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Supervised Machine Learning Techniques based Human Age, Gender and Emotion Detection

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Abstract: *The proposed work is "Supervised machine learning based Human Age, Gender and Emotion Detector" is a project to help people avoid being victims of frauds. Automated age and gender detection has been generally used in our daily lives that we come across, majorly in a person to computer interaction, visual surveillance, biometric analysis, electronics and other applications of commercial use. By recognizing the emotions of a person, we can improve the recommendation system. The existing methods have quite satisfying performance on real-world images if facial expressions of input image is neutral or calm, it lacks significantly in age prediction when facial expressions are altered. For image classification, a convolutional neural networks (CNNs) pre=trained are used on ImageNet from Caffe, a modifiable platform for state-of-the-art deep learning algorithms and a set of reference models. The YOLOv3 (You Only Look Once V3) algorithm was employed for such purposed having a desirable ability to serve the required purpose.*

Keywords: Age detection, Gender Detection, Emotion Detection, CNN, YOLOv3 Algorithm

I. INTRODUCTION

This Supervised machine learning based Human Age, Gender and Emotion Detector is a project to help people avoid being victims of frauds. This project can be implemented in the cyber sector to prevent the daily small level frauds and scams. This project can also be implemented in the medical sector. Using this project, Patients with Alexithymia (who don't know about human emotions and expressions) can be treated and taught about Human Emotions. This project is a digital approach to help people with such disabilities. This project can be used in small scale such as at home as well as on a large scale such as some big organisations like hospitals, some cyber security organisations. This project takes real time images/video/audio as well as recorded or stored ones. The user selects the function he wants to perform if it is age detection or gender detection or emotion detection. User has to grant permissions to the project to take the input. If he is selecting for real tine image or voice then he has grant permission to the system to have the access of the camera and the microphone. The system will take the input from the user. The input will be from the camera or microphone. The system will then process the input data. It will process the data and find the age, gender and emotion of the data taken.

II. LITERATURE REVIEW AND RELATED WORK

Many systems have been developed over the past couple of years. In this section, we study several existing approaches and explain their limitations. Furthermore, we simulate these different strategies under realistic conditions and compare their performance.

2.1 Age, Emotion and Gender Recognition using Face

Age recognition: Age recognition is the strategy applied to detect the age. In this case, the system captures the real time image from the webcam and provides the range of the age (the age group) as an output.
Gender detection: Gender detection is the strategy applied to detect the gender of a person. In this case, the system captures the real time image from the webcam and provides the gender of the person (Male or Female) as an output.
Emotion detection: Emotion detection is the strategy applied to detect the emotion of a person. In this case, the system captures the real time image from the webcam, processes the image and provides the emotion of the person (Happy, Sad, Neutral, Angry, Shocked etc.) as an output.

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2.2 Gender Recognition using Voice

Over the past few years many systems have been developed to recognize age and gender from voice signals. In this part we study different existing approaches and their limitations.

Age recognition: Age recognition is the strategy applied to detect the age. In this case, the system captures the real time speech signal from the microphone and provides the range of the age (the age group) as an output.

Gender detection: Gender detection is the strategy applied to detect the gender of a person. In this case, the system captures the real time speech signals from the microphone, processes the signals and provides the gender of the person (Male or Female) as an output.

2.3 Related Work

Sr. No.	Paper Name	Author Name	Year
1.	Age and gender Estimation by using hybrid facial features	1. V. Karimi 2. A.Tashk	2012
2.	Exploring the limits of compact model for age estimation	1.Chao Zhang 2.Xun XU	2019
3.	Gender-Driven emotion recognition through speech signals for ambient intelligence application	1.Igor Bisio 2.Fabio Lavagetto 3.Mario Marchese	2013
4.	Gender and age estimation methods based on speech using deep neural networks	1.Damian Kwasny 2.Daria Hemmerling	2021

III. METHODOLOGY

For Gender recognition by voice, we are going to create a program that will classify gender by voice using the TensorFlow framework and Librosa library in Python. Librosa is a python library for analyzing audio,music. It has a flatter package layout, standardizes interfaces and names, backward compatibility, modular functions, and readable code. We can also use it in categorizing call by gender, or you can add it as a feature to a virtual assistant that can distinguish the talker's gender.

For Age detection we will use Deep Learning to accurately identify the gender and age of a person from a single image of a face or from live video source. To build an age detector that can approximately guess the gender and age of the person (face) in a picture using Deep Learning on the Audience dataset. A Convolutional Neural Network is a deep neural network (DNN) widely used for the purposes of image recognition and processing and NLP. Also known as a ConvNet, a CNN has input and output layers, and multiple hidden layers, many of which are convolutional

For Emotion/Mood detection, we are going to create a program that takes an image or live video from webcam as an input and outputs a list of human emotions/mood that it invokes. For this, we're going to use Deepface which is an open-source face recognition attribute analysis framework that was created for python. Deepface is an open-source face recognition attribute analysis framework that was created for python. It is a very powerful computer vision library that's helpful in identifying things in images, as the shapes and faces within the image, so it's easy to detect and analyse them.

We are developing a software that includes :

1. Gender recognition by voice
2. Emotion detection by DeepFace using python
3. Age detection with OpenCV using python

In our project a user can detect gender of a person from their voice, detect emotion/mood of a person from their face and can detect the age of a person from their face. For this project, we're only going to be using one of the many modules that deepface provides which is the Facial Attribute Analysis module, it can tell us about age, gender, facial expression, and mood from the provided image or data. The user will be provided with a list/menu of operations listed below

1.Gender detection	2. Emotion detection	3. Age detection
a. From Microphone	a. From Webcam	a. From Webcam

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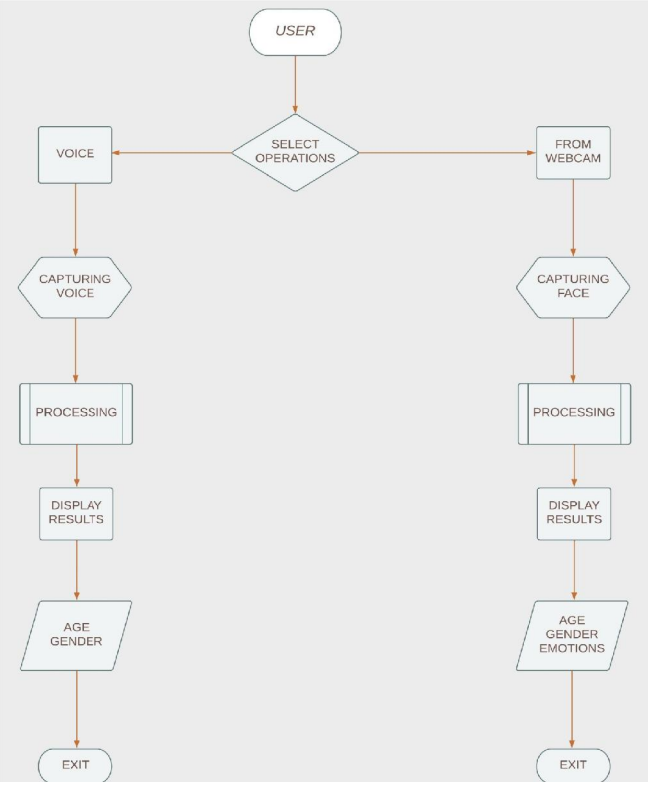
Here is the table of contents :

1. Preparing the Dataset
2. Building the Model
3. Training the Model
4. Testing the Model
5. Testing the Model with your own voice



IV. EXPERMENTAL SETUP

When a system gets executed, a GUI pops up on which we have to select the operation we want to perform i.e., either from Voice detection or from Face detection.

Figure 4.1: Welcome screen GUI

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Now if user select voice option, the code to perform the desired operation on voice is executed in which the user has to input voice message and the Gender will be displayed as an output.

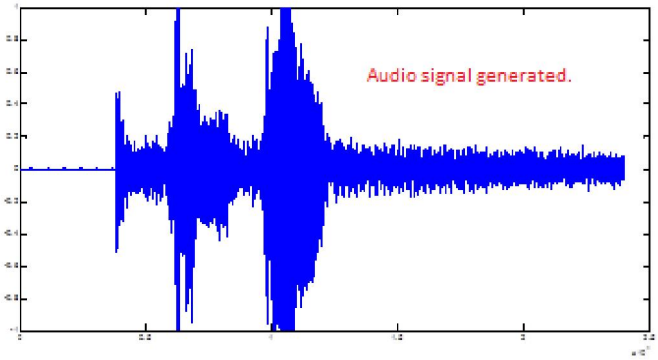

Figure 4.2: From Voice

If the user selects Face option the code to perform the desired operation on face is executed, in which the user has to align his face in front of the web camera and the Age, the gender and emotion will be displayed as an output.

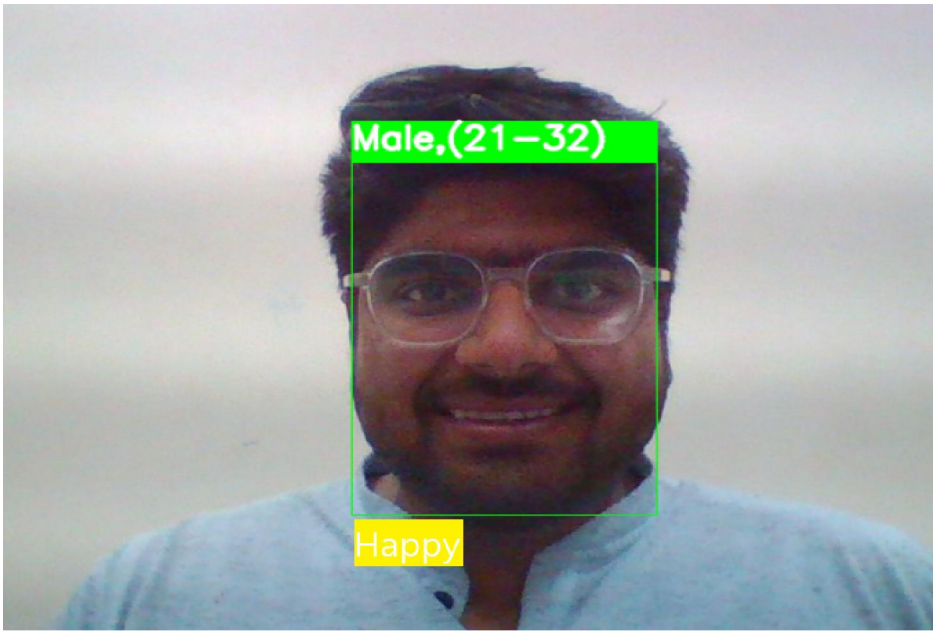

Figure 4.3: From Face

V. CONCLUSION

In this paper, we developed a software through which a user will be provided with operations like gender detection of a person from their voice or from a voice recording, age detection of a person from an image or from a webcam (live video source) and mood detection of a person from an image or from a webcam (live video source). The user can select any one operation at a time and can get the task done. Our project provides accuracy up to 90%. The user can choose between three operations and can perform the desired task. This project will be useful in many fields such as medical sciences, automative speech recognition, training for robots, etc.

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