REAL TIME AGE AND GENDER PREDICTION USING PYTHON AND ML

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Abstract - Facial analysis, particularly age and gender estimation, is crucial in various intelligent applications. This study presents a CNN-based model for predicting age group and gender from single face images in real-world environments. The approach involves formulating age and gender classification as discrete annotations and training classifiers accordingly. A robust image preprocessing algorithm is devised to enhance model performance. Leveraging large-scale datasets facilitates effective training and generalization of the CNN model. Despite limited accurate labels, the proposed architecture demonstrates significant progress in face recognition using deep convolutional neural networks.

***Key Words*:** Facial analysis, CNN, age estimation, gender classification, image preprocessing, deep learning, face recognition.

1.INTRODUCTION

In the ever-evolving landscape of artificial intelligence and machine learning, the intersection with demographic prediction, specifically age and gender estimation, has garnered significant attention. Notably, the imperative to addressprivacy concerns has led to a paradigm shift in methodologies, prompting a departure from traditional voice-based analyses. This survey paper embarks on an exploration of age and gender prediction, focusing explicitly on methodologies that exclude voice analysis, while harnessing the capabilities of Python programming in tandem with Convolutional Neural Network (CNN) algorithms.

The driving force behind this investigation lies in the contemporary emphasis on safeguarding individual privacy, necessitating innovative and non-intrusive approaches in demographic prediction. By deliberately excluding voice analysis, the study seeks to meet the demands of diverse applications that require accurate predictions without compromising privacy. Central to this inquiry is the introduction of CNN algorithms, known for their proficiency in processing image-based data, as a viable solution for robust and reliable demographic predictions.

This introduction sets the tone for a comprehensive survey that not only reviews existing methodologies but also delves into the foundational aspects of CNN algorithms within the context of age and gender prediction. The motivation behind steering away from voice-dependent approaches is underlined, emphasizing the need for solutions that strike a balance between predictive accuracy and privacy preservation. Through an in-depth examination of various techniques, datasets, and emerging trends, the paper aims to equip researchers and practitioners with a nuanced understanding of the current state-of-the-art in demographic prediction. Ultimately, the survey contributes to the ongoing discourse surrounding ethical and privacy-centric applications of machine learning in the realm of demographic analysis. Facial age and gender prediction has gained significant attention in recent years due to its wide range of applications in various fields, including marketing, security, and healthcare. This project aims to develop a real-time facial age and gender prediction application using Python and Tkinter, which will leverage a pre-trained model to accurately estimate the age and gender of individuals based on input from a live camera feed.

2.0 LITERATURE SURVEY

Paper Name: A Lightweight Deep Convolutional Neural Network Model for

Author: Md. Nahidul Islam Opu, Tanha Kabir Koly, Annesha Das and Ashim Dey

Abstract: Recognition of age and gender has become a significant part of the biometric system, protection, and treatment. It is widely used for people to access age-related content. It is used by social media in the distribution of layered advertising and promotions to expand its scope. Application of face detection has grown to a great extent that we should upgrade it using various methods to achieve more accurate results. In this paper, we have developed a lightweight deep Convolution neural network model for real-time age and gender prediction. For making the training dataset more diverse, Wiki, UTKFace, and Adience datasets have been merged into one containing 18728 images. Using this vast mixed dataset, we have achieved accuracy of 48.5980.76tested in real-time. Different experimental investigations on the prepared dataset show that with most recent approaches, our model provides competitive prediction accuracy

Paper Name: Gender, Makeup, Age and Illumination Prediction from Faces using Ensemble Modelling.

Author: Kundan Nigam, Sahil Sharma

Abstract: Gender, makeup, age and illumination classification has become one of the major tasks and these tasks has become more powerful in real time applications. Still, the performance of existing method is lacking when compared in optimization. In this research paper we have been applied various machine learning models to get the results more optimized. We try to developed ensemble techniques for sturdy age classification ranges and these ranges are classified into four categories that are child, young, middle and old. Similarly, Gender classification ranges are divided into male and female and Makeup classification ranges are divided into partial makeup and over makeup and also illumination classification ranges are divided into bad, medium and high categories.

Paper Name: Gender and Age based Census System for Metropolitan Cities

Author: Shiva Mittal, Vikram Singh Rajput

Abstract: This paper presents a smart computer-vision based system which helps ensure disciplined entry of people in places by ascertaining the allowable age and gender of the person, as well as storing the data for census use. The system involves deep learning based facial image classifiers, which predict the gender and age from the image of face captured by the camera in real-time. The actuating response is generated according to the prediction of the computer vision algorithm, which further keeps the record of encountered faces with the respective counts of persons with corresponding facial traits. The log of the entire surveillance process can be monitored online through the integrated IOT capability, thereby can be used as primary data source. The successful experimental runs demonstrate the system's usability in the real-world applications.

2.1 ACTUAL METHODOLOGY

1. Image/Video Capture: This module is responsible for capturing images or video streams from various sources, such as cameras or file systems. It may include additional functionality such as image cropping or resizing.
2. Preprocessing: This module is responsible for preparing the images or video streams for analysis. This may include operations such as normalization, denoising, or color correction.
3. Face Detection: This module is responsible for detecting faces in the images or video streams. It may use various algorithms and techniques such as Haar cascades or deep learning models to detect faces.
4. Face Alignment: This module is responsible for aligning the detected faces to a standard pose and size. This is important because the pre-trained CNN models typically expect input images to be in a specific format and orientation.
5. Feature Extraction: This module is responsible for extracting relevant features from the aligned faces using a pre-trained CNN model. The pre-trained CNN model has been trained on a large dataset of faces and can extract useful features that are relevant to age and gender prediction.

6. Age and Gender Prediction: This module is responsible for predicting the age and gender of the extracted face features using a pre-trained classifier model. The classifier model has been trained on a labeled dataset of faces and can predict the age and gender based on the extracted features.

7. Post-Processing: This module is responsible for post-processing the predictions, such as filtering out inaccurate predictions or smoothing out predictions over time.

8. Visualization: This module is responsible for presenting the results of the analysis to the user. This may include displaying the predicted age and gender on the images or video streams in real-time.

These modules work together to enable real-time age and gender prediction using a pre-trained CNN model. The pre-trained CNN model provides a powerful feature extraction capability that can be leveraged to predict age and gender with high accuracy. The real-time nature of the system allows for rapid analysis of images or video streams, making it useful for a wide range of applications.

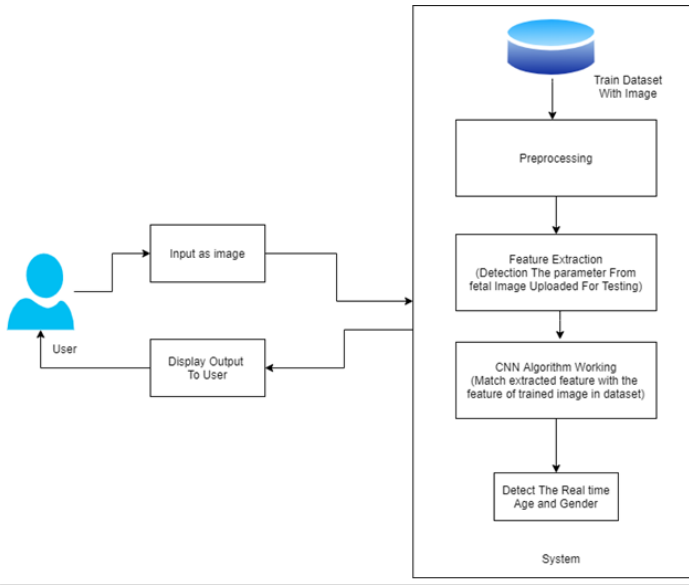


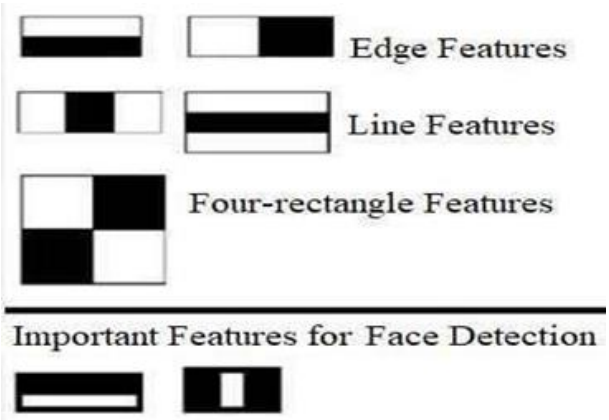
Fig. Proposed system architecture

2.2 PROPOSED ALGORITHM

HAAR-LIKE FEATURES:

Haar-like features are named after Alfred Haar, a Hungarian mathematician in the 19th century who developed the concept of Haar wavelets (kind of like the ancestor of haar-like features). The features below show a box with a light side and a dark side, which is how the machine determines what the feature is. Sometimes one side will be lighter than the other, as in an edge of an eyebrow. Sometimes the middle portion may be shinier than the surrounding boxes, whichcan be interpreted as a nose.

- There are 3 types of Haar-like features that Viola and Jones identified in their research:
- Edge features
- Line-features
- Four-sided features



These features help the machine understand what the image is. Imagine what the edge of a table would look like on a b&w image. One side will be lighter than the other, creating that edge like b&w feature as you can see in the picture above. In the two important features for Face Detection, the horizontal and the vertical features describe what eyebrows and the nose, respectively, look like to the machine. Additionally, when the images are inspected, each feature has a value of its own. It's quite easy to calculate: Subtract White area from the Black area.

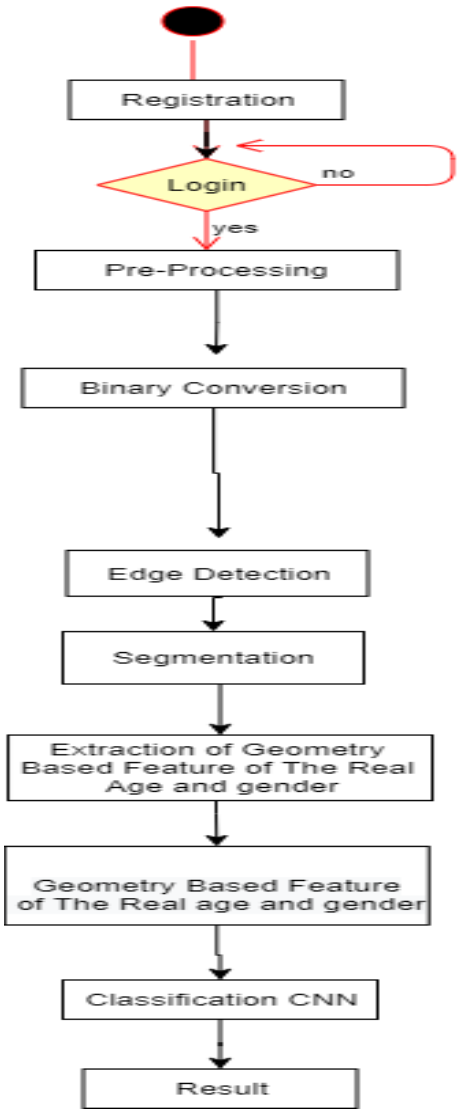
CNN Algorithm:

A convolutional neural network consists of an input layer, hidden layers and an output layer. In any feed-forward neural network, any middle layers are called hidden because their inputs and outputs are masked by the activation function and final convolution. In a convolutional neural network, the hidden layers include layers that perform convolutions.

Defining the CNN Model

- Input layer
- Convo layer (Convo + ReLU)
- Pooling layer
- Fully connected(FC) layer
- Softmax/Logistic layer
- Output layer

2.3 IMPLEMENTATION



2.4 APPICATIONS

Some of the Applications of the estimation of Age and Gender Detection will be as follows

1. Forensic Department in the medical field as to gather information of the dead bodies.

2. In the banking sector to detect the information about the individual just by the images by age and gender detection.

3. Classify details of the individuals in the ADHAAR database.

4. Criminal Investigation Department to gather the information about the suspects by the age and gender detection.

5. Surveillance Monitoring.

3. REFERENCES

1.J. Brownlee, "How to Perform Face Detection with Deep Learning," Machine Learning Mastery, Jun. 02, 2019.

2.W. Ouyang et al., "DeepID-Net: Object Detection with Deformable Part Based Convolutional Neural Networks," IEEE Trans. Pattern Anal. Mach. Intell., vol. 39, no. 7, pp. 1320–1334, Jul. 2017, doi: 10.1109/TPAMI.2016.2587642.

3.A. Voulodimos, N. Doulamis, A. Doulamis, and E. Protopapadakis, "Deep Learning for Computer Vision: A Brief Review," Computational Intelligence
and Neuroscience, Feb. 01, 2018.
(accessed Jul. 14, 2020).

4. Y.-L. Boureau, J. Ponce, and Y. LeCun, "A Theoretical Analysis of Feature Pooling in Visual Recognition," p. 8, 2010.

5.S. Manasa, J. S. Abraham, A. Sharma, and K. Himapoornashree, "Age, gender and emotion detection using cnn," International Journal of Advanced Research in Computer Science, vol. 11, no. Special Issue 1, p. 68, 2020.

6 O. Agbo-Ajala and S. Viriri, "Deeply learned classifiers for age and gender predictions of unfiltered faces," The Scientific World Journal, vol. 2020, 2020.

7 A. Kharchevnikova and A. V. Savchenko, "Neural networks in videobased age and gender recognition on mobile platforms," Optical Memory and Neural Networks, vol. 27, no. 4, pp. 246–259, 2018.

8 M. Dileep and A. Danti, "Human age and gender prediction based on neural networks and three sigma control limits," Applied Artificial Intelligence, vol. 32, no. 3, pp. 281–292, 2018.

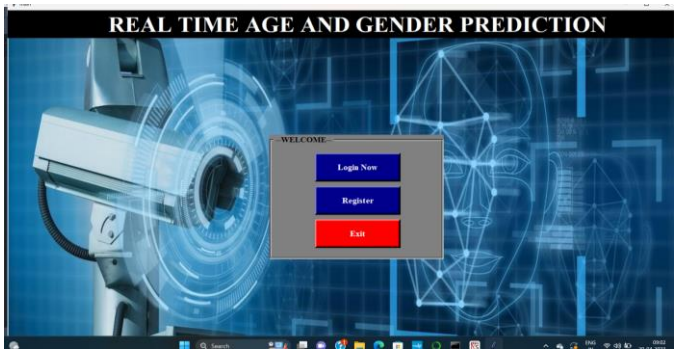
9 Z. Zhang, Y. Song, and H. Qi, "Age progression/regression by conditional adversarial autoencoder," in IEEE Conference on Computer Vision and Pattern Recognition (CVPR). IEEE, 2017

10 .C. B. Ng, Y. H. Tay, and B.-M. Goi, "Recognizing Human Gender in Com- puterVision: A Survey," in PRICAI 2012: Trends in Artificial Intelligence, Berlin, Heidelberg, 2012, pp. 335–346, doi: 10.1007/978-3- 642-32695-031

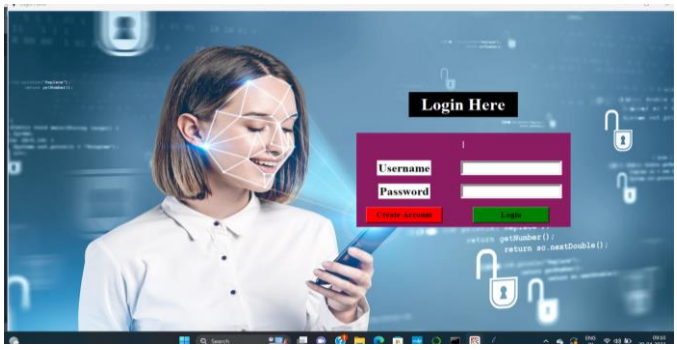
4. Result

4.1. Welcome page

4.2. Home page

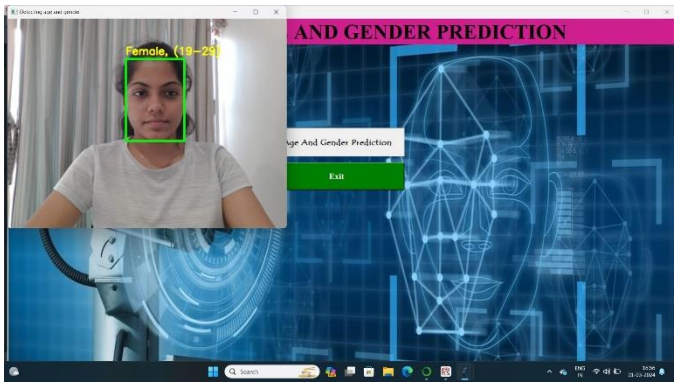


4.3. Login page



4.4. Registration page

4.5. Result for input 1



4.6. Result for input 2

5. FUTURE SCOPE

When changing a dataset, the same model can be trained to predict the feelings of race etc. Age and gender classifications can be used to predict age and gender in uncontrolled real-time situations such as train stations, banks, buses, airports, etc. For example, depending on the number of male and female passengers by the age on the train station, toilets and restrooms can be built to facilitate transportation.

For future works, we will consider a deeper CNN architecture and a more robust image processing algorithm for exact age estimation. Also, the apparent age estimation of human's face will be interesting research to investigate in the future.

6. CONCLUSION

This project presents a real-time facial detection and tracking system capable of estimating age and gender using Convolutional Neural Networks (CNN). Despite limited labeled data, the CNN architecture is optimized to mitigate overfitting issues, yielding enhanced results for age and gender estimation. Leveraging color and texture features, our approach inflates the training dataset by incorporating artificially cropped images, further enhancing model robustness. The study demonstrates the efficacy of CNN in simplifying age and gender detection while improving performance significantly. By employing image processing techniques, real-time face datasets are analyzed, contributing to more accurate predictions.