Facial Age Classification and Gender Detection Using Deep Learning

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Abstract: Automatic age and gender classification has become relevant to an increasing amount of applications, particularly since the rise of social platforms and social media. Nevertheless, performance of existing methods on real-world images is still significantly lacking, especially when compared to the tremendous leaps in performance recently reported for the related task of face recognition. In this paper we show that by learning representations through the use of deep-convolutional neural networks (CNN), a significant increase in performance can be obtained on these tasks. To this end, we propose a simple convolutional net architecture that can be used even when the amount of learning data is limited. We evaluate our method on the recent Audience benchmark for age and gender estimation and show it to dramatically outperform current state-of-the-art methods. Age and gender play fundamental roles in social interactions. Languages reserve different salutations and grammar rules for men or women, and very often different vocabularies are used when addressing elders compared to young people. Despite the basic roles these attributes play in our day-to-day lives, the ability to automatically estimate them accurately and reliably from face images is still far from meeting the needs of commercial applications

Index Terms - CNN classification, Python, Age estimation, Gender detection.

I. INTRODUCTION

Facial analysis from images has gained a lot of interest because it helps in several different problems like better ad targeting for customers, better content recommendation system, security surveillance, and other fields as well. Age and gender are a very important part of facial attributes and identifying them are the very basic of facial analysis and a required step for such tasks. Many companies are using these kinds of tools for different purposes making it easier for them to work with customers, cater to their needs better and create a great experience for them. It is easier to identify and predict needs of people based on their gender and age. The task of gender and age detection just from an image is not an easy task even for us humans because it is totally based on looks and sometimes it is not easy to guess it. People of the same age can look very different from what we can guess. Not everyone ages the same and it all depends on genetics and how well they care for their skin and body, we also often associate balding and white hairs with aging but it is very different for different people. Similarly, we associate long hairs and jewelry with women but it is different in many cases. So we can say that it is not such an easy task. This task especially age detection is a subjective matter and solely based on looks and appearances and can vary widely.

II. TECHNOLOGY STACK

OpenCV : Open Source Computer Vision Library commonly known as OpenCV is a collection of programming functions which is prominently used for Real time Computer Vision. As the name states, it is commonly used for capturing videos or images live. OpenCV was built by Intel and was put forward by Willow Garage then Itseez. Finally after a few months , it was again undertaken by Intel Corporation. This Library is under the BSD licence and can be used across several platforms with no cost. It is an open source software library used for capturing and processing video's. It uses the concepts of Computer Vision to process the captured video. [1]

CNN: In deep learning, a convolutional neural network (CNN, or ConvNet) is a class of artificial neural network (ANN), most commonly applied to analyze visual imagery. CNNs are also known as Shift Invariant or Space Invariant Artificial Neural Networks (SIANN), based on the shared-weight architecture of the convolution kernels or filters that slide along input features and provide translation-equivariant responses known as feature maps. Counter-intuitively, most convolutional neural networks are only equivariant, as opposed to invariant, to translation.[2]

TensorFlow: TensorFlow is a free and open-source software library for machine learning and artificial intelligence. It can be used across a range of tasks but has a particular focus on training and inference of deep neural networks. TensorFlow provides a collection of workflows to develop and train models using Python or JavaScript, and to easily deploy in the cloud, on-prem, in the browser, or on-device no matter what language you use.[3].

Numpy: JSON Numpy is a software library mainly used for Array Vectorization. It is implemented using the Python programming language. It supports large multidimensional arrays and matrices. It also includes many Mathematical functions to operate on single and multidimensional arrays. Numpy was originally written as Numeric and was created by Jim Huguin with support from several other Developers. It is known to be an ancestor of Numpy.[4].

Python: Python is a high-level, interpreted, general-purpose programming language. Its design philosophy emphasizes code readability with the use of significant indentation.Python is dynamically-typed and garbage-collected. It supports multiple programming paradigms, including structured (particularly procedural), object-oriented and functional programming. It is often described as a "batteries included" language due to its comprehensive standard library.[5].

Deep Learning: Deep learning is a subset of machine learning, which is essentially a neural network with three or more layers. These neural networks attempt to simulate the behavior of the human brain—albeit far from matching its ability—allowing it to "learn" from large amounts of data. While a neural network with a single layer can still make approximate predictions, additional hidden layers can help to optimize and refine for accuracy.[6].

III. PROPOSED SYSTEM

We developed a CNN model which is used to predict the age and detect the gender based on the input image given by the user and live camera.

Hardware setup:

- Processor: Minimum 1.5GHz. Recommended 2GHz or more.
- Ethernet connection(LAN) or Wi-Fi
- Hard Drive: Minimum 32GB. Recommended 64GB or more, 2GB free disk space
- Memory(RAM): Minimum 4GB
- Operating system: Windows 7 or newer.

Software setup:

- Platform: Windows
- Front End: Python GUI.
- Back End: Deep learning networks, ML library, Python

About System

Dashboard:

- User Area
  >Input image
  >pass café model
  >Identify Input Image
  >Store model output
  >Evaluate model output
 >Show final output

IV. RESULTS AND DISCUSSION

Once the code has been run and the model has been trained, we add the source file of image feed that needs to be evaluated for gender and age estimation. Processing of the image is done at fixed intervals continuously for the entire image and the trained model determines which action is being performed in the image. The output of image is displayed over the playback of the image in real time on the top left corner of the screen. It keeps on changing based on the activity being performed at that instance of the video being played.

Test-Case

Give the input image to the model and model will predict the age and detect the gender.
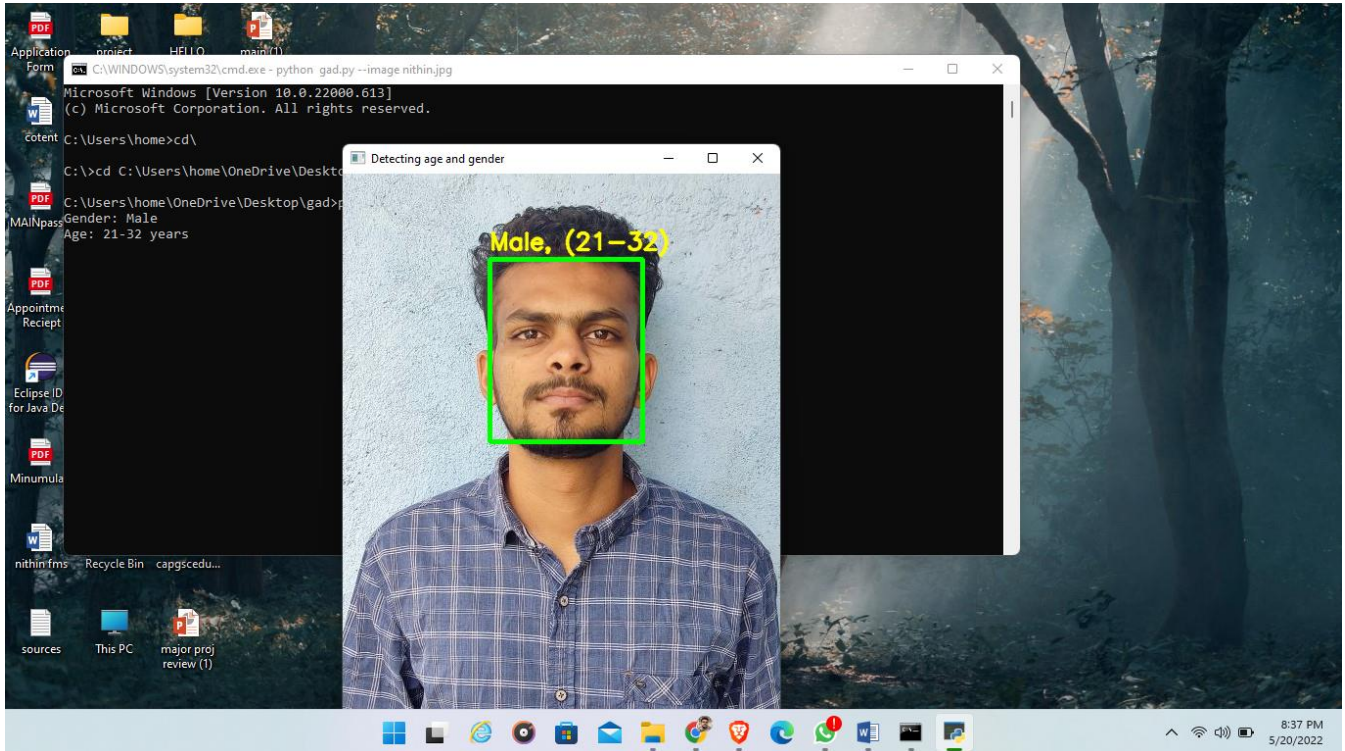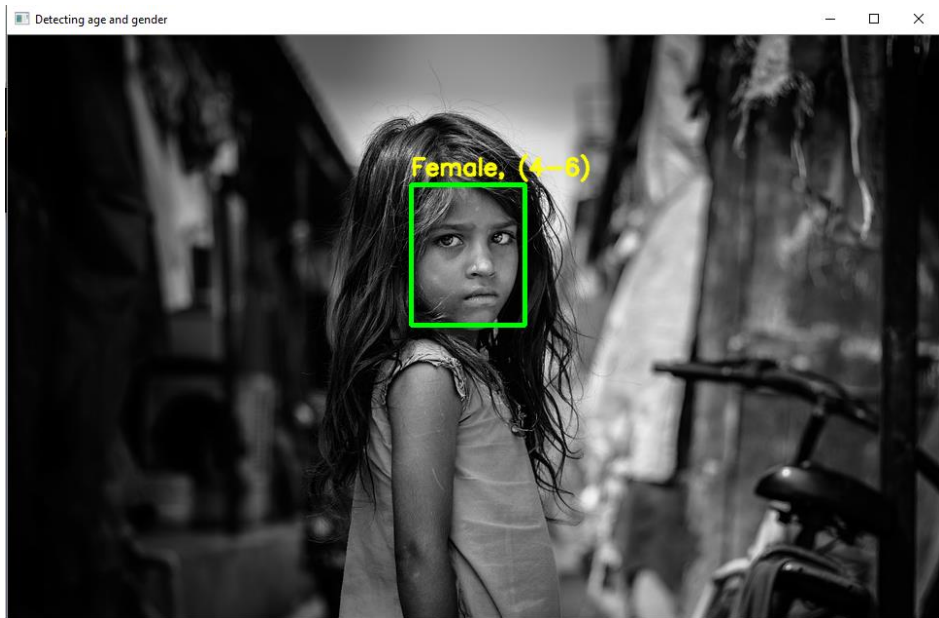
V. CONCLUSION

Though many methods have solved the problems that were raised when detecting age and gender, until recently, most of these methods have focused on images which had constraints and limitations, and which were maintained in lab conditions. Such conditions will have an impact on the methods we perform on real-world images on social websites and online platforms. Internet images are abundant. Anybody can have access to the internet which consists of huge collections of real-world images which makes the training process very effective for our machine learning-based systems. Even though for supervised learning we want a large collection of labeled data, this huge availability of data makes our problem simpler.

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