Age and Gender Prediction using Face Recognition

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Contents

ABSTRACT

- Due to its vast applications in many facial analysis challenges, automatic age and gender prediction from face photos have received a lot of interest recently. We show in this project that by learning representations using deep-convolutional neural networks (CNN), we were able to significantly improve age and gender identification using the Caffe Model Architecture of Deep Learning FrameWork.

- We propose a simplified convolutional net design that may be employed even when learning data is scarce. On the recent Showing potential benchmark for age and gender estimation, we show that our method improves current state-of-the-art methods significantly.

- This project covers predicting age and gender, as well as face detection and recognition using a trained model. In internal evaluation, the Caffe framework outperforms TensorFlow by 1 to 5 times.

- The trained model will recognize the face and accurately predict the age and gender of the person.

Statement of Problem

- Age and gender information are very important for various real-world applications.
- Despite their huge applications, being able to automatically predicting age and gender from face images is a very hard problem
- There are numerous works proposed for age and gender prediction in the past several years.

- Automatic prediction of age and gender from face images has drawn a lot of attention recently, due to its wide applications in various facial analysis problems.

- As there are various works proposed for age and gender prediction, those works lack performance, which leads to inefficiency.

SCOPE OF PROBLEM

There are 4 steps in training a CNN using Caffe:

- Data Preparation
- Model Definition
- Solver Definition
- Model Training

- **The advantage of the Caffe framework has a performance of 1 to 5 times more than TensorFlow in the internal benchmarking**

- **The trained model will recognize the face and predict the age and gender**

System Analysis

Proposed Methods
Applications

Proposed Methods

- Image processing
- Face Detection
- Face alignment
- CNN architecture
- Training Details
- Age group classification
- Gender classification

Applications

- *Access control*
- *Human-Computer Interaction*
- *Marketing intelligence and visual surveillance*

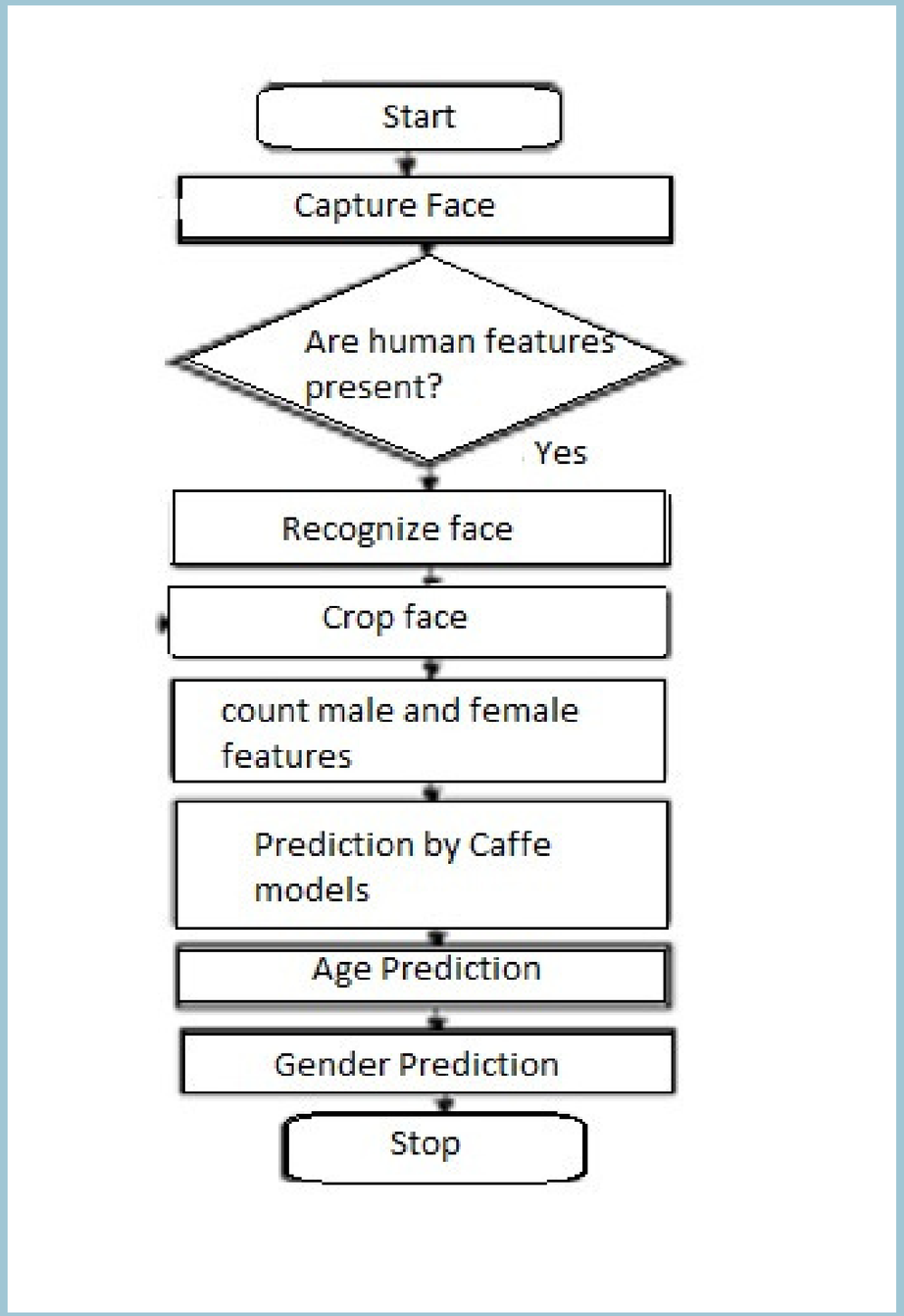
HARDWARE REQUIREMENTS:

Hardware Tools	Minimum Requirements
Processor	i5 or above
Hard Disk	10GB
RAM	8GB
Monitor	17” colored
Mouse	Optical
Keyboard	122

SOFTWARE REQUIREMENTS

Software Tools	Minimum Requirements
Platform	Windows, Linux (or) MacOS
Operating System	Windows, Linux (or) MacOS
Technology	Machine Learning-Python
Scripting Language	Python
IDE	PyCharm (and jupyter)

FLOW CHART


Start
Capture Face
Are human features present?
Yes
Recognize face
Crop face
count male and female features
Prediction by Caffe models
Age Prediction
Gender Prediction
Stop

IMPLEMENTATION

As already mentioned, there are 4 steps in training a CNN using Caffe:

- Step-1: Data preparation

In this step, we clean the images and store them in a format that can be used by Caffe. We will write a Python script that will handle both image pre-processing and storage

- Step-2: Model definition:

In this step, we choose a CNN architecture and we define its parameters in a configuration file with extension .prototxt.

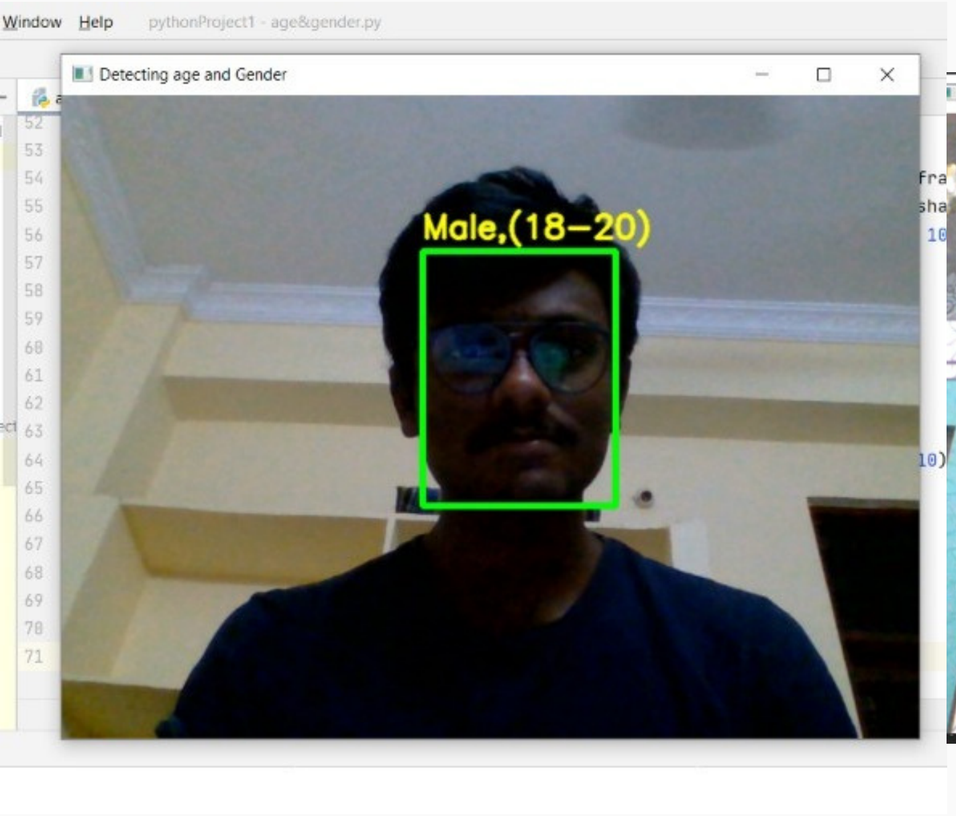
- Step-3: Solver definition:

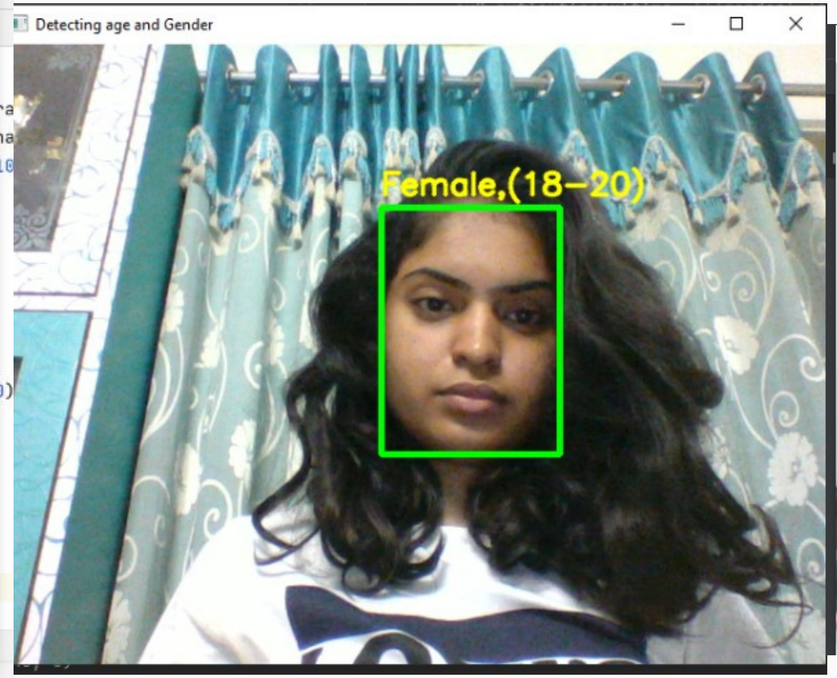
The solver is responsible for model optimization. We define the solver parameters in a configuration file with extension .prototxt.

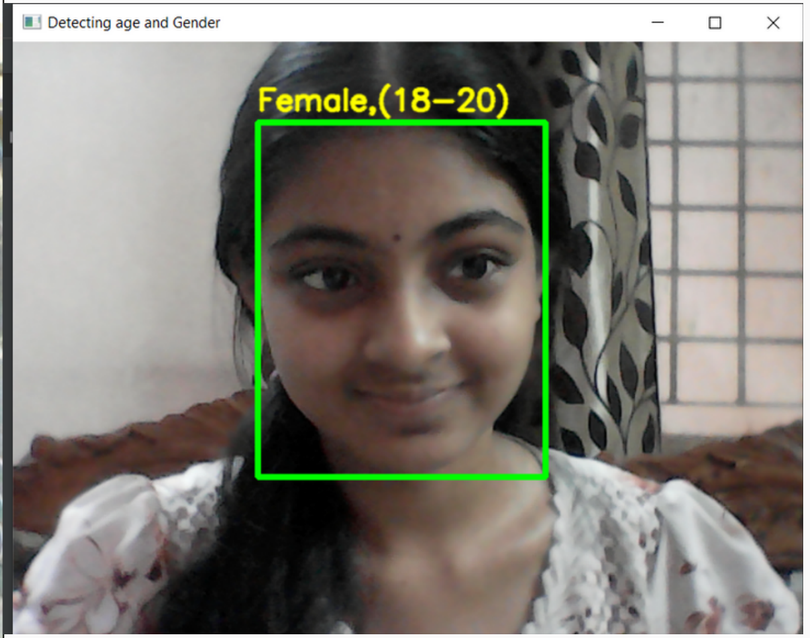
- Step-4: Model training

We train the model by executing one Caffe command from the terminal. After training the model, we will get the trained model in a file with the extension .caffemodel.

SCREENSHOTS







Conclusion

- Two important conclusions can be made from our results. First, CNN can be used to provide improved age and gender classification results, even considering the much smaller size of contemporary unconstrained image sets labeled for age and gender.
- Second, the simplicity of our model implies that more elaborate systems using more training data may well be capable of substantially improving results beyond those reported here.

Future Scope

For future work, we'll look into a more complex CNN architecture and a more reliable image processing approach for estimating exact ages.

We can use this project for electronic customers, crowd behavior analysis.

References

Image Dataset:
https://www.kaggle.com/ttungl/adience-benchmark-gender-and-age-classification
OpenCV:
https://docs.opencv.org/3.4/d6/d0f/group__dnn.html
https://docs.opencv.org/4.5.2/d5/de7/tutorial_dnn_googlenet.html

Literature Survey:
https://towardsdatascience.com/age-detection-using-facial-images-traditional-machine-learning-vs-deep-learning-2437b2feeab2
https://arxiv.org/pdf/2010.03791.pdf#:~:text=Age%20and%20gender%20information%20are,item%20recommendation%2C%20and%20many%20mor

Any Questions?