Identifying Age and Gender using Deep Learning for Humans

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ABSTRACT
Nowadays, The Deep Learning widely used for image processing ,here we used Deep Learning to detect the gender and predict the age of a person from a single image of a face. The prediction of people's gender and age from their facial images is an ongoing and active problem of research. A static pattern recognition approach for solving this problem is Convolutionary Neural Networks(ConvNet/CNN),a Deep Learning algorithm. Human's face contains features that determine identity, age, gender and emotions of people. Among these features gender and age classification can be useful in several real-world applications including security and video surveillance, electronic customer relationship management, biometrics, electronic vending machines, human-computer interaction, forensic art and entertainment etc. There is a difficulty in accurately guessing an age from a single image because of factors like makeup, lighting, obstructions and facial expressions. So we made it a classification problem instead of regression. Convolutionary Neural Networks(CNN) requires much less pre processing than any other algorithms. The implementation process consists of pre trained caffe model along with Python libraries such as Open CV . In this research, face images of individuals will be trained with Convolutionary Neural Networks (CNN), gender and age with a high rate of success will be predicted.
Keywords - Audience dataset, Caffe model , CNN ,Deep Learning, OpenCV

I. INTRODUCTION

These days technology is growing up very fast, The computer science is speeding up than the remaining technologies, The Artificial intelligence is one of the current trending technology. Artificial intelligence is the processing of performing like humans by learning from input or experience. The input like image processing, audio, a text document, video, etc. Machine learning and deep learning are sub-branches in AI. These technologies are helps to reduce computational time and increase performance.

Predicting or making a correct estimation of a person's age is a very difficult task sometimes we need to know the age of a person so, here we are using deep learning technology to solve this problem, in deep learning, we are using convolutional neural network it can help to classify the gender and age. We need to have a model to provide high accuracy we used a pre-trained model which can improve efficiency in predicting results. Classification of gender and age from the image is the main objective of this paper. By using deep learning it should be easier for several applications like security control, forensic, etc.

II. RELATED WORK

In this part we provide the literature and description about age and gender classification approaches these are early implemented approaches which are most related to our project, these all are emphasize on identifying age and gender .In many few years ago all approaches were implemented in handcrafted ,manually doing the extraction from face .The very first approach for identifying age from image is developed by Kwon and Lobo[1] in 1999 about different features ,it can classify the children and young people ,but cannot be differenciate between young people and older people. After this ,in 2004,one of the approach

proposed by Lanitis et al. [2] is Active Appearance Model (AAM).It contains both the texture, geometric features for classification .It is not applicable for the few types of real world images which have different poses lightening effect, expressions. After 2007 ,most of the approaches revealed for estimation Gabor[3],Spatially Flexible patches (SFP)[4],local binary patterns (LBP)[5,6], and biologically inspired features()[BIF] . Hu et al. [8] used the approaches of SVM,ULBP and PCA for age prediction. Classification approaches in [9,10-12] used support vector machine (SVM) approaches for gender and age identification. The common regression approaches are support vector regression (SVR)[13],canonical correlation analysis(CCA)[14] and partial least squares(PLS)[15] for identification of gender and age..These days the use of CNN in Deep Learning for gender and age identification has been widely adopted, it gives high accuracy in producing results when tested on face images with tilt, lightening effect and occlusion. it has good ability to extract features from these types of images..At the first time Le –Net-5[16] used CNN for identification of age and gender. However The CNN used after D-CNN[17] was developed for age and gender identification..The another mostly used approach was implemented by Wang et al.[18],to combining features from CNN to features of PCA approach.

III. METHODOLOGY

The previous approaches were bad at accuracy. If we follow convolutional neural network technique in deep learning is easier than remaining and it consumes limited resources for computing of training model, In our project we used caffe model for identifying age and gender .
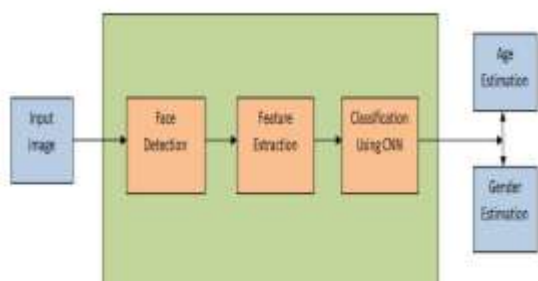

Figure1:Block Diagram for proposed work

The methods are available on internet we can utilize easily, those methods helps to recognize speech, face detection ,expressions of human easily. If we have good accuracy for classification then we need better trained model with large dataset. Creating a large dataset is very time-consuming and difficult task because there are many security issues ,it may require permissions to collect images from public, so we have to collect from internet ,there are different datasets available on internet for classification. There are different parameters in our problem, so we are considering Convolutional neural network in deep learning, we need to take care while using different methods. The system we proposed is good at accuracy .In this project age of a person classified into there are eight classes and gender is classified into two classes male and female. To getting results for our input there are different neural networks available .They all have Three major layers are input layer ,hidden layer(s) and finally output layer. There are many neurons involved in each layer ,where each neuron contains certain value of weights. To activating the neurons , At the time of forward and backward propagations the values of the weights are updated along with activation at every layer or neurons.
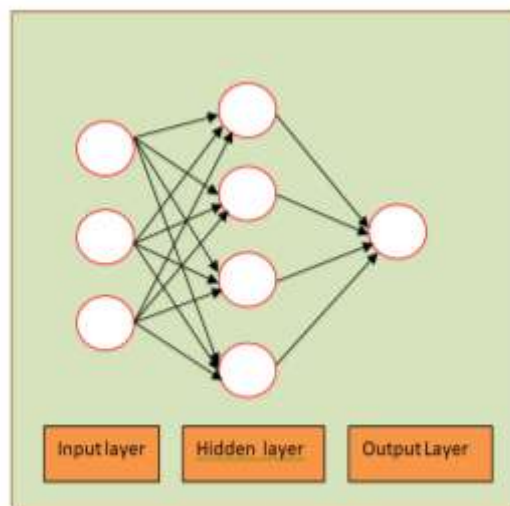

Figure2: Basic neural network

The 3 convolutional layers in convolutional neural network are:

Every Layer has nodes and kernels ,It contains two fully connected layers , in this each layer contains 512 nodes, and a final output layer of softmax type .when the convolutions are done there will be features are extracted internally. Based on Intensity values of the pixels convolutions are done in selected particular region of input image. Matrix is helped to make convolutions ,To making convolutions across rows and columns same matrix dimensions are used. To reduce the matrix dimensions the data is given to max pool layers after completion of convolution layer, it may help

for computations on large set of values. The data is sub sampled initially and after the max pooling by the help of strides, optimizing the neurons connections or by zero padding.
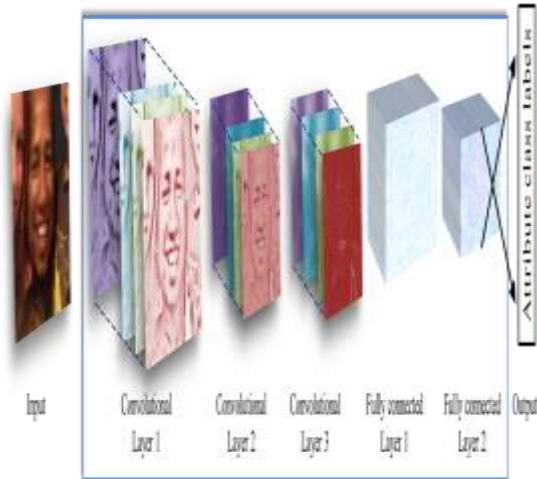

Figure3: Illustration of CNN

IV. EXPERIMENTAL STUDY

This section include description about all elements used in experiment to our proposal model approach in identification of age and gender and also includes implementation of proposed model and description of dataset.

1. DATASET

Here we are using Adience dataset because collecting of images for dataset from public there may need privacy permissions. In this Adience dataset has large number of real time face images ,it is easier to solve our problem. The Adience dataset introduced in 2014,it has 26580 images across 2284 subjects and age groups partitioned into eight splits. The main objective of this dataset is to capture the input to real world conditions like appearance , pose, lighting conditions and quality of images.

Classifier	Optimizer	No. of epochs	Initial learning rate	Momentum term	L2 Weight decay
Age group	Adam	150	0.0001	-	0.0005
Gender	SGD	140	0.01	0.9	0.0005

Table1:Training Details with OIU-Adience

2. OPENCV

OpenCV is a library by using OpenCv we can develop real-time computer vision applications. OpeCv used for image processing ,video capturing . This library has many algorithms which can be used to detect real time objects, recognize human faces, etc. OpenCV was started at Intel in the year 1999 by Gary Bradsky. It has interfaces for Python, Java and C++. OpenCV-Python is the python API for OpenCV.
Download and install OpenCv:pip install opencv-python

3. CAFFE MODEL

CAFFE: Convolutional Architecture for Fast Feature Embedding. Caffe is deep Learning framework developed by BVLC: Berkeley Vision and Learning Center ,It is written in C++ and it has matlab and python binding. It is open source under a BSD license. Caffe allows deep Learning concepts like classification. To training a CNN using caffe model we have four steps they are Data preparation ,model definition, solver definition and model training.

The face detection from image is now easy by using Machine learning technology in this protocol buffer files are used. Protocol buffer file has different extension they are used to hold data in binary form and it can also hold text format. Binary format is located in .pb extension and text format in .pbtxt These files helps to run trained models for age and gender detection.

V. EXPERIMENTAL RESULT
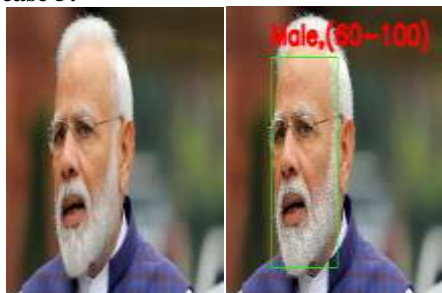
Test case1:

Test case 2:
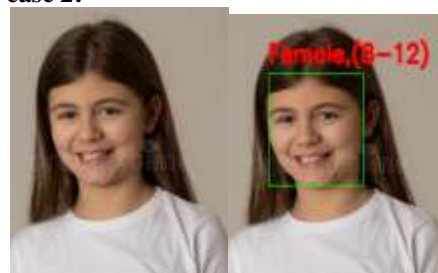
Test case 3:

Test case 4:

Test case 5:

VI. CONCLUSION

The Identification of age and gender using Deep Learning gives good results. It is beneficial for marketing , security, forensic purposes. This can be make better like fixing sensors in public places ,it helps to finding in money theft from ATMs. This is also increase marketing of retail stores based on mostly visiting age group persons and gender.

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