Savitribai Phule Pune University.

A PROJECT REPORT ON

HUMAN FACE RECOGNITION

SUBMITTED TO THE UNIVERSITY OF PUNE, PUNE
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE

BACHELOR OF ENGINEERING

Computer Engineering

BY

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UNDER THE GUIDANCE OF

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C E R T I F I C A T E

This is to certify that the Project Report entitled

”IMPLEMENT HUMAN FACE RECOGNITION”

Submitted by

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is a bonafide work carried out under the supervision of Prof. R.M Wahul and it is submitted towards the partial fulfillment of the requirement of Sav- itribai Phule Pune University, Pune for the award of the degree of Bachelor of Engineering(Computer Engineering).

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Place: Pune

Date: 18/04/202

ABSTRACT

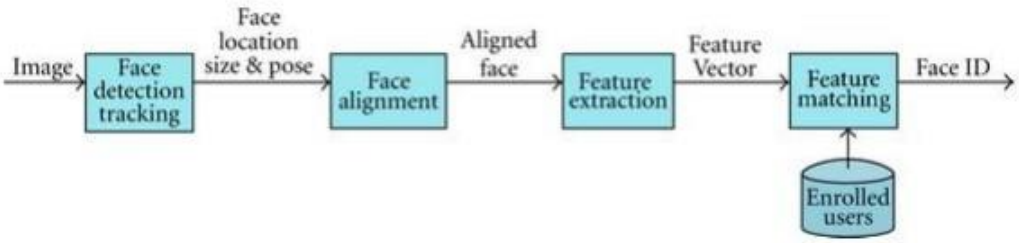
Face recognition is a rapidly developing and widely applied aspect of biometric technologies. Its applications are broad, ranging from law enforcement to consumer applications, and industry efficiency and monitoring solutions. The recent advent of affordable, powerful GPUs and the creation of huge face databases has drawn research focus primarily on the development of increasingly deep neural networks designed for all aspects of face recognition tasks, ranging from detection and preprocessing to feature representation and classification in verification and identification solutions. However, despite these improvements, real-time, accurate face recognition is still a challenge, primarily due to the high computational cost associated with the use of Deep Convolutions Neural Networks (DCNN), and the need to balance accuracy requirements with time and resource constraints.

Other significant issues affecting face recognition relate to occlusion, illumination and pose invariance, which causes a notable decline in accuracy in both traditional hand- crafted solutions and deep neural networks. This survey will provide a critical analysis and comparison of modern state of the art methodologies, their benefits, and their limitations. It provides a comprehensive coverage of both deep and shallow solutions, as they stand today, and highlight areas requiring future development and improvement. This review is aimed at facilitating research into novel approaches, and further development of current methodologies by scientists and engineers, whilst imparting an informative and analytical perspective on currently available solutions to end users in industry, government and consumer.

INTRODUCTION

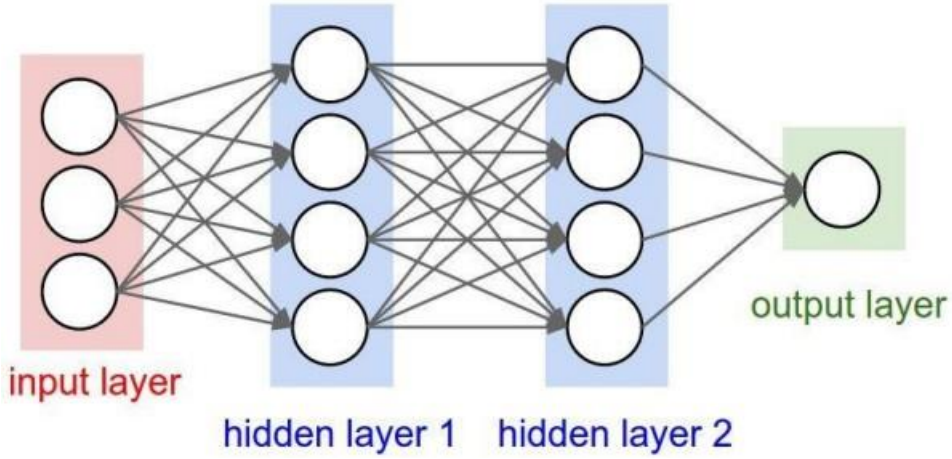
1.1 Introduction

The implementation of human face recognition has gained significant attention in recent years due to its wide range of applications in various fields such as security, surveillance, biometrics, and human-computer interaction. Human face recognition refers to the automated identification or verification of individuals based on their facial features. With the advancements in computer vision, image processing, and machine learning techniques, human face recognition systems have become more accurate, reliable, and efficient. These systems use a combination of algorithms, models, and datasets to extract and analyzefacial features from images or video streams. The primary goal of implementing humanface recognition is to develop a system that can accurately identify or verify individualsin real-time scenarios. This involves capturing or obtaining facial images, detecting fa-cial landmarks, extracting relevant features, and comparing them against a database of known faces. The system then matches the captured face with the stored representationsto determine the identity of the person.



1.2 Deep Learning

Deep Learning is providing major discoveries in solving the issues that have withstood several tries of machine learning and Artificial Intelligence Community in the past.Deep learning has overcome many of the traditional neural network problems such as vanishing gradient problem, over fitting, and local optima. As a result, it is currently used to decipher hard scientific problems at an unusual scale, e.g. in the reconstruction of brain circuits, analysis of modifications in DNA, prediction of structure-activity of potential drug molecules, and recognize traffic sign. Deep neural networks have additionally become the well-liked option to solve several difficult tasks.



1.3 Objectives

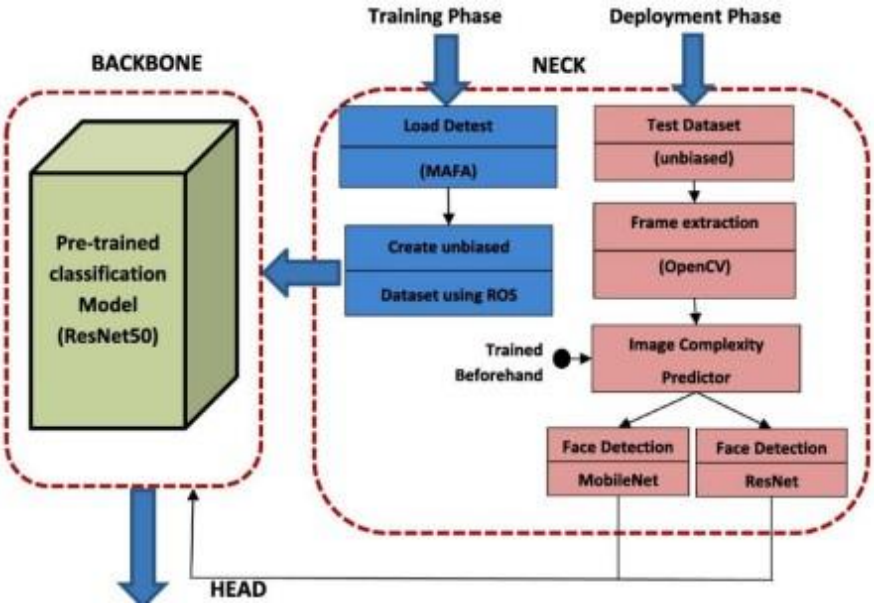
- To develop a face recognition system using machine learning techniques.
- To explore different feature extraction methods and classification algorithms to determine the best combination for our dataset.
- To evaluate the performance of our face recognition system using standard eval-- ation metrics.
- To compare the performance of our system with other state-of-the-art face recog- nition methods.
- To identify any limitations of our study and suggest areas for future research

1.4 Problem definition

Human face recognition is a challenging problem in computer vision, with important real-world applications such as security, surveillance, and human-computer interaction. While the field has seen significant progress in recent years, developing accurate and efficient face recognition systems remains a difficult task due to various factors such as variations in illumination, facial expression, and pose.

Architecture

2.1 Proposed Architecture



The proposed model is based on the object recognition benchmark given in According to this benchmark, all the tasks related to an object recognition problem can be ensembled under three main components: Backbone, Neck and Head as depicted in Here, the backbone corresponds to a baseline convolutional neural network capable of extracting information from images and converting them to a feature map. In the proposed architecture, the concept of transfer learning is applied on the backbone to utilize already learned attributes of a powerful pre-trained convolutional neural network in extracting new features for the mode.

2.2 Statistical Shape Models

A face shape can be represented by points as a -element vector. Given s training face images, there are shape vectors. Before we can perform statistical analysis on thesevectors, it is important that the shapes represented are in the same coordinate frame. Below Figure illustrates shape model.

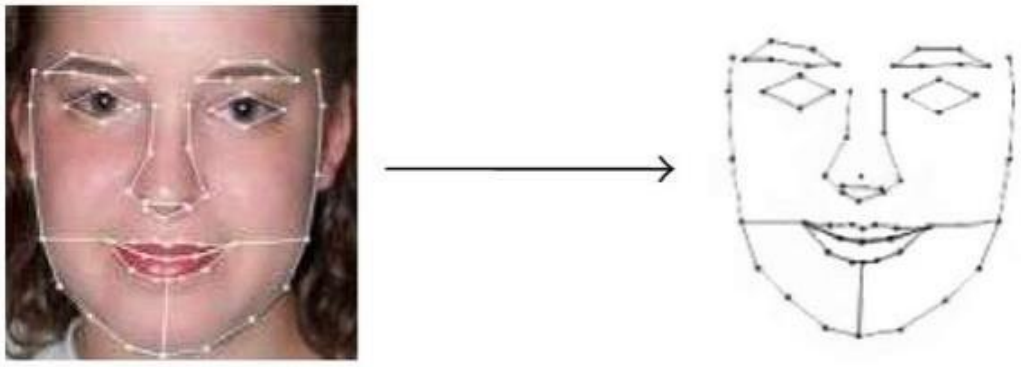
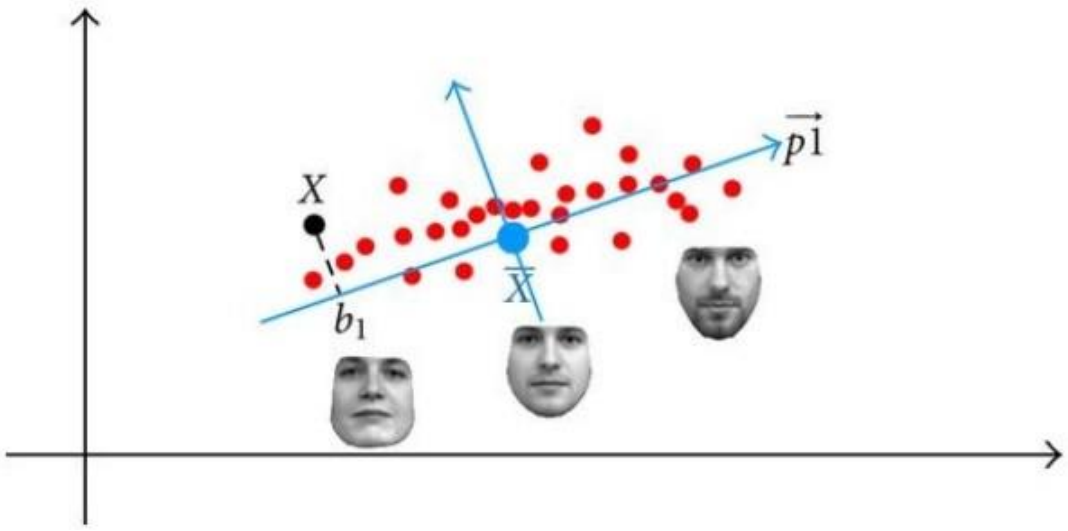


Image X

In particular, we seek a parameterized model of the form where is a vector of param- eters of the model. Such a model can be used to generate new vectors. If we can model the distribution of parameters, we can limit them so the generated s are similar to thosein the training set. Similarly, it should be possible to estimate using the model.

2.3 Convolutional Layer



This layer consist of 4layer:

1) Convolutional layer

2) Max Pooling

3) Fully Connected

4) Pooling layer

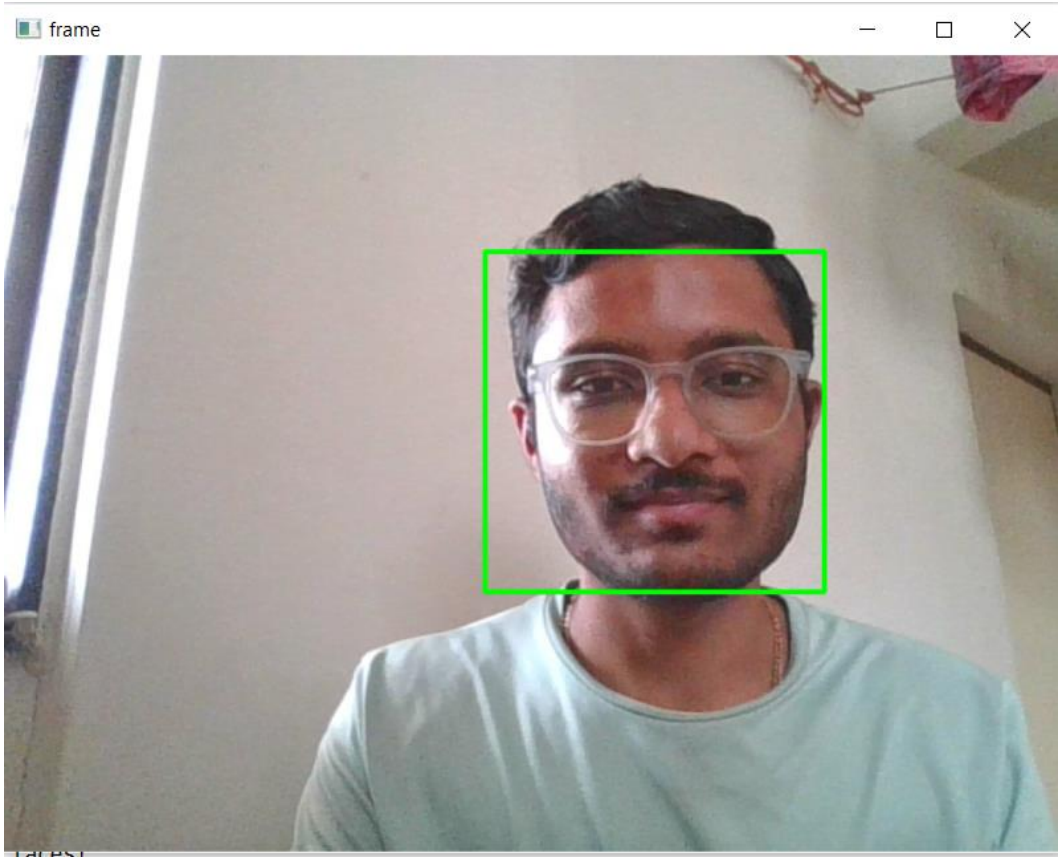
Limitation:

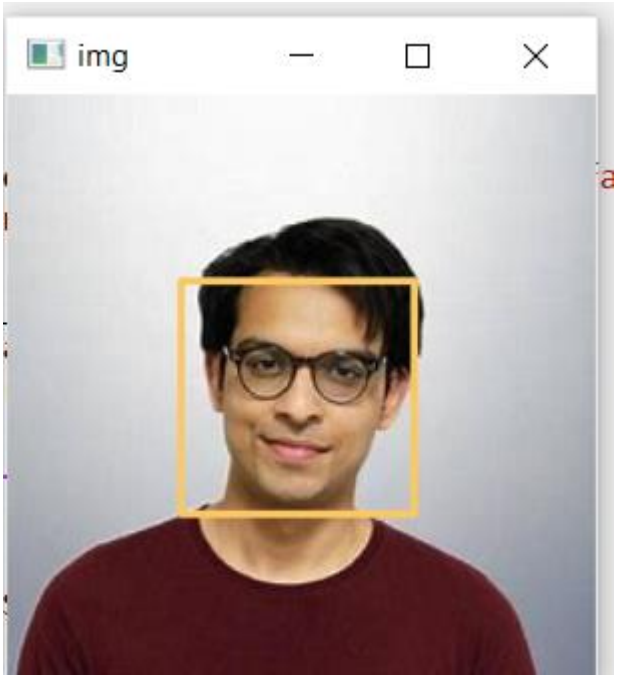
1) It initially detect full face instead of separate part of faces.

Application:

1) Recognize face from live streaming video.

Results





CONCLUSION

In conclusion, we have successfully built and deployed a human face recognition model using a convolutional neural network. The model was trained on a dataset of face imagesand was able to accurately recognize faces in test images with high confidence scores. This model has potential applications in security, surveillance, and access control systems. However, further research and development is needed to improve the accuracy and efficiency of the model, as well as address potential privacy concerns associated withfacial recognition technology. Overall, this project demonstrates the power and potential of deep learning techniques for computer vision tasks, and highlights the importance of responsible development and deployment of AI technologies