COUTING TOOL

A Mini Project Report Submitted by

MEGHANA BHAT PERVAJE   **KAVANA PAI**
(4NM20AI025)   **(4NM20AI020)**

UNDER THE GUIDANCE OF

Mr.MaheshB.L
Assistant Professor Gd-1

Department of Artificial Intelligence and Machine Learning Engineering

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N.M.A.M. INSTITUTE OF TECHNOLOGY
(An Autonomous Institution affiliated to Visvesvaraya Technological University, Belagavi)
Nitte – 574 110, Karnataka, India
(ISO 9001:2015 Certified), Accredited with 'A' Grade by NAAC
☎ : 08258 - 281039 – 281263, Fax: 08258 – 281265

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CERTIFICATE

Certified that the mini project work entitled

"Counting Tool"

is a bonafide work carried out by

Meghana Bhat Pervaje   *Kavana Pai*
(4NM20AI025)   *(4NM20AI020)*

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The mini project report has been approved as it satisfies the academic requirements in respect of the mini project work prescribed for the Bachelor of Engineering Degree.

Signature of Guide   **Signature of HOD**

Evaluation

Name of the Examiners   **Signature with Date**

1. _____

2. _____

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Meghana Bhat Pervaje

Kavana Pai

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ABSTRACT

The massive use of the social media and the huge number of messages that are shared on the internet, create a countless need to automatically detect the age and gender of the people who write the messages. Several types of platforms uses several ways for finding the truth about a message .Here we used a few machine learning algorithms to classify them and detect them. Because of its wide range of applications in a variety of facial investigations, automatic age and gender prediction from face photos has recently gained a lot of attention. We can leverage the aforementioned technologies to determine a person's age and gender just on a single glimpse from a camera, image, or video. This paper will outline convolutional neural network using deep learning, methodologies, and algorithms that can be used, and how everything fits together for gender classification and age detection. Technology will also underline its importance and how it may be used to better our everyday lives. The paper's prime objective of use deep learning to develop a gender and age detector that can roughly predict the gender and age of a human face in an image. Further, the map shows how this technology might be applied to our benefit and look at the broad array of applications where it could be used: from intelligence agencies, CCTV cameras, and policing to matrimony sites.

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CHAPTER 1

INTRODUCTION

Nowadays, with the rapid spread in the use of internet resources and the huge amount of data shared on the internet, most of them were almost untreatable ,and were not recognized by people. Even a few People were afraid of those messages ,even some messages are leading to death of people.so as to detect them this project is used to detect the peoples who sent that message and classifies their age and gender. So as we can control and stop these kind of works. Gender and age play a significant role in interpersonal interactions among people who live in communities. The use of smart gadgets has expanded as technology has progressed, and social media has begun to draw everyone's attention. Daily studies on gender and age prediction have grown in prominence, it increases the number of apps that use such techniques. In these applications, facial photographs are commonly employed since they contain useful information that may be used to extract human interaction. For gender detection and age prediction, Image processing, feature extraction, and classification steps are usually used. These steps may change based on the objective of the study and the characteristics to be used. The face images were processed using a variety of approaches, and calculations were performed based on the results of the investigations. For image processing, there are two basic and typical which we need to follow. Image enhancement is the process of improving an image so that the resultant image is of higher quality and can be used by other applications. The most popular technique for extracting information from an image is the other technique. The image is divided into a specified number of parts or objects in order to solve the challenge and this procedure is called Segmentation. Due to the accuracy of its classification technique, deep learning techniques are a variety of tasks such as classification, feature extraction, object recognition, and so on, it helps in gender and age prediction.

1.1 OVERVIEW

The previous system's machine learning algorithms were not utilized to improve classification skills for a vast number of images and data available via the internet. In this paper, Deep Learning techniques are used to reliably estimate a person's gender and age from a single facial capture. 'Male' or 'Female' will be the predicted gender. We might use age categories based on the experiment to forecast a person's age. The eyes are one of the most essential aspects of face images in various applications such as facial recognition and emotional

expression. Human Facial Image Processing gives numerous hints and signs that can be applied to a variety of businesses, security, entertainment, and others. The expression on a person's face can reveal a lot of information about them, such as their emotional condition, the slightest agreement or disagreement, irony or fury, and so on. Faces have become an important subject of study in psychology for this reason. Gender detection can provide a wealth of information to firms' recruitment teams, for example. Verification of ID cards, such as voter ID cards, which are used by millions of people to vote in elections, and so on. Finding ineligible or fraudulent individuals is made easier with human facial image analysis..

1.2 PROBLEM STATEMENT

We already have several approaches to detect gender and age through facial images.We can do these classification on Gender Based on Human faces has been detected.We have collected certain data of equipped work and worked through it to detect age and gender and mentioned the methods used below. Here fig 1 indicates the Proposed age and gender detection.

There are various methods to solve the problem of accurately estimating age and gender. The first approach relies on manually extracting features such as the size of the head, position of eyes or length of the nose. Another approach is based on end-to-end deep learning models. The two methods can be combined to form a new mixed approach. Most modern methods use deep learning approach.

1.3 STUDY AREA

Predicting age and gender from a picture involves several steps. First we need to detect and extract face from the image. Optionally we can recognise face features such as eyes, mouth and nose and using those we can align the detected face. Then we pass the detected and aligned face through our model to get the prediction

1.4 OBJECTIVE

The primary aim of this thesis is to detect the gender of a person from his/her facial image with decent accuracy. There has been a lot of work done in this field using various methods which all have their shortcomings. It ignores that some people are blind or does not have eyebrows. There are other methods that acknowledge these faults but fail to provide satisfactory results. This thesis has specifically targeted on the issue of establishing a new tactics which can help us to establish efficient operation of facial data extraction and gender classification techniques. The step-by-step procedure of this thesis is summarized here. This work marks the following issues:

♣ Firstly, we have used input images to detect faces using Viola & Jones algorithm for robust and real-time extraction of faces.

♣ Then, the image has been processed to reduce noise using Adaptive Filtering and for adjusting contrast, Histogram Equalization.

♣ Finally, we have used DSP (Deformable Spatial Pyramid) to produce extremely accurate results and efficient computation to reduce computational time.

1.5 MOTIVATION

The motivation behind this thesis was to build an application for age and gender classification using a model that is suitable for real life predictions. Many models are focusing on datasets with constrained faces and are not suitable for in-the-wild estimation. In this thesis we will focus on deep learning end-to-end methods.

1.6 ORGANIZATION OF THE CHAPTERS

The project report has been organized under nine chapters, which are as follows:

Chapter I: Introduces to the main idea of the project. It gives a brief knowledge about the aim and methodology of the same.

Chapter II: It includes literature survey of related works.

Chapter III: Discusses the system requirements that are needed for the project. These include functional requirements, non-functional requirements, user requirements and hardware requirements.

Chapter IV: Includes the system design details which includes flowchart, sequence diagram.

Chapter V: Includes the implementation details of the project

Chapter VI: Deals with system testing concepts and the various test cases for the project.

Chapter VII: Includes the screenshots of the application.

Chapter VIII: Discuss the results of the project.

Chapter IX outlines conclusions and future work that can be done

In the section, we present the methodology of the proposed age and gender detection system. The first step is to input the data. The second step is tokenization and extraction of the feature sets that we will use later to build the classifier, where tokenization of the data means chopping the text into words, The third step is applying string to word vector which is very important as it cleans the data by removing unnecessary information to improve system performance. The fourth step is applying feature selection to the data. The fifth step is applying the classifier using different algorithm namely(random forest, naïve Bayes, decision tree).The last step is producing the output class and evaluating the results.

RandomForestClassifier: Random forests or random decision forests are an ensemble learning method for classification ,regression and other tasks that operate by constructing a multitude of decision trees at training time.

Naive Bayes: It is used to classify objects .It assumes strong, independent attributes of data points.it also includes spam filters, text analysis and even medical diagnosis. Decision tree classifier A decision tree is a decision support tool that uses a tree-like model of decision and their possible Consequences ,including chance event outcomes, resource costs, and utility. It is one way to display an algorithm that only contains conditional control statements.

2.1 PROPOSED SYSTEM

In this Python Project, we will use Deep Learning to accurately identify the gender and age of a person from a single image of a face. We will use the models trained by Tal Hassner and Gil Levi. The predicted gender may be one of 'Male' and 'Female', and the predicted age may be one of the following ranges- (0 – 2), (4 – 6), (8 – 12), (15 – 20), (25 – 32), (38 – 43), (48 – 53), (60 – 100) (8 nodes in the final SoftMax layer). It is very difficult to accurately guess an exact age from a single image because of factors like makeup, lighting, obstructions, and facial expressions. And so, we make this a classification problem instead of making it one of regression.

The CNN Architecture

The convolutional neural network for this python project has 3 convolutional layers:

Convolutional layer; 96 nodes, kernel size 7

Convolutional layer; 256 nodes, kernel size 5

Convolutional layer; 384 nodes, kernel size 3

It has 2 fully connected layers, each with 512 nodes, and a final output layer of softmax type.

To go about the python project, we'll:

Detect faces

Classify into Male/Female

Classify into one of the 8 age ranges

Put the results on the image and display it

The Dataset

For this python project, we'll use the Adience dataset; the dataset is available in the public domain and you can find it *here*. This dataset serves as a benchmark for face photos and is inclusive of various real-world imaging conditions like noise, lighting, pose, and appearance. The images have been collected from Flickr albums and distributed under the

Creative Commons (CC) license. It has a total of 26,580 photos of 2,284 subjects in eight age ranges (as mentioned above) and is about 1GB in size. The models we will use have been trained on this dataset.

install OpenCV (cv2) to be able to run this project. You can do this with pip-

pip install opencv-python

Other packages you'll be needing are math and argparse, but those come as part of the standard Python library.
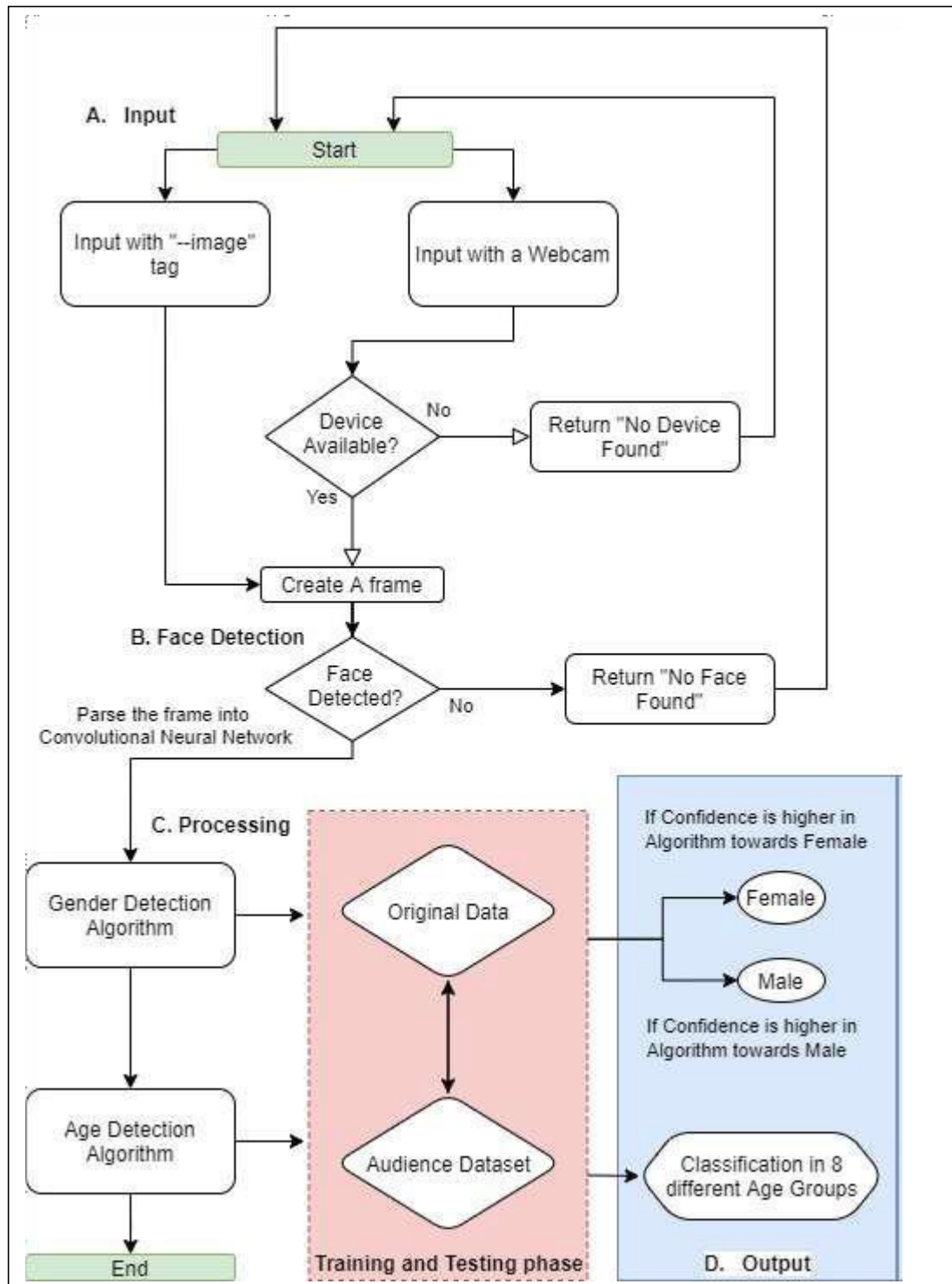
CHAPTER 3 SYSTEM ANALYSIS AND REQUIREMENTS

3.1 SYSTEM ANALYSIS

3.1.1 Relevance of Platform

Neural networks, also known as artificial neural networks (ANNs) or simulated neural algorithms. Their name and structure are inspired by the human brain, mimicking the way that biological neurons signal to one another.

Artificial neural networks (ANNs) are comprised of a node layers, containing an input layer, one or more hidden layers, and an output layer. Each node, or artificial neuron, connects to another and has an associated weight and threshold. If the output of any individual node is above the specified threshold value, that node is activated, sending data to the next layer of the network. Otherwise, no data is passed along to the next layer of the network.

Relevance of Programming Language

Python is a very popular general-purpose interpreted, interactive, object-oriented, and high-level programming language. Python is dynamically-typed and garbage-collected programming language. It was created by Guido van Rossum during 1985- 1990. Like Perl, Python source code is also available under the GNU General Public License (GPL).

Python supports multiple programming paradigms, including Procedural, Object Oriented and Functional programming language. Python design philosophy emphasizes code readability with the use of significant indentation.

This tutorial gives a complete understanding of Python programming language starting from basic conceopts to advanced concepts. This tutorial will take you through simple and practical approaches while learning Python Programming language.

3.2 REQUIREMENT ANALYSIS

Scope and Boundary

Requirements are during early stages of a system development as a specification of what should be implemented or as a constraint of some kind of on the system. They may be a user level facility description, a detailed specification of expected system behaviour, a general system property, a specific constraint on the system, and information on how to carry out some computation or a constraint on the development of the system. The end product of the requirement analysis phase is a requirement specification. The requirement specification is a reconstruction of the result of this analysis phase. Its purpose is to communicate this result to others. System requirements are more detailed descriptions of the user requirements. They may serve as the basis for a contract to the implementation of the system and should therefore be a complete and consistent specification of the whole system. In principle, the system requirements should state what the system should do and not how it should be implemented. However, at the level of detail required to specify the system completely, it is virtually impossible to exclude all design information.

FUNCTIONAL REQUIREMENTS
Software Requirements:
Software: 1. Python Software

Hardware Requirements

Operating system: Windows 9 and above.

RAM   : 4GB and above.

Processor   : Intel® Core(TM)2 duo CPU T6500.

Processor speed : 2.67 GHz.

CPU   : 64-bit operating system.

NON-FUNCTIONAL REQUIREMENTS:

In systems engineering and requirements engineering, a non-functional requirement (NFR) is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors. Non-functional requirements are conditions under which the system must be able to function and the quality the system must have. It defines how a system is supposed to be.

- ♣ Performance
- ♣ With ideal condition , response should be fast and error free.
- ♣ Flexibility: This code will be easy to learn and use. Is able to analyze and give the output as quickly as possible.
- ♣ User-friendly: The users should be able to find their age easily.The multiple features should be self-explanatory.
- ♣ Response Time: The selected video should load and display quickly without consuming much buffer time.
- ♣ Understandability: All users can learn to operate the website because of its simplicity.

CHAPTER 4 SOFTWARE APPROACH

4.1 DEEP LEARNING

Deep learning can be considered as a subset of machine learning. It is a field that is based on learning and improving on its own by examining computer algorithms. While machine learning uses simpler concepts, deep learning works with artificial neural networks, which are designed to imitate how humans think and learn. Until recently, neural networks were limited by computing power and thus were limited in complexity. However, advancements in Big Data analytics have permitted larger, sophisticated neural networks, allowing computers to observe, learn, and react to complex situations faster than humans. Deep learning has aided image classification, language translation, speech recognition. It can be used to solve any pattern recognition problem and without human intervention.

Artificial neural networks, comprising many layers, drive deep learning. Deep Neural Networks (DNNs) are such types of networks where each layer can perform complex operations such as representation and abstraction that make sense of images, sound, and text. Considered the fastest-growing field in machine learning, deep learning represents a truly disruptive digital technology, and it is being used by increasingly more companies to create new business models.

4.2 PYHTON

Python is consistently rated as one of the world's most popular programming languages. Python is fairly easy to learn, so if you are starting to learn any programming language then Python could be your great choice. Today various Schools, Colleges and Universities are teaching Python as their primary programming language

Python is a MUST for students and working professionals to become a great Software Engineer specially when they are working in Web Development Domain. I will list down some of the key advantages of learning Python:

- **Python is Interpreted** − Python is processed at runtime by the interpreter. You do not need to compile your program before executing it. This is similar to PERL and PHP.
- **Python is Interactive** − You can actually sit at a Python prompt and interact with the interpreter directly to write your programs.

- **Python is Object-Oriented** − Python supports Object-Oriented style or technique of programming that encapsulates code within objects.
- **Python is a Beginner's Language** − Python is a great language for the beginner-level programmers and supports the development of a wide range of applications from simple text processing to WWW browsers to games.

4.3 JUPYTER NOTEBOOK

The Jupyter Notebook is an open source web application that you can use to create and share documents that contain live code, equations, visualizations, and text. Jupyter Notebook is maintained by the people at [Project Jupyter](#).

Jupyter Notebooks are a spin-off project from the IPython project, which used to have an IPython Notebook project itself. The name, Jupyter, comes from the core supported programming languages that it supports: Julia, Python, and R. Jupyter ships with the IPython kernel, which allows you to write your programs in Python, but there are currently over 100 other kernels that you can also use.

4.CLASSIFICATION ALGORITHM

Based on training data, the Classification algorithm is a Supervised Learning technique used to categorize new observations. In classification, a program uses the dataset or observations provided to learn how to categorize new observations into various classes or groups. For instance, 0 or 1, red or blue, yes or no, spam or not spam, etc. Targets, labels, or categories can all be used to describe classes. The Classification algorithm uses labeled input data because it is a supervised learning technique and comprises input and output information. A discrete output function (y) is transferred to an input variable in the classification process (x).

In simple words, classification is a type of pattern recognition in which classification algorithms are performed on training data to discover the same pattern in new data sets.

4.5 OPEN CV

OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in commercial

products. Being an Apache 2 licensed product, OpenCV makes it easy for businesses to utilize and modify the code.

The library has more than 2500 optimized algorithms, which includes a comprehensive set of both classic and state-of-the-art computer vision and machine learning algorithms. These algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, produce 3D point clouds from stereo cameras, stitch images together to produce a high resolution image of an entire scene, find similar images from an image database, remove red eyes from images taken using flash, follow eye movements, recognize scenery and establish markers to overlay it with augmented reality, etc. OpenCV has more than 47 thousand people of user community and estimated number of downloads exceeding 18 million. The library is used extensively in companies, research groups and by governmental bodies.

Along with well-established companies like Google, Yahoo, Microsoft, Intel, IBM, Sony, Honda, Toyota that employ the library, there are many startups such as Applied Minds, VideoSurf, and Zeitera, that make extensive use of OpenCV. OpenCV's deployed uses span the range from stitching street view images together, detecting intrusions in surveillance video in Israel, monitoring mine equipment in China, helping robots navigate and pick up objects at Willow Garage, detection of swimming pool drowning accidents in Europe, running interactive art in Spain and New York, checking runways for debris in Turkey, inspecting labels on products in factories around the world on to rapid face detection in Japan.

It has C++, Python, Java, and MATLAB interfaces and supports Windows, Linux, Android and Mac OS. OpenCV leans mostly towards real-time vision applications and takes advantage of MMX and SSE instructions when available. A full-featured CUDA and OpenCL interfaces are being actively developed right now. There are over 500 algorithms and about 10 times as many functions that compose or support those algorithms. OpenCV is written natively in C++ and has a templated interface that works seamlessly with STL containers.

CHAPTER 5 SYSTEM DESIGN

ARCHITECTURE
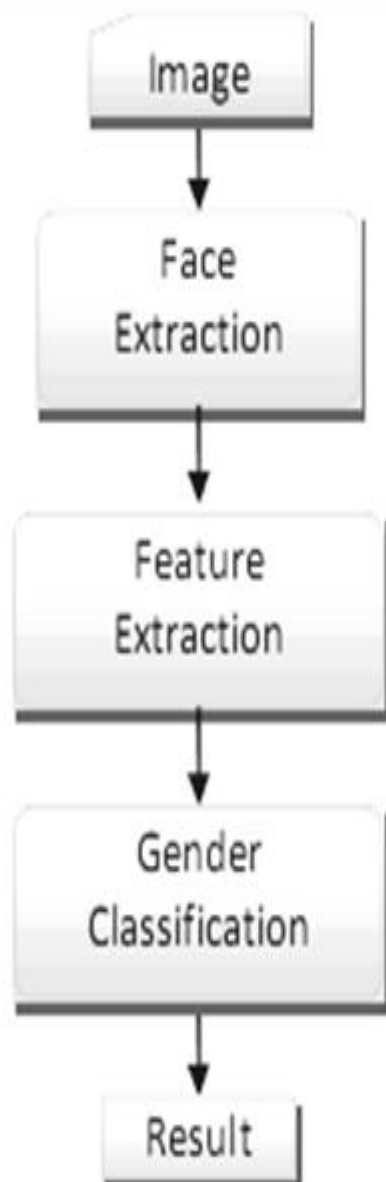
5.1 LOW LEVEL DESIGN ARCHITECHTURE

5.1.1 Sequence Diagram /DFD

A sequence diagram shows object interaction arranged in time sequence. It describes interactions among classes in terms of an exchange of messages over time. It is also called as event diagram. A sequence diagram is a good way to visualize and validate various run time scenarios. These can help to predict how a system will behave and to discover responsibilities a class may need to have in the process of modelling the new system. Messages are arrows that represent communication between the objects. Lifelines are vertical dashed lines that indicate the object presence over time.
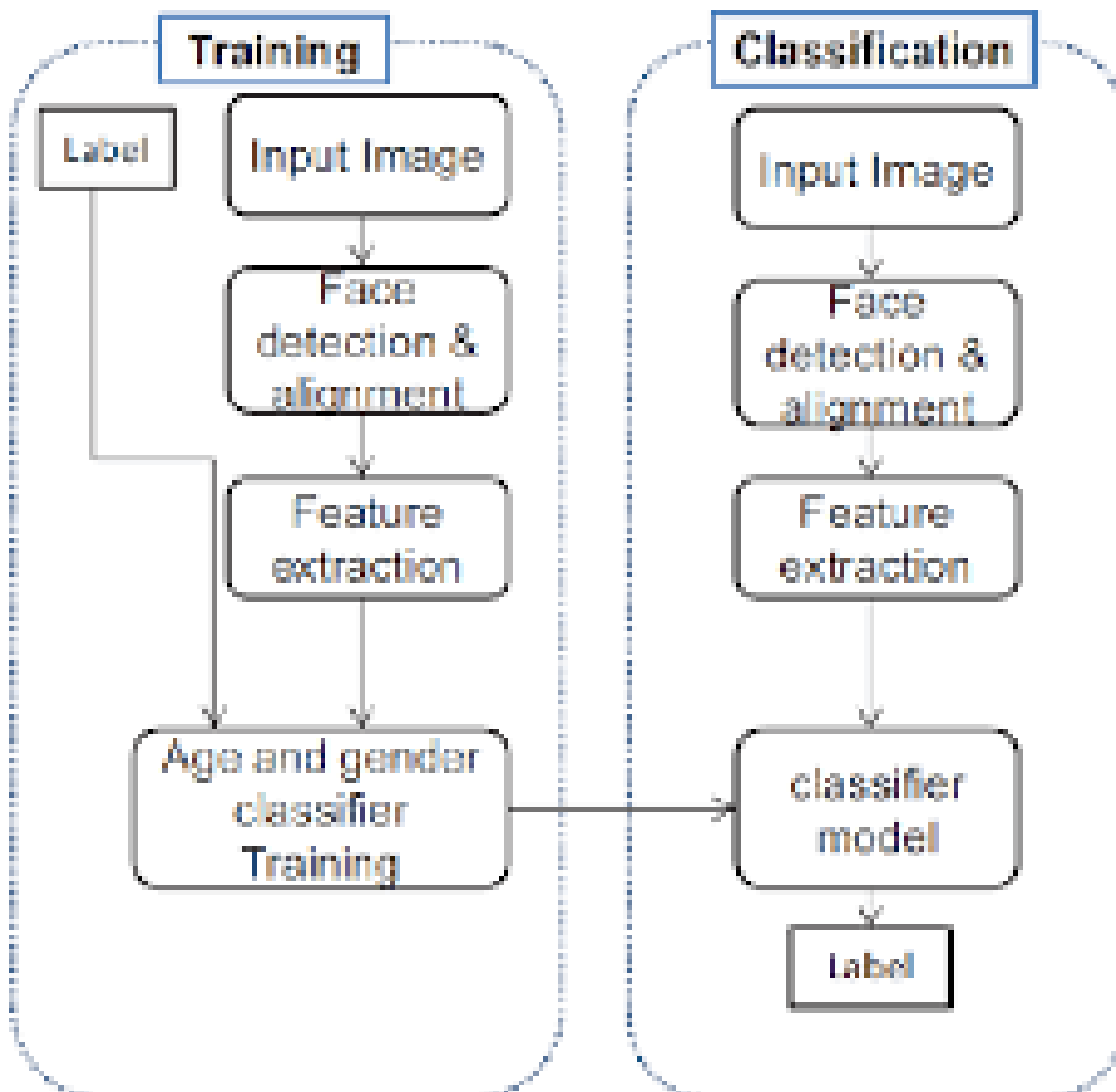
CHAPTER 6 SYSTEM IMPLEMENTATION

6.1 SOFTWARE APPROACH

6.1.1 Command Prompt
The Windows 11 Command Prompt is an application that allows you to launch programs and change settings by typing commands into a window.

6.1.1 Working

For face detection, we have a .pb file- this is a protobuf file (protocol buffer); it holds the graph definition and the trained weights of the model. We can use this to run the trained model. And while a .pb file holds the protobuf in binary format, one with the .pbtxt extension holds it in text format. These are TensorFlow files. For age and gender, the .prototxt files describe the network configuration and the .caffemodel file defines the internal states of the parameters of the layers.

2. We use the argparse library to create an argument parser so we can get the image argument from the command prompt. We make it parse the argument holding the path to the image to classify gender and age for.

3. For face, age, and gender, initialize protocol buffer and model.

4. Initialize the mean values for the model and the lists of age ranges and genders to classify from.

5. Now, use the readNet() method to load the networks. The first parameter holds trained weights and the second carries network configuration.

6. Let's capture video stream in case you'd like to classify on a webcam's stream. Set padding to 20.

7. Now until any key is pressed, we read the stream and store the content into the names hasFrame and frame. If it isn't a video, it must wait, and so we call up waitKey() from cv2, then break.

8. Let's make a call to the highlightFace() function with the faceNet and frame parameters, and what this returns, we will store in the names resultImg and

faceBoxes. And if we got 0 faceBoxes, it means there was no face to detect. Here, net is faceNet- this model is the DNN Face Detector and holds only about 2.7MB on disk.

- Create a shallow copy of frame and get its height and width.
- Create a blob from the shallow copy.
- Set the input and make a forward pass to the network.
- faceBoxes is an empty list now. for each value in 0 to 127, define the confidence (between 0 and 1). Wherever we find the confidence greater than the confidence threshold, which is 0.7, we get the x1, y1, x2, and y2 coordinates and append a list of those to faceBoxes.
- Then, we put up rectangles on the image for each such list of coordinates and return two things: the shallow copy and the list of faceBoxes.
  9. But if there are indeed faceBoxes, for each of those, we define the face, create a 4-dimensional blob from the image. In doing this, we scale it, resize it, and pass in the mean values.

10. We feed the input and give the network a forward pass to get the confidence of the two class. Whichever is higher, that is the gender of the person in the picture.

11. Then, we do the same thing for age.

12. We'll add the gender and age texts to the resulting image and display it with imshow().

CHAPTER 7 SYSTEM TESTING

7.1 INTRODUCTION

Open command prompt, run our script with the image option and specify an image to classify

```
C:\>cd DataFlair\gad

C:\DataFlair\gad>py gad.py --image girl1.jpg
Gender: Female
Age: 25-32 years

C:\DataFlair\gad>
```

- Open your Command Prompt or Terminal and change directory to the folder where all the files are present.
- **Detecting Gender and Age of face in Image** Use Command :

```
python detect.py --image <image_name>
```

Note: The Image should be present in same folder where all the files are present
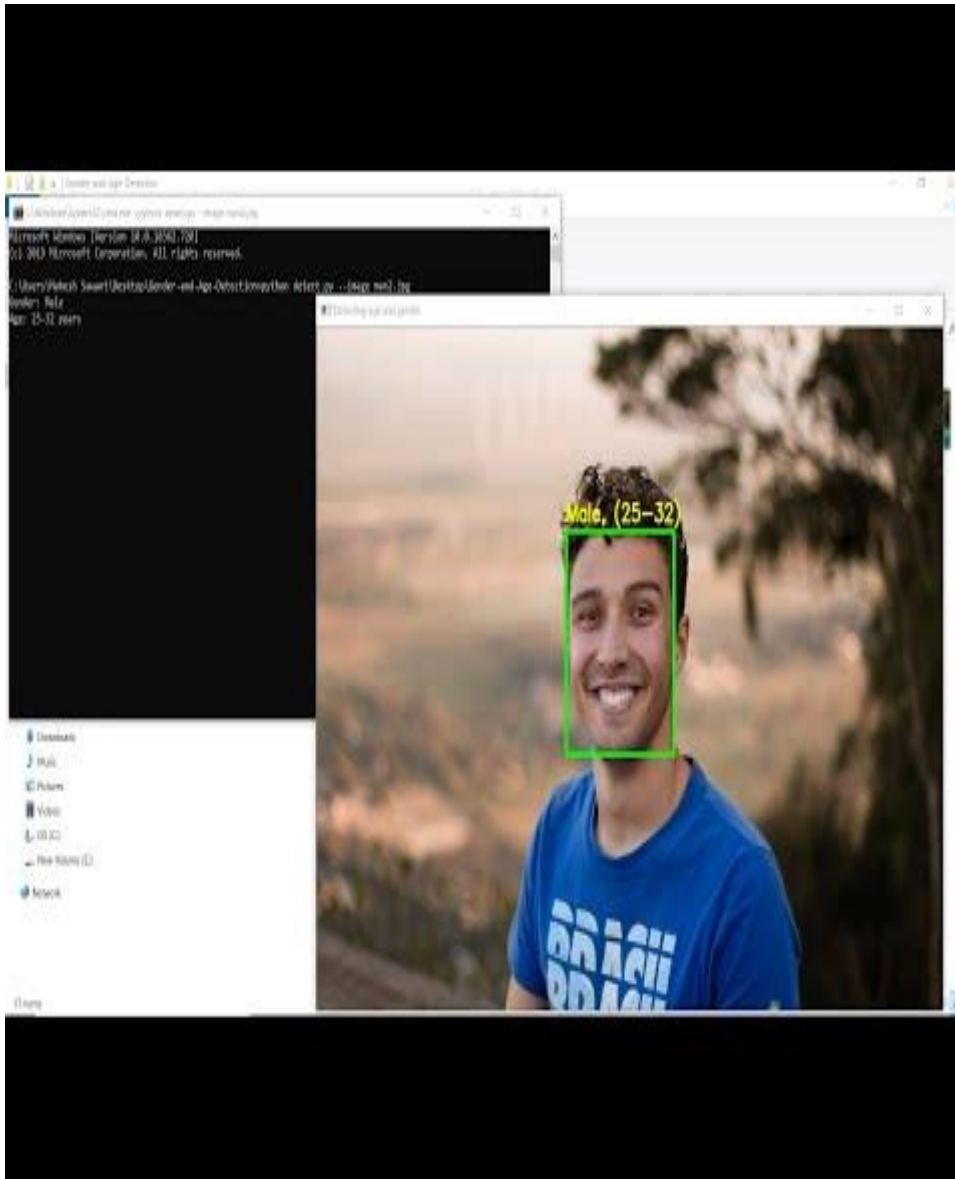
- **Detecting Gender and Age of face through webcam** Use Command :

```
python detect.py
```

- Press **Ctrl + C** to stop the program execution.
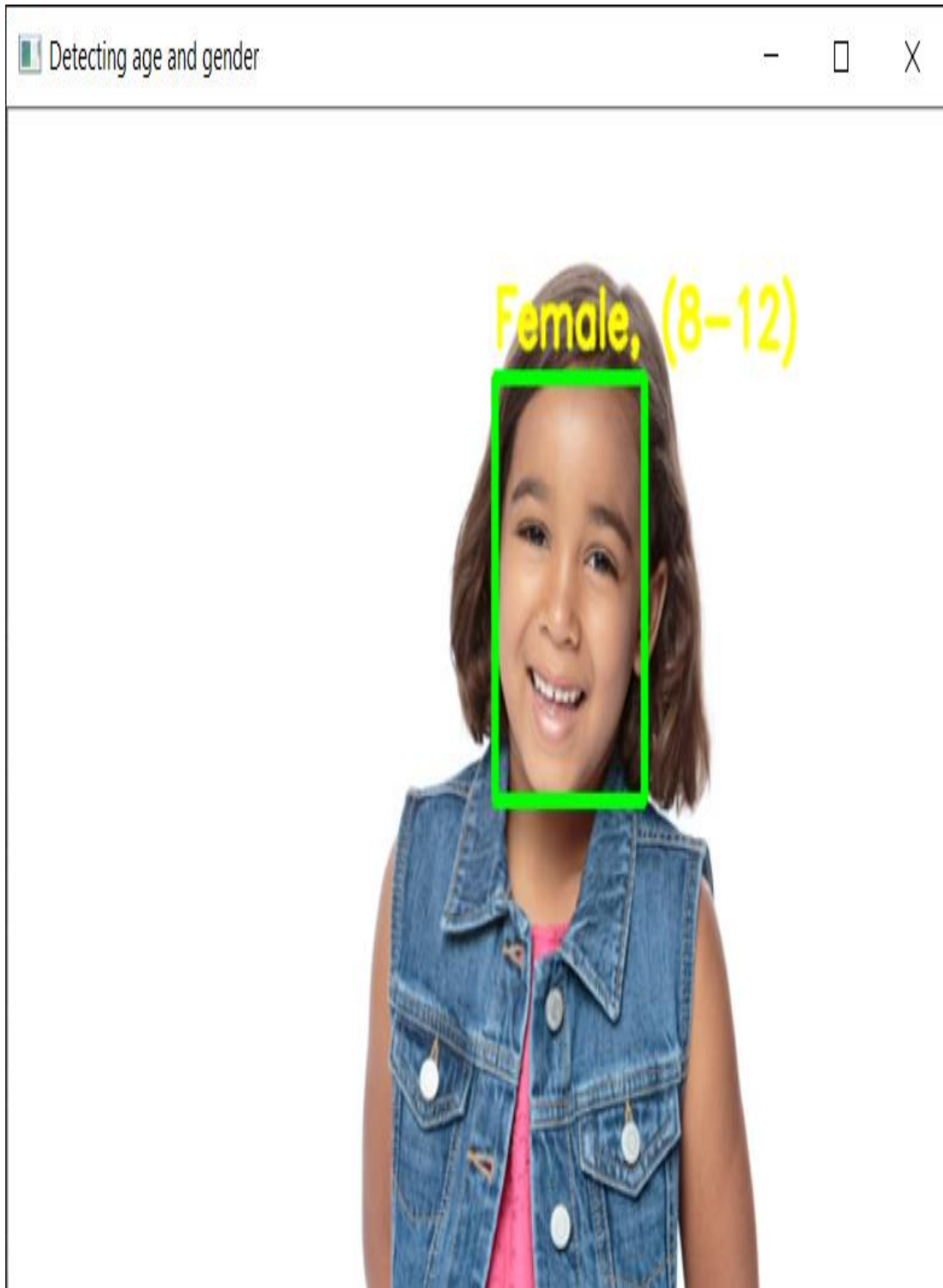
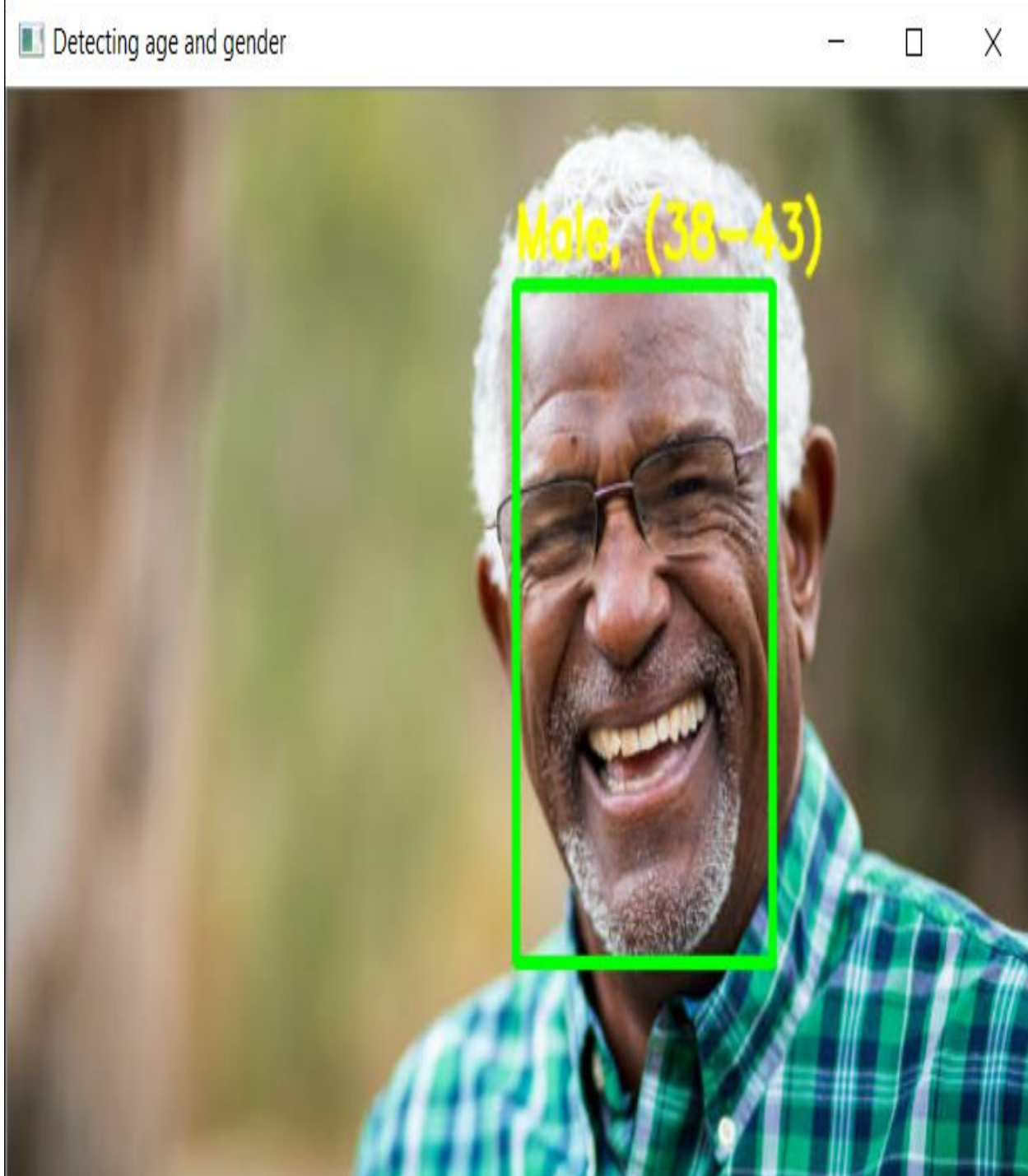# CHAPTER 8 RESULTS AND DISCUSSSIONS

RESULT


```
>python detect.py --image girl1.jpg
Gender: Female
Age: 25-32 years
```

```
>python detect.py --image girl2.jpg
Gender: Female
Age: 8-12 years
```

```
>python detect.py --image man1.jpg
Gender: Male
Age: 38-43 years
```

8.1 DISCUSSIONS

There are many possibilities in age and gender estimation research. A n immediate idea would be to look more deeply into training models with integral images as additional colour channels using more varied neural network architectures. Another idea would be to use more varied neural network architecture specifically for gender prediction. Many current tools use the same architecture for both age and gender prediction.

Age and gender prediction from images is an important application of computer vision. There are many approaches to solve this problem. We evaluate three different methods. We combine publicly available datasets and one manually labelled dataset into a large set and train the best method. We further extend the data by adding a colour channel to the images and train the best method. We show that training a network with a large dataset improves the performance, however adding additional colour channel does not. Based on our results we develop an application for age and gender classification.

CHAPTER 9 CONCLUSION AND FUTURE WORK

9.1 CONCLUSION

Age and Gender Classification are two of the most essential resources for getting information from an individual. Human faces contain enough information to be useful for a variety of purposes. Human age and gender classification are critical for reaching the right audience. We attempted to replicate the process using standard equipment. The algorithm's efficiency is determined by a number of factors, but the major goal of this study is to make it as simple and quick as possible while maintaining the highest level of accuracy. Work is being done to improve the algorithm's efficiency. Future enhancements include discarding faces for nonhuman objects, adding more datasets for people of other ethnic groups, and giving the computer more granular control over its workflow. Deep learning and CNN could be used to improve this prototype's ability to reliably identify a person's gender and age range out of a single image of their face. From this study, we can conclude with two important conclusions. First, despite the limited availability of age and gender-tagged photos, CNN can be used to improve age and gender detection outcomes. Second, by employing additional training data and more complex systems, the system's performance can be slightly increased.

9.2 FUTURE WORK

Using other Deep Convolution Neural Network architecture in the same problem in place of VGGNet that we have used in this project. I would have the wished to supplant the different completely associated fully connected layers at the end part of this architecture with just a single layer and rather than this moved those parameters over to extra convolutional layers. By a wide margin, the most troublesome region of this undertaking was building up the preparation foundation with the appropriate division of the information into folds, prepare every classifier, performing cross-approval, what's more, join the different resulting classifiers into a test-prepared classifier

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