Compute Age and Gender of Person through ML

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Abstract - In this paper we propose a deep learning solution to age estimation and gender recognition. By using deep learning concepts, we can easily classify age and gender with more accuracy even if we have less refined values. We are using Kaggle dataset which is the greatest available dataset of human faces for training. It contains all the meta information. For age and gender classification we are using Keras high level API of TensorFlow. Keras is used for building and training our model. Whether we have less data we can easily interpret gender and age by using TensorFlow the core open source library to help develop our model. We are using VGG Face Model for age estimation in which we are using VGG-16 architecture that run on cropped image of face. To the end we demonstrate that our proposed method will show better results on age and gender estimation as compared to other methods.

Key Words: VGG-16, Kaggle, Keras, TensorFlow, Gender Estimation.

1.INTRODUCTION

Age and gender, two of the key attributes of the face, play a fundamental part in societyinteractions, making estimation of a ge and gender from a single face image a significantrole in smart systems, such as access control, humancomputer interacti on, legislationsecurity compliance, communications and visual monitoring, etc. During the last decades,many strategies ha ve been suggested to address the age and gender task. Earlier we used to make pixel intensity as a data feed to the classifier for its training eg- Support Vector Machine (SVM).

When resolution increased the previous work gave a significant increase in the scales of image characteristics as well. That is why some characters Reduction techniques like Principal Component Analysis came into existence.

Some image definers have also been put into role for age and gender estimation. They are quite powerful techniques. Some of them are LBP (Local Binary Patterns), Gabor Filters, Histogram of oriented gram (HOG) etc.

Results are still not satisfactory even after the latest work has improved so much as compared to the previous works.

Deep learning has become an integral part in latest technologies for computer vision applications. Areas like image classification, detection, Convolutional Neural Networks is a latest tool which is producing significant results.

However, there are still areas where improvement is needed, still we can say that it has produced better results than the previous algorithms

1.1 Objective

To revisit the previous algorithms along with the new one given by the Convolutional Neural Networks.

To make a working architecture of age and gender with the help of VGG model.

To predict the precision and accuracy of each algorithms by various experiments.

1.2 Problem Identification & Definition

Age and gender classification has gained importance in recent times due to increasing influence and rise of social media platforms.

However, accuracy of previous algorithms on the images is still not sufficient enough Which can match the performance made in the field of face recognition.

Still this problem is a tricky problem which needs to be resolved . The main difficulty is that the

Nature as well as the abundancy of data which is required to train the type of systems. While general classification projects have access to millions of images which is very helpful in training but for age and gender classification specifically we have lesser number of images maybe in the range of thousands. The main reason behind this is that in order to have labels we should have personal data of the subjects in the images.

Hence we require new algorithms and tools to cope up with this problem. These above reasons are responsible for choosing this new approach.

2. RELATED WORK

This area has been under research for various decades. Many new algorithms have been made to tackle this problem.

Early works use facial features and various features of face as ratios to determine signs of varying age factor. It included the distances between the eyes, nose and mouth.

These were pretty good when it comes to simpler images but with real world images, it was not satisfactory as it should have due to picture quality/clarity.

In early works generally in 1990s, neural networks were used in determining gender which revolutionized the world. Later in 2000s, SVM was used and it was later found out that very low error on the gender estimation could be achieved which had a low resolution.

Yet again it was not producing satisfactory results on real world images which consisted of many other factors like lighting, darkness in the background etc.

All other works either tackle age estimation or gender estimation. There was not a solution that dealt with both.

As suggested above in the mid 90's there were several other attempts made on the precision for making it much better than the previous models but they did not succeed in it.

Other works were also being done on this but they were only able to find the gender Estimation as more precise and accurate.

Age Estimation accuracy was not improved even after so many years. Due to unavailability of real- world images so that we train our model based on the images and then we will be able to find more accurate results.

Until later, due to introduction of the new concept of neural networks we are able to perform more accurate calculations due to which we are able to get better results.

Now the images are distributed in a set of images which are further de classified into smaller images in which we use algorithms to find the values which are further explained in the later part.

In this way, we are able to perform more accurate results using it.

PROPOSED METHODOLOGY

The modern CNN architectures usually require larger training datasets for effective results. Since the face image data sets are often very small in numbers. There is lesser number of images which can be used to train the data, only thousands of images are there with age tags.

To this end, we generally took the 12,500 people which are on the Kaggle website which included their images and information from their profiles.

We do not consider the images which has time label on it, and we also did not accept the images which are easily recognizable and authorized. We were able to assign the biological (real) age to every such image with the help of the algorithm and in the end we get a rectangular shape on the face of a person which shows its age as well as gender.

We can of course not say with certainty for the accuracy of information designated to the age. Apart from incorrect information about time, we have images which are in turn snapped during filmography as well as in theatres. In sum we got 600 face photos from Kaggle for personalities.

In sum there have been 400 face pictures with age information included. Since some images have other data persons as well but we do not consider it because the face features should qualify at least a minimum threshold, if they qualify it, they are included.

In order to make the network equally discriminatory for all generations we normalize the distribution of age , i.e. we arbitrarily dismiss a few of the pictures of the ages most frequent. For our CNNs, that presents us with 11,500 training photos.

IMPLEMENTATION AND RESULTS

We implement approach of Deep Expectation – to estimating age is inspired by huge developments in areas including image classification or detection of objects driven by deep learning. We learn four main ideas from deep learning knowledge which we add to our problem

(I) If we have a large network, then it acts as an advantage for us because we will then be able to maintain a decent level of performance.

(ii) Complexity of the training data sets help the network to learn more and more such that it can produce more accurate results.

(iii) object alignment in the input image affects overall performance

(iv) There is a way to enhance a pre modelled network which is to take advantage of the transition when the training data is small.

The age estimation is achieved by adding a Convolutional neural network from preceding processing stage to the observed image. Our approach uses the design of the VGG16 which has generated excellent results on the ImageNet competition.

In this model we will be applying average 2-D pooling. We are introducing two strata of the Convolutional Neural Network.

On top of these FC layer features, we must learn a new Softmax classification layer and train it to identify the sex of the input face picture into one of the two "male" and "female" groups.

Similarly we have found out about the age of the person in the cropped image.

RESULTS AND DISCUSSION

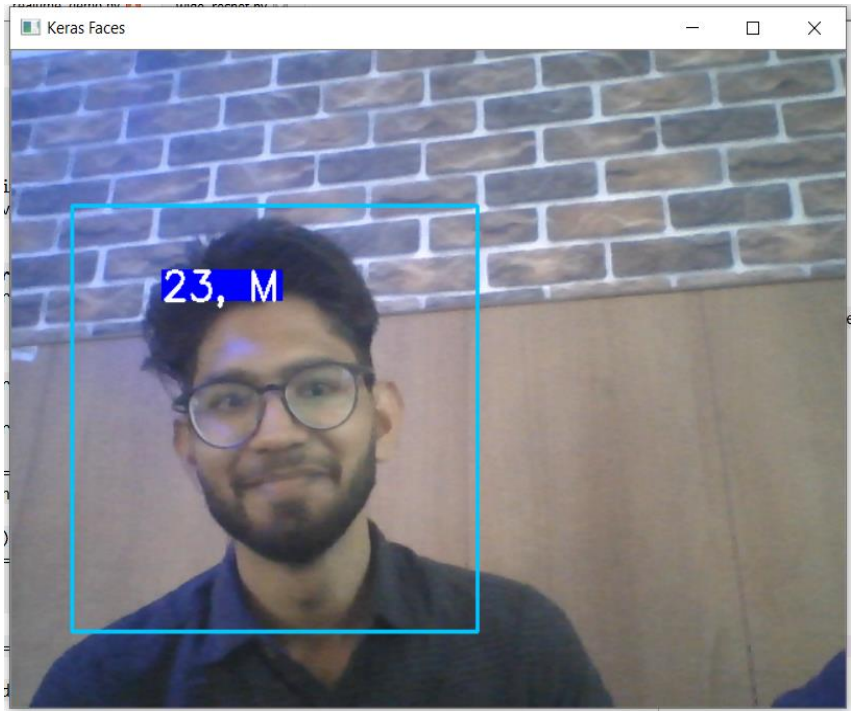

Fig -1: 1st Snapshot

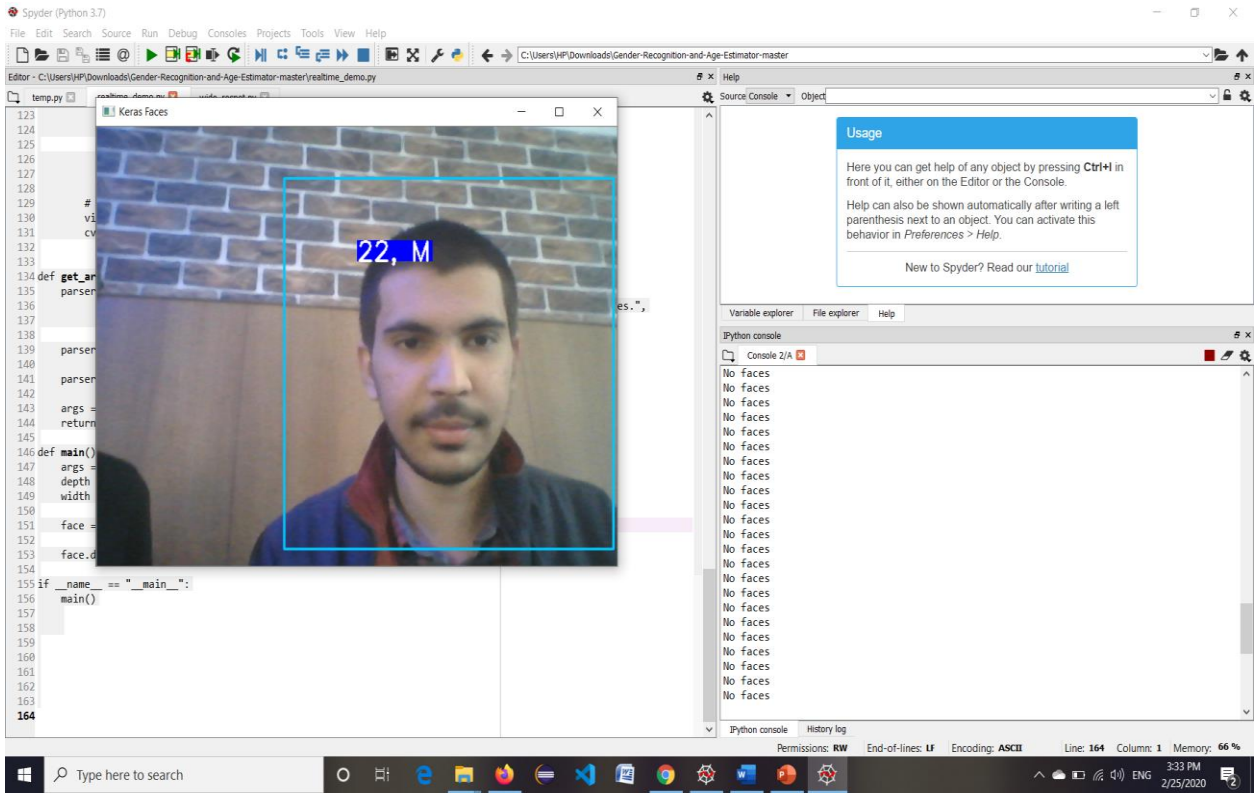

Fig -2: 2nd Snapshot

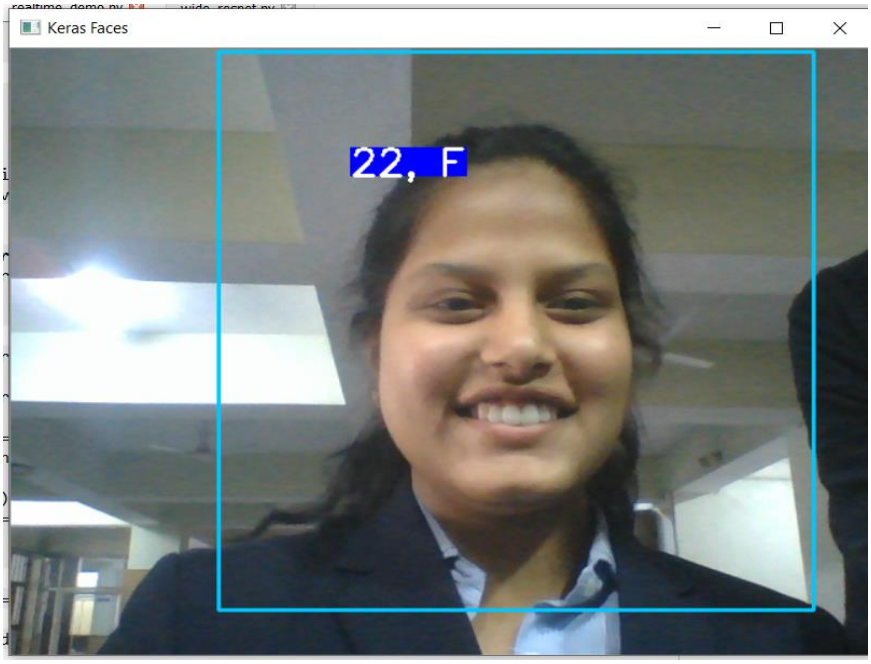

Fig-3: 3rd Snapshot

Output of our implemented model for age calculation and gender detection:

The main factors are:

Identification stage failure We fail to clearly capture the individual due to Environmental conditions near the person.

Bad quality constraints either by the camera i.e bad resolution power, or improper Lighting conditions.

6. CONCLUSIONS

Although many earlier methods addressed the topic of the problem as grouping of images, in this paper we set a benchmark for the task based on our own observations and conclusions and show that chaining age predictions with gender predictions can improve overall precision. We deliver results with an architecture of open neural networks in such way that we avoid all kind of mismatch of data. Compared with any of the latest network designs, our network is "shallow," thereby that the amount of its parameters and the possibility to overfit. By unnaturally attaching cropped variants of the photos into our training set, we have broadened our data model. From our results we can draw two important conclusions. First, CNN can be used to deliver better results in age and gender classification, even analyzing the much smaller size of contemporaneous unconstrained sample images that are marked. Secondly, with the help of our model, other people who are doing the same project or may do in the future which needs more training data sets can further improve the system.

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