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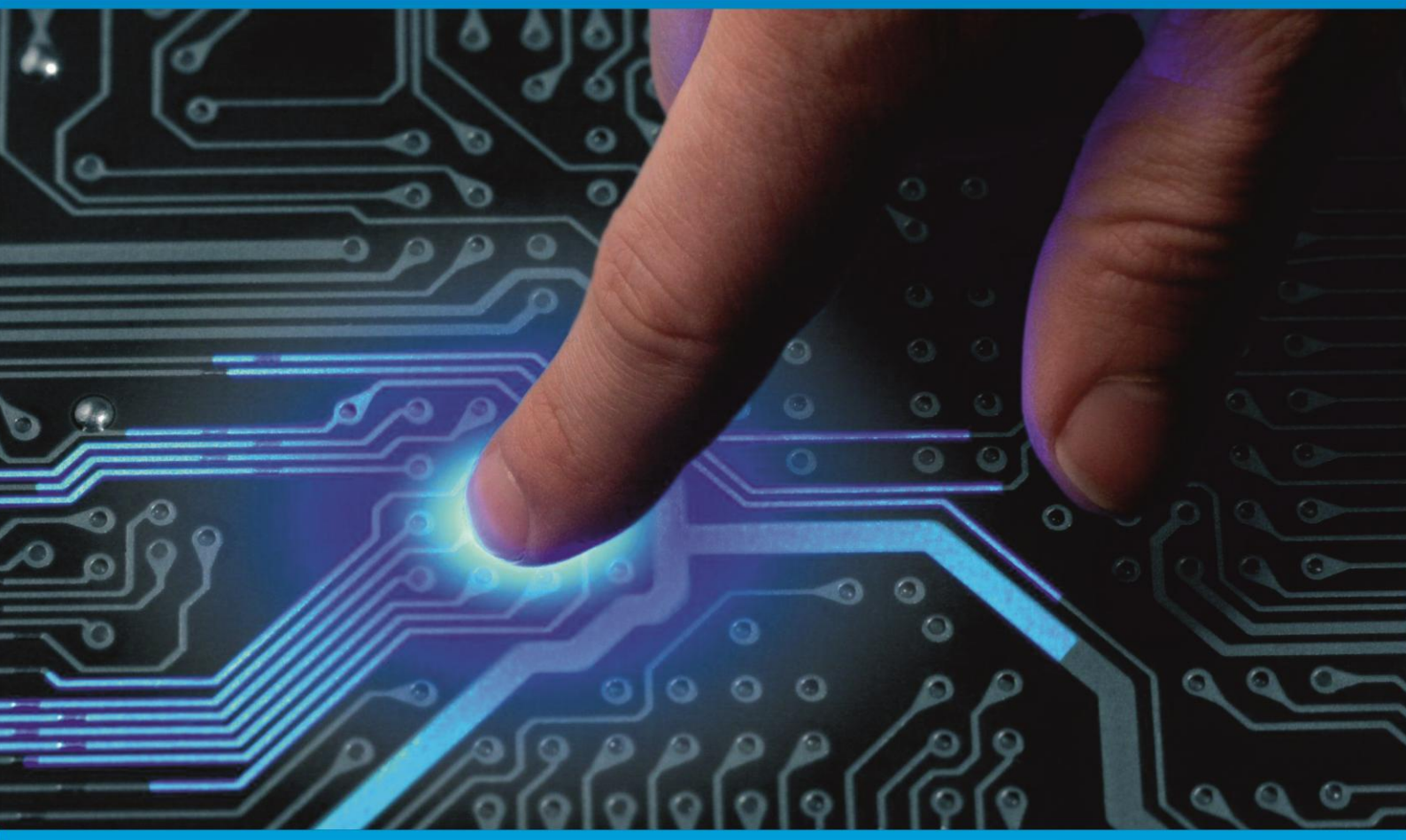

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Analysis and Detection of Age and Gender using Deep Heuristic

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ABSTRACT: During this modern era, there is a drastic increase in technologies where Age and Gender detection became relevant and widely used in applications like social platforms and social media. Face detection and recognition play a crucial part in detecting age and gender. The attribute information such as age and gender plays a huge role in improving the accuracy and performance of face recognition. However, existing technologies on authentic image and gender classification lacks performance and efficiency. The main aim of this paper is to overcome this challenge and give a brief view on how classification is done using deep learning for which we used a Convolutional neural network (CNN) which performs well even when huge tasks are given. Deep-Convolutional neural networks study the face images of a person on which the CNN model has been trained. Many methods were proposed by researchers in the past for age estimation and gender detection but there were some disadvantages such as partial reflection of faces which caused a problem in detecting the age and gender of a person accurately. We used the UTKFace dataset which consists of various categories of real-world face images which were used for training our CNN model. To the end of this project, we have proposed a simple convolutional network architecture that increases the performance, accuracy, and efficiency even when the training data is limited.

KEYWORDS: Attribute information, Deep-Convolutional neural networks, face detection, face recognition, gender classification, UTKFace dataset.

I. INTRODUCTION

The analysis of age and gender detection has been playing an important role in this advanced world where machines are used to do the work instead of human beings.The reason why most people prefer machines is they are easy to operate and we can maintain them easily and the quality of the work will be more accurate when compared to the work done by a person. The major role of "analysis and detection of age" is to classify the gender and age of a person. Based on our daily life, we communicate with different kinds of people and based on age and gender the way we communicate to a person differs. The very first thing that a person does while meeting a new person is to classify his or her gender. This classification is mainly based on a person's facial features. Face recognition plays a vital role in the surveillance sector. Mostly face recognition is used in places where high security must be provided to keep the place away from intruders. When a new face is detected the CNN trained models immediately recognizes and alerts the guards. By using face recognition, we can monitor at what place a particular individual is present and at what time, this makes it easier to keep an eye on a particular individual. In this way, face recognition is used in security surveillance to identify a particular person or to recognize his face and try to get his details, etc.

As humans are well versed to classify the gender of a person but a machine could not classify that instantly. To make this possible we developed a model and trained the model with different data sets to classify the gender of a person. So, to develop the model here we used Convolutional Neural Network (CNN) and deep learning to estimate age and gender detection. The model uses a computer that has a camera which is used to detect the face and the trained model scans the image. To make this work we trained the model with a data set that has a sufficient amount of data and each time the computer recognizes a face it uses its data to extract facial features and detects the gender and age of a person by comparing the person's image with the trained data set. For this model we added another extension, with this we can also give a physical image to estimate its age and gender detection. The model is a high-level security feature

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that can be an asset to the surveillance system so that, if any security breach had happened we can detect the person's face using this facial recognition and detect his gender too. This could help the organization to find the targeted person easily. The main purpose of the project is to make a system capable enough to recognize a person and to detect the gender and age of the person just like humans.

DEEP LEARNING:

Deep learning is a subset of machine learning which is used in artificial intelligence, it has networks that can learn from unsupervised data that is unstructured or unlabeled. It is also known as a deep neural network; the AI is independent therefore it can learn without human supervision.The use of deep learning is we can collect an enormous amount of data which is also known as “Big Data” and this data is collected from sources like social media, search engines, e-commerce platforms, but not all data is useful. Generally, what deep learning does is takes this unstructured-unsupervised data and learn from the data by itself. Here, we are using raw data which is unstructured and by using deep learning algorithms the AI differentiates the differences and adapts according to the data whereas in machine learning we have to train the model by providing data sets that are structured and labeled and the model gets prepared accordingly. Similar to the human brain the deep learning also uses a structure of algorithms that are multi-layered called neural networks. The main goal of deep learning algorithms is to enable computers that can mimic human behavior. The algorithms try to make similar decisions as humans do by repeatedly analyzing that has a logical structure. The architecture of neural networks is based on the structure of the human brain. Just like humans perceive data to identify patterns and classify the data accordingly the neural networks can be used to perform the tasks just like a human does in the data. As similar to how a human brain works whenever we receive new info the brain tries to compare with the known objects in the same way the concept of the neural network is designed. Neural networks help us to perform different tasks like clustering, classification, or regression. With this we can sort unstructured data into structured data with the given samples (OR) we can train the network by using a labeled data set to classify the objects in the data set into different categories.AI can solve problems that machine learning can never solve. The recent advancement of technology is due to the deep learning algorithms, without them we would not have personal assistants like Alexa, Siri. And some other examples are chatbots, self-driving cars, Google lenses. The advertisements we see on our mobile and the movie suggestions we get in an OTT platform are all made possible with the help of neural networks.The main advantage of deep learning over machine learning is a feature called feature extraction. Feature extraction is usually a complex process that is embedded in the deep learning system. It requires a piece of thorough knowledge of the problem statement. Then, the preprocessing layer must be altered, checked, and processes over several steps for ideal results.

CONVOLUTIONAL NEURAL NETWORKS:

CNN stands for Convolutional Neural Network which is a neural network that is specialized in processing data that has the input like 2d images which is used to classify or recognize the image. On seeing a new image, we can scan the image from any direction or any angle to find different features of the image and then we bring together all the features that we scanned to classify the image. This is how CNN works. The translational invariant feature which is a property of CNN helps in the recognition of an image irrespective of the size or the rotation the objects will be recognized so we don’t need to consider the image transformations like rotation, deformations. Recently we discovered that CNN has a large capacity to perform sequent data analysis like natural language processing.CNN is a unique form of deep neural network which is used to process data that have multiple arrays and grid-like topology. CNN's can be used on 3D (video), 2D (image), and 1D (text or audio) input data to perform in deep learning applications. It can draw out high-degree features from raw input features, which are much more robust than human-designed features. Thus, it has brought remarkable advances to several fields—for example, image segmentation and recognition. CNN is a type of radial basis function neural network in AI which is widely used for image recognition and the input data is of the form of multidimensional arrays. The more data we have the more effective the CNN.CNN has a feature named receptive field which is to extract every portion of the input image. CNN network has an input and an output layer and in between, there are multiple hidden layers. These hidden layers consist of a series of convolutional layers. This makes the training of the model completely computerized and the performance is better than the manual work done. It can also be used for various types of image recognition problems and image types.The efficiency of the CNN can be determined by the number of layers and the size of the network. Therefore, this technique is limited by computing power and the availability of larger data.

II. RELATED WORK

[1] Identifying age and gender became very prominent in recent times. it is prominent as well as gained significant attention recently due to the rise in social media. Yunjo Lee proposed that the fMRI method is employed to review age detection methods. The study involves a correct recording of the variations of individuals based on their changes consistent with age, gender, identity, and other features. The brain activation tasks associated with face matching are performed and tested outside

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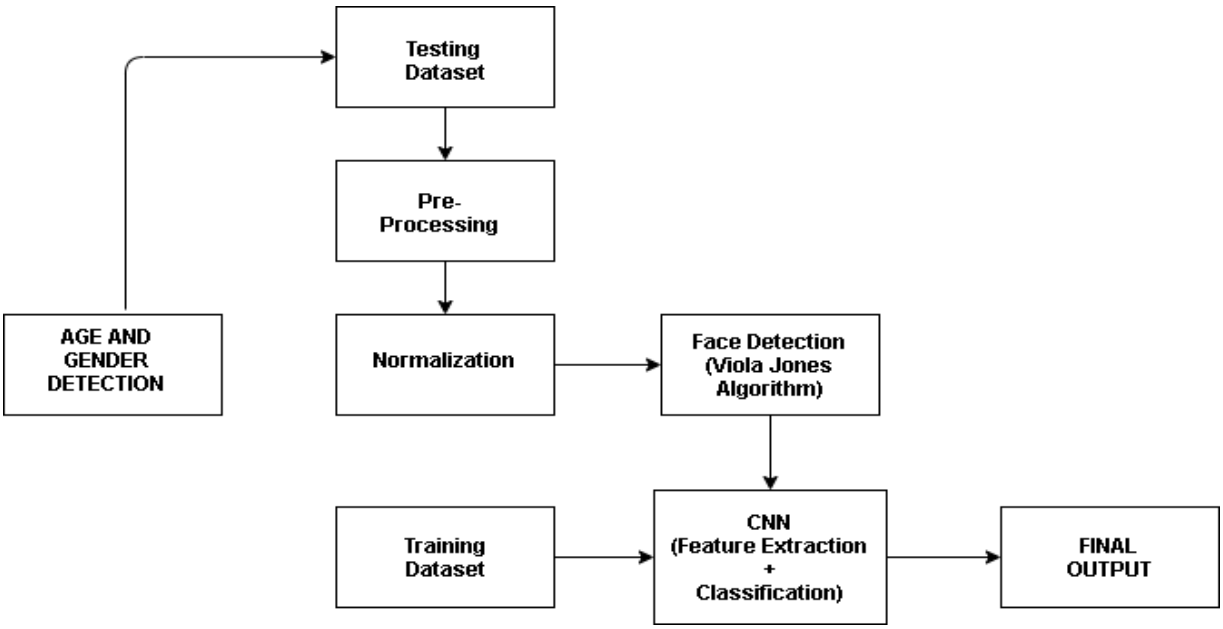
the scanner. There was the same end in face processing in older also as young adults. The results based on the performance are high in the two cases having the same facial viewpoints. The aging of the elders isn't supported anybody factor. It is a combination of varied factors that end in accountancy of such results. The results got to be kept a track on which are supported all credentials kept in certain environments.

[2] Sarah N. Kohail proposed that age estimation is now the present challenge being faced. Here, this paper finds the right support to move forward in the approach of neural networks to estimate the age of persons. Most of the change that has been made during this method is the fine-tuning of the age ranges. To find out the multi-layer perception neural networks (MLP) the countenance of the new images were extracted and recorded. The results have shown the MLP method as an honest method with minimum errors within the results. These results are often utilized in many applications like age-based access control applications and also within the age adaptive human-machine interaction. The upgrades are to be made within the system, where the system is to be made more automatic, and also the numbers of input facial features that are provided to be reduced.

[3] Chao Yin proposed that the Conditional Probability Neural Network (CPNN) is a distribution learning algorithm used for age estimation using facial expressions. It follows the three-layer neural network system in which the target values and the conditional feature vectors are used as input. This can help it in learning the real ages. The relationship between the face image and the related label distribution through the neural network is used as the learning method for this system. CPNN has proved to be providing better results than all the previously made methods. Through this method the results provided were very easy, there was less computational involved, and the outcomes very efficient. Due to all such advantages, it was preferred more than the others.

[4] Hang Qi proposed that various techniques are arising for the detection of faces which may also identify the age of the person. Here, an automatic system has been proposed which may classify the age and help distinguishing kids face from that of an adult face. There are three parts that the system encompasses. The first part is face detection the second one is face alignment and normalization and the last is one is age classification. Face samples are created by the traditional face detection and alignment methods. ICA is employed for the extraction of the local facial components that are present within the images. this technique has been proved to be much faster and the results are efficient. So this technique is often utilized in the future as a prototype.

III. SYSTEM ARCHITECTURE



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TESTING DATASET: A testing dataset also called a Real-time dataset is the first step in age and gender detection where a webcam is triggered and is switched on to detect the face of a person. Webcam is triggered by using THE capture function which is used in OpenCV. Once the face is detected then, it is pre-processed in the later stage.

PREPROCESSING: This is used to enhance the quality of the image by converting the image into grayscale and then by reducing the noise in the image which is caused by the environment. It is the lowest level of abstraction where it smoothens the image without any noise by filtration methods.

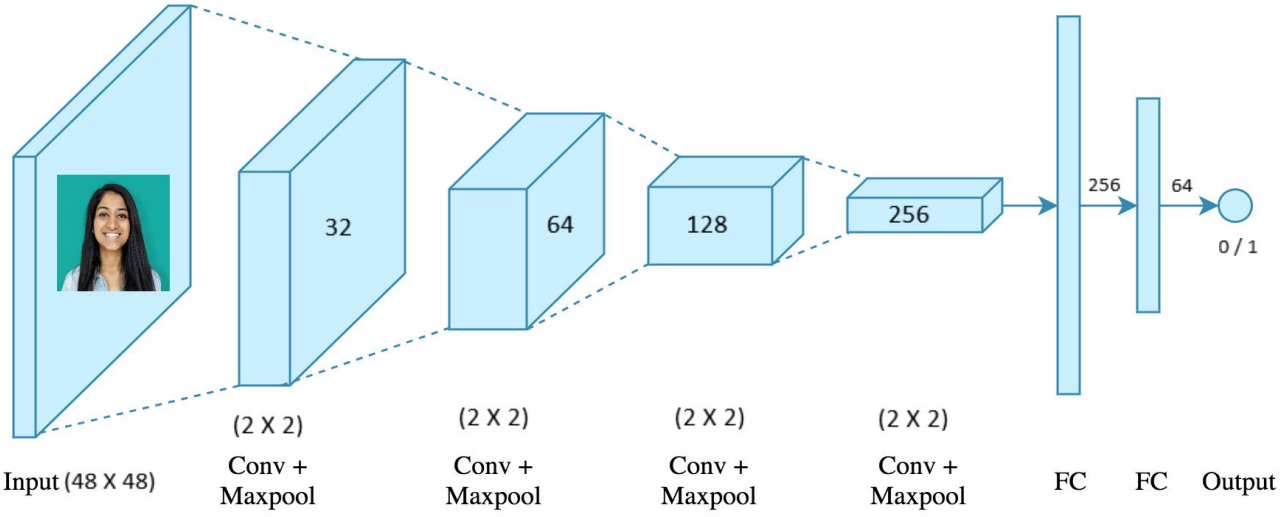
NORMALIZATION: It is a technique that is used to produce a uniform size image by cropping the detected part of the face into a rectangular box which eliminates unnecessary parts in the image. It is then used to detect every part of the face like the eyes, nose, lips, etc.

FACE DETECTION: For detecting the face we used the Viola-Jones algorithm which is the best Object detection algorithm which is used to detect the faces of a person from the input image. In this algorithm, we select Haar-like features where all the pixels are added and then make this into an Integral image where only the boundary pixels are added. The last two steps involve Adaboosting where training is done and the final step is Cascading the image.

FEATURE EXTRACTION: It gives meaningful information to the input image by calculating the distance between the eyeballs, the distance between nose and chin, etc. After feature extraction, classification of the image is done where the probability is calculated using Softmax or SVM to predict the age and gender based on the Training dataset where the CNN model gets trained. Finally giving the accurate output.

IV. NETWORK ARCHITECTURE

Our proposed network architecture comprises four convolutional layers and two fully connected layers comprising a finite amount of neurons. The main motivation of our project is to design a small architecture that can increase performance and reduce the risk of overfitting.



The input image is first rescaled to a size of 48 X 48 and then fed to the convolutional neural network model where it then detects the age and gender of a person from the set of images that we have given for training.

1.32 filters of size 24 X 24 pixels are applied to the input in the first convolutional layer, followed by a rectified linear operator (ReLU), a max-pooling layer that takes an input of 2 × 2 regions with a one-pixel stride.

2. The output of the first layer is then fed to the second convolutional layer, containing 64 filters of size 12 X 12 pixels which are again followed by ReLU and a max-pooling layer.

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3. The third convolutional layer operates by applying a set of 128 filters of size 6 X 6 pixels, followed by ReLU and a max-pooling layer.

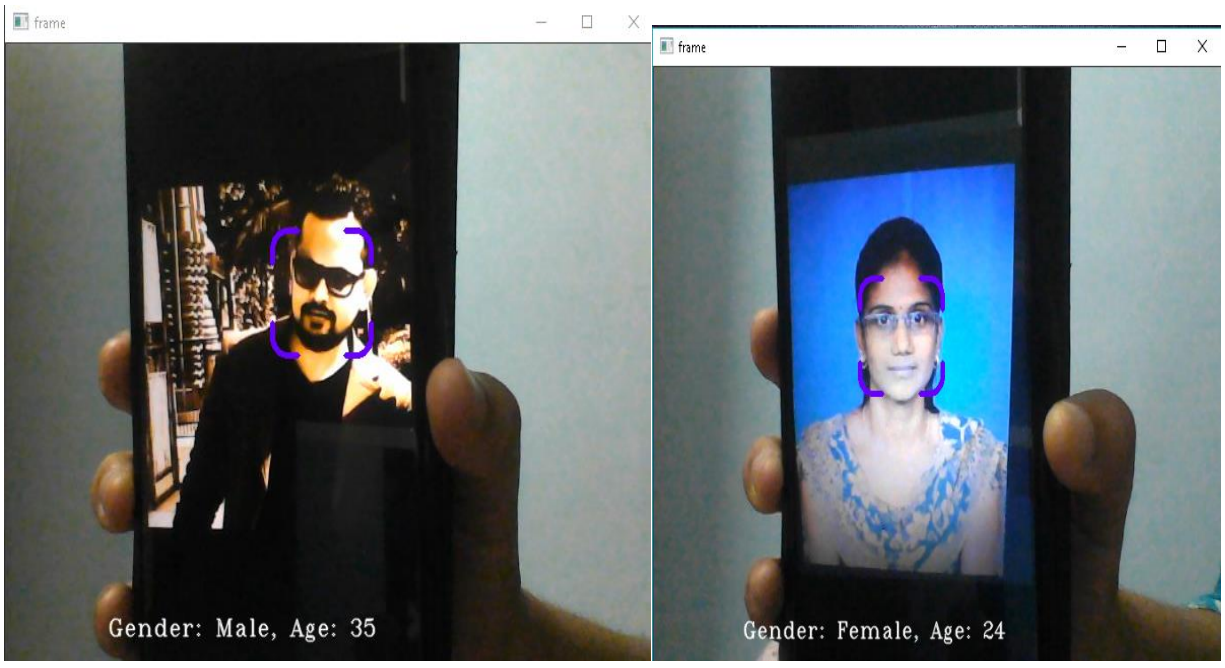
4. Finally, the fourth convolutional layer i.e the last layer contains 256 filters of size 3 X 3 pixels followed by ReLU and max-pooling similar to the first three layers as discussed above.

5. The first fully connected layer receives the output of the fourth convolutional layer which contains 256neurons, followed by a ReLU and a dropout layer.

6. The second fully connected layer that receives output from the first fully connected layer contains 64 neurons, followed by a ReLU and a dropout layer.

Finally, the output of the second fully connected layer is fed to a soft-max which is a probability distribution function calculated for each class that predicts the age and gender by taking the class with the maximum probability of either 1 or 0 for the given test image where 0 indicates Female and 1 indicates the gender Male.

V. RESULTS



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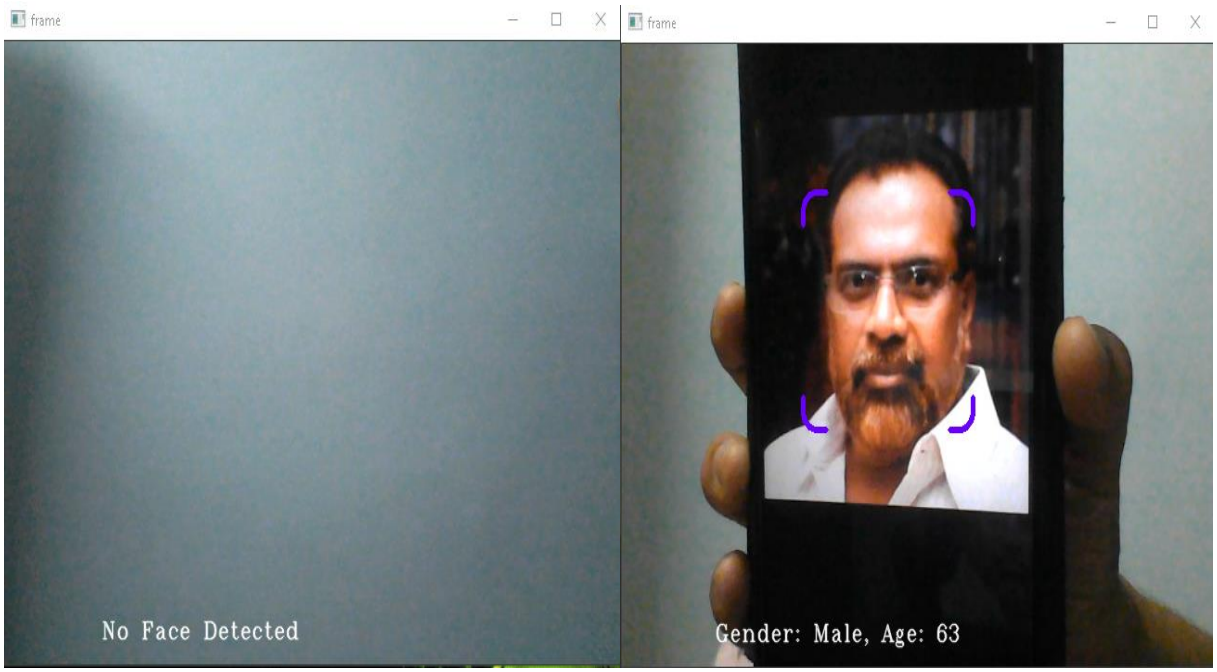

VI. CONCLUSION AND FUTURE WORK

CNN makes the detection of age and gender easier and also improves performance. As CNN is a more elaborate system, so the accuracy of the analysis could be more efficient and standards of the prediction would meet reality. Age and gender represent very important information of a wide range of tasks. An overall study of gender classification and age estimation can be used to solve real-time application problems. The real-time image sensor detection and tracking of the face became a challenge for several researchers. This project demonstrates a system that detects and tracks faces in real-time and estimates age and gender. The CNN is used to provide enhanced results of age and gender estimation, even by considering a limited training dataset of unconstrained labeled images for age and gender. The simplified network architecture will resolve the issue of over-fitting of data and will yield better results for other training datasets as well as testing real-time images. In this project, most of the research work done is in Convolutional neural networks. Though many previous methods have addressed the problems of age and gender classification, much of this work has focused on constraints. The key features of the images are the color and texture of the image. We provide results with a lean deep-learning architecture that is designed to avoid overfitting. After that, we increase the size of the training data by adding some cropped images to our training set. Two important conclusions can be made from our results. First, CNN makes the detection of age and gender a lot easier and the performance is also improved a way better. Second, as CNN a more elaborate system, so the accuracy of the analysis could be more efficient and standards of the prediction would meet reality. This project includes real-time dataset collection, followed by pre-processing and classification. Using these image processing techniques real-time face datasets are analyzed and their gender and age are predicted. Performance analysis is done in terms of accuracy where 90.15% is obtained for CNN whereas 87.95% for the existing system.

REFERENCES

[1]. Yunjo Lee, Cheryl L. Grady, Claudine Habak, Hugh R. Wilson, and Morris Moscovitch," Face Processing Changesin Normal Aging Revealed by fMRI Adaptation", 2011 Massachusetts Institute of Technology

[2]. Sarah N. Kohail," Using Artificial Neural Network for Human Age Estimation Based on Facial Images", 2012 International Conference on Innovations in Information Technology.

[3]. Chao Yin and Xin Geng," Facial Age Estimation by Conditional Probability Neural Network", 2012 SpringerVerlag Berlin Heidelberg

[4]. Hang Qi and Liqing Zhang," Age Classification System with ICA Based Local Facial Features", 2009 Springer-Verlag Berlin Heidelberg C. Romero and S. Ventura, ''Educational data mining: A survey from 1995 to 2005,'' *Expert Syst. Appl.*, vol. 33, no. 1, pp. 135–146, Jul. 2007.

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[5] R. Ghorbani and R. Ghousi, ''Predictive data mining approaches in medical diagnosis: A review of some diseases prediction,'' *Int. J. Data Netw. Sci.*, vol. 3, no. 2, pp. 47–70, 2019.
[6] D. Kabakchieva, ''Student performance prediction by using data mining classification algorithms,'' *Int. J. Comput. Sci. Manage. Res.*, vol. 1, no. 4, pp. 686–690, 2012.
[7] A. I. Adekitan and E. Noma-Osaghae, ''Data mining approach to predicting the performance of first year student in a University using the admis- sion requirements,'' *Educ. Inf. Technol.*, vol. 24, no. 2, pp. 1527–1543, Mar. 2019.
[8] E. Fernandes, M. Holanda, M. Victorino, V. Borges, R. Carvalho, and G. V. Erven, ''Educational data mining: Predictive analysis of academic performance of public school students in the capital of Brazil,'' *J. Bus. Res.*, vol. 94, pp. 335–343, Jan. 2019.
[9] R. S. Baker and K. Yacef, ''The state of educational data mining in 2009: A review and future visions,'' *J. Educ. Data Mining*, vol. 1, no. 1, pp. 3–17, 2009.
[10] E. Chandra and K. Nandhini, ''Knowledge mining from student data,'' *Eur. J. Sci. Res.*, vol. 47, no. 1, pp. 156–163, 2010.
[11] A. B. El Din Ahmed and I. S. Elaraby, ''Data mining: A prediction for student's performance using classification method,'' *World J. Comput. Appl. Technol.*, vol. 2, no. 2, pp. 43–47, 2014.
[12] M. M. A. Tair and A. M. El-Halees, ''Mining educational data to improve students' performance: A case study,'' *Int. J. Inf. Commun. Technol. Res.*, vol. 2, no. 2, pp. 1–7, 2012.
[13] H. A. A. Hamza and P. Kommers, ''A review of educational data mining tools & techniques,'' *Int. J. Educ. Technol. Learn.*, vol. 3, no. 1, pp. 17–23, 2018.

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