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IDENTIFICATION OF GENDER AND AGE FROM FACIAL IMAGES USING NEURAL NETWORKS

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ABSTRACT
Due to the increasing use of social media and an increase in number of applications, automatic gender and age classification has become very vital these days. For commercial applications,automatically prediction of age and gender accurately and reliably from the facial images is very much needed. This project highlights a method that would classify the attributes of gender and agefrom facial image and a live video. This methodology is being carried out using deep-convolutional neural networks.A convolutional neural network generally contains multiple hidden layers that are convolutional in addition to the input and output layers. A CNN layer,contains a convolutional layer a pooling layer and a fully connected layer. This includes a pre-trained model which is used for the comparison of the image taken from the input image or video. The implementation of this project is done in python, which produced better and accurate results in terms of gender and age classification.

Keywords: *gender and age classification, convolutional neural network, pre-training and deep learning.*

1.INTRODUCTION
In particular, the term "technology" and its usage have evolved and continue to evolve over time. The development of technology has had a great impact on the development of human civilization, and this technology can be used for various real-time applications. One of the fastest-growing generational applications is predicting age and gender from photos and videos. There are many examples where age and gender predictions are used. Biometrics, which identifyindividuals based solely on physiological or behavioral characteristics, are gaining interest because they are more secure and convenient than traditional strategies consisting of keys, passwords, and more.

Numerous biometric features such as the face, fingerprint, iris, signature, voice, and gait can be used to authenticate an individual. Among them, facial recognition is the hottest research theme in biometrics, and face private authentication is very popular because it is an herbal method for humans. The advantage of facial reputation is that it does not require a dedicated facial image capture system, making it easier to use compared to other popular biometric strategies consisting of iris and fingerprints.
Deep learning neural networks[1], are constructed by combining data inputs, weights, and biases in order to simulate the workings of the human brain. It is these elements that help recognize, classify, and describe objects within the data in an accurate manner.
The term deep learning refers to a form of machine learning that utilizes neural networks that have three or more layers. The neural networks are designed to replicate the behavior of a human brain, but they are far from fulfilling that function, allowing them to "learn" from great sums of data.Deep learning[2], can be described in the context of machine learning, and more specifically, as a set of techniques used in neural networks. It works in a series of layers that enable the decomposition and analysis of the data

entering the representation system. These layers are not designed specifically for each question but are part of a general process that can be customized for different question types.

Therefore, to solve many problems, this network structure can be reused for different problems. Such models behave differently depending on the way the network is trained and the type of data used. Many studies have shown that deep [3-6] learning has shown improvements in solving tasks that were previously difficult to solve with other algorithms, with several showing better results than previous studies.These tasks involve problems whose inputs have complex structures and are not learnt easily by convolutional algorithms like speech recognition and image classification. Convolutional Neural Networks (CNNs) are primarily used in computer vision and image classification, convolutional neural networks are primarily used to detect features and patterns in images in order to perform tasks like object recognition and classification. The first time CNN beat humans in a challenge for object recognition was in 2015. Due to their ability to handle continuous or time-series data, recurrent neural networks (RNNs) are commonly used in natural language and speech recognition applications because they work with continuous or time-series data.

2. METHOD

It is aimed to attain truthful outcomes by predicting the age and gender of an image using a deep learning technique. The deep learning technique which is used is the convolutional neural networks (CNNs) to acquire a resourceful result. Several layers of the convolution network are used for the forecast of age and gender. The implementation of this project is done in python.The output is expected to estimate the correct age and gender of a person from the image of a live video. The block diagram of this proposed system is shown below.

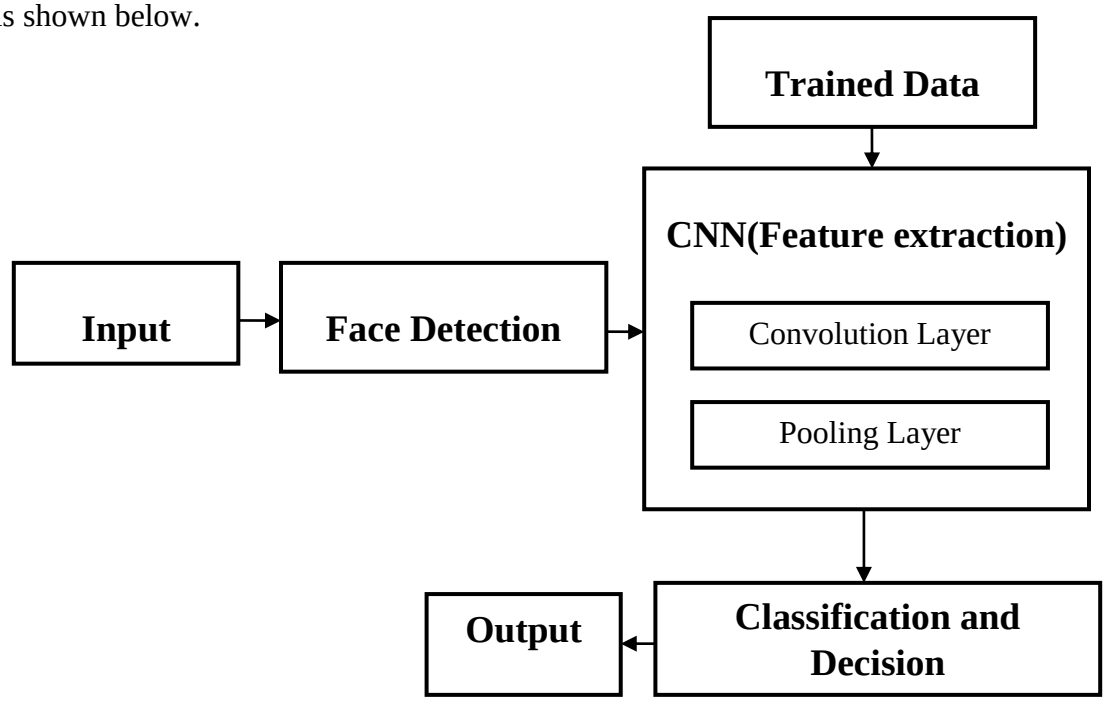

Fig 1: Block diagram of the proposed system

2.1 Training data

A large dataset has been used to train the machine learning models. This training data helps to train the models for appropriate prediction in order to extract the features to the set goals. Labeled training data is used for supervised machine learning models and unlabeled data is used train unsupervised models.

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2.2 Face Detection

The face detection algorithm focuses on detecting frontal human faces. Facial recognition is the first step involved in many real-time face-related applications. A facial recognition system mathematically maps a person's facial features and saves the data as a face print. Facial recognition algorithms typically start by looking for one of the easiest features to detect: the human eye. The algorithm tries to recognize eyebrows, mouth, nose, nostrils, and iris.

2.3 Convolutional Neural Networks

CNNs are designed to process data in the form of multiple arrays and pass inputs between layers[7-9]. The layer extracts the desired features of the input and assigns computed weights or filters to those features to determine which are more important. CNN consists of three types of layers[13]. These are convolutional layers, pooling layers, and fully connected layers.

1. A convolutional layer extracts features from an image and produces a feature map.
2. A ReLU layer is used after each convolution and has the purpose of replacing all negative pixels in the feature map with zeros. The main purpose of such operations is to introduce non-linearity into the network.
3. The pooling layer reduces the dimensionality of the feature map and retains only the most important information depending on the type of pooling applied. This can be viewed as a scaled-down image. This helps improve computation time and results.
4. A fully connected layer contains neurons that are directly connected to neurons in the two adjacent layers, and not to layers within those layers.

2.4 Classification and Decision

The classificationand decision are the last steps in this model. A classification of the gender of the person in the image is given by male or female category, and the age of the faces detected in the image is quantified by range[10,11]. After implementing various layers of a convolutional neural network, a person's gender and age are the output of the CNN model.

3. RESULTS

This section presents the implementation results. Several images from various resources have been given as input to the algorithm. Image classification is shown below according to the given input image. A person's age is displayed in a range, and a person's gender is categorized as ‘Male’ or ‘Female’.

No Face Detected

Fig 2: Input image of a cartoon.

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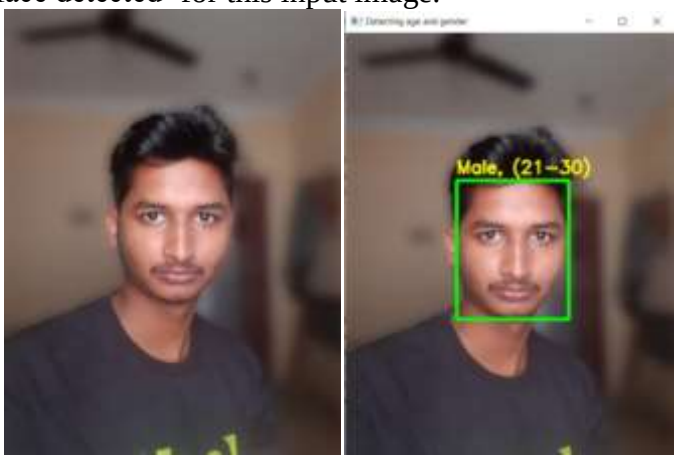
The image in this example is the picture of a minion, which is a cartoon character. The proposed method delivers an output as 'No face detected' for this input image.

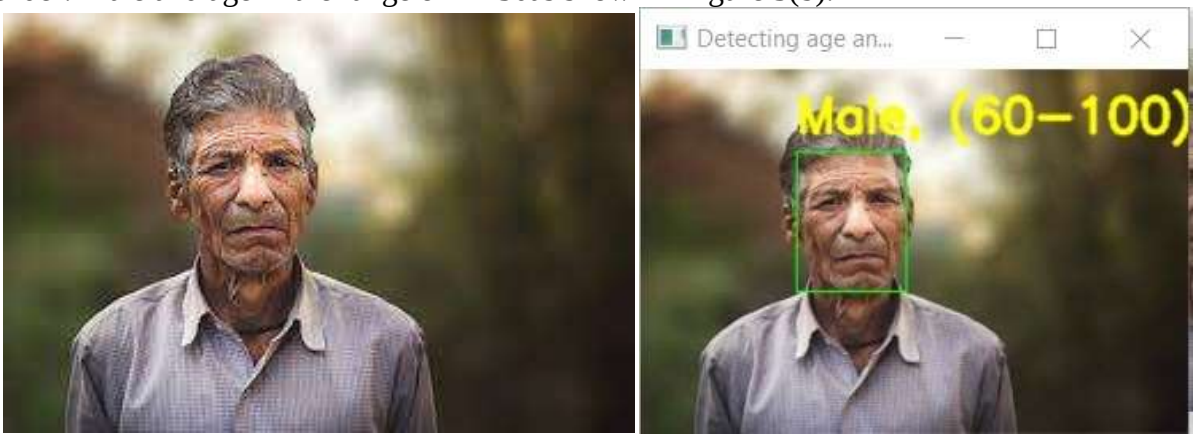


(a) **(b)**

Gender: MaleAge: 21-30 years

Fig 3:a) Input image of a young boy b) Output image of a young boy

Here, the image of a boy in figure 3(a) has been inputted to the algorithm and the resulted is displayed as: Gender: Male and age in the range of 21-30as shown in figure 3(b).



(a) **(b)**

Gender: Male sAge: 60-100 years

Fig 4: a) Input image of an old manb) Output image of an old man

Here, the image of an old man in figure 4(a) has been inputted to the algorithm and the resulted is displayed as: Gender: Male and age in the range of 60-100 as shown in figure 4(b).

4. CONCLUSION

In the proposed method, the implementation of the deep convolutional neural network for human age and gender prediction is examined. Firstly, face detection is done for the input image given to the model. Next, a deep learning algorithm is applied, through a convolutional neural network to train the model for gender classification, and then a competent model for age estimation is applied. The predicted gender is categorized as 'Male' or 'Female' and the age is presented in a range. This project is beneficial in many real-time applications in the era of escalating technology. The results of this

project show that the utilization of the deep neural convolutional network is an efficient way to forecast age and gender prediction.

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