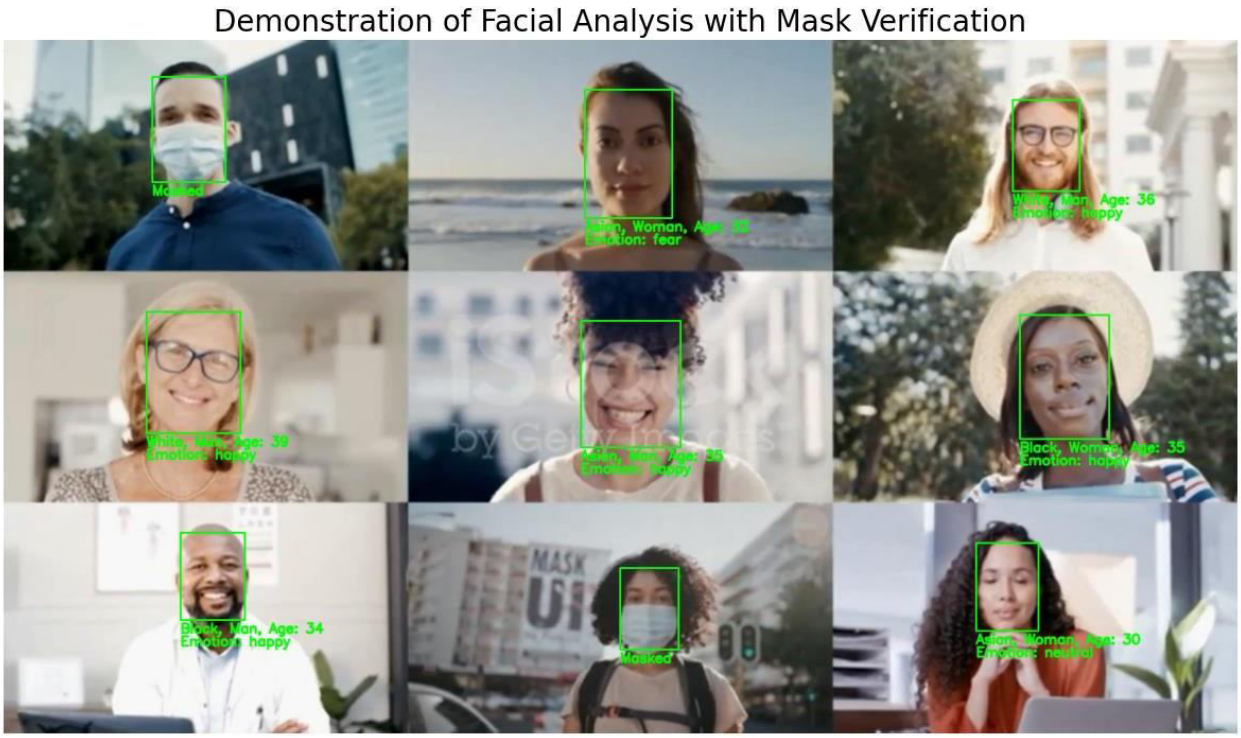


Fig:0.2 Output data

KEY FEATURES:

The foremost purpose of the program is to supply a quick and cheaper thanks to age and gender segregation. a number of the foremost key features of the project are: -

1) No need for top hardware/software accuracy. Images can be processed and detected directly from a webcam or from an image.

2) This method of operation is straightforward to use and doesn't require advanced knowledge. a bit of general computer information is enough.

3) Can process and maintain many facial effects with an identical effect without slowing down or delaying.

CONCLUSION:

In conclusion, the analysis of facial age and emotional expressions through technology has proven to be a promising tool in various fields, including psychology, healthcare, marketing, and security. By accurately assessing a person's age and emotional state through facial analysis, we can better understand human behavior, improve customer experiences, enhance security measures, and provide more personalized healthcare. However, it's crucial to address ethical concerns regarding privacy and consent, ensuring that these technologies are used responsibly and ethically. With continued research and development, facial age and emotional analysis technology have the potential to significantly impact society positively.

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