Dr.M.G.R.
Educational and Research Institute
(DEEMED TO BE UNIVERSITY)
(An ISO Certified Institution)
UNIVERSITY WITH SPECIAL AUTONOMY STATUS
Maduravoyal , Chennai - 600 095

REAL TIME FACE MASK DETECTION

MINI-PROJECT REPORT

submitted in partial fulfillment of the requirements
for the award of the degree in

BACHELOR OF TECHNOLOGY
in
COMPUTER SCIENCE AND ENGINEERING

By

DHRUV RAJ (191061101049)
ATHAR IMAM (191061101026)

DEPARTMENT OF
COMPUTER SCIENCE AND ENGINEERING

MAY 2022

DECLARATION FORMAT

We DHRUV RAJ (191061101049), ATHAR IMAM (191061101026)

hereby declare that the Mini Project Report entitled "**REAL TIME FACE MASK DETECTION**" is done by us under the guidance of **"Staff Coordinator1 & Staff Coordinator2"** is submitted in partial fulfillment of the requirements for the award of the degree in Bachelor of Technology in Computer Science and Engineering.

1. DHRUV RAJ
2. ATHAR IMAM

DATE:

PLACE: BIHAR

SIGNATURE OF THE CANDIDATE(S)

Dr. M.G.R.

Educational and Research Institute

Deemed to be University

E.V.R. Periyar High Road, Chennai - 600 095

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this Mini Project Report is the bonafide work of

Mr. DHRUV RAJ Reg. No 191061101049,

Mr. ATHAR IMAM Reg. No 191061101026, who carried out the mini-project entitled "**REAL TIME FACE MASK DETECTION**" under our supervision from Jan 2021 to May 2022.

Mini Project Coordinator 1	**Mini Project Coordinator 2**	**HoD**
Name	Name	Name
Designation	Designation	Designation
Department of CSE	Department of CSE	Department of CSE
Dr. M.G.R. Educational and Research Institute Deemed to be University	Dr. M.G.R. Educational and Research Institute Deemed to be University	Dr. M.G.R. Educational and Research Institute Deemed to be University

Submitted for Viva Voce Examination held on_____

Internal Examiner	**External Examiner**
(Name in Capital letters with Signature)	(Name in Capital letters with Signature)

ACKNOWLEDGEMENT

We would first like to thank our beloved Chancellor **Thiru A.C. SHANMUGAM, B.A., B.L.** and President **Er. A.C.S. Arunkumar, B.Tech., M.B.A.,** and for all the encouragement and support extended to us during the tenure of this project and also our years of studies in his wonderful University.

We express my heartfelt thanks to our Vice Chancellor **Prof. Dr. S. Geethalakshmi** in providing all the support of my mini Project.

We express my heartfelt thanks to our Head of the Department, **Prof. Dr. S. Geetha**, who has been actively involved and very influential from the start till the completion of our mini project.

Our sincere thanks to our Project Coordinators ---------- & ----------, for their continuous guidance and encouragement throughout this work, which has made the mini project a success.

We would also like to thank all the teaching and non-teaching staffs of Computer Science and Engineering department, for their constant support and the encouragement given to us while we went about to achieving my project goals.

CONTENTS

ABSTRACT

In the face of the COVID-19 pandemic, the World Health Organization (WHO) declared the use of a face mask as a mandatory biosafety measure. This has caused problems in current facial recognition systems, motivating the development of this research. This manuscript describes the development of a system for recognizing people, even when they are using a face mask, from photographs. A classification model based on the MobileNetV2 architecture and the OpenCv's face detector is used. Thus, using these stages, it can be identified where the face is and it can be determined whether or not it is wearing a face mask. The FaceNet model is used as a feature extractor and a feedforward multilayer perceptron to perform facial recognition. For training the facial recognition models, a set of observations made up of 13,359 images is generated; 52.9% images with a face mask and 47.1% images without a face mask. The experimental results show that there is an accuracy of 99.65% in determining whether a person is wearing a mask or not. An accuracy of 99.52% is achieved in the facial recognition of 10 people with masks, while for facial recognition without masks, an accuracy of 99.96% is obtained.

CHAPTER 1

1. INTRODUCTION

During pandemic COVID-19, WHO has made wearing masks compulsory to protect against this deadly virus. In this project we will develop a machine learning project – Real-time Face Mask Detector with Python.

We will build a real-time system to detect whether the person on the webcam is wearing a mask or not. We will train the face mask detector model using Keras and OpenCV.

Face recognition is a natural method of recognizing and authenticating people. Face recognition is an integral part of people's everyday contact and lives. The most effective approach for detecting a person's face is to use Python and a Convolutional Neural Network in deep learning. This method is useful in a variety of fields, including the military, defense, schools, colleges, and universities, airlines, banks, online web apps, gaming, and so on.

Face masks are now widely used as part of standard virus- prevention measures, especially during the Covid-19 virus outbreak. Many individuals or organizations must be able to distinguish whether or not people are wearing face masks in a given location or time. This data's requirements should be very real-time and automated. The challenging issue which can be mentioned in face detection is inherent diversity in faces such as shape, texture, color, got a beard\moustache and/or glasses and even masks.

From the experiments it is clear that the proposed CNN and Python algorithm is very efficient and accurate in determining the facial recognition and detection of individuals.

CHAPTER 2

2. REQUIREMENT ANALYSIS

2.1 FUNCTIONAL REQUIREMENTS:

2.1.1 Functional Requirements of Face Mask Dataset:

- The system must have an unbiased ‘with_mask’ dataset.
- The dataset must have over 1500+ images in both ‘with_mask’ and ‘without_mask’ classes.
- The dataset must not re-use the same images in training and testing phases.

2.1.2 Functional Requirements of Face Mask Detector:

- The system must be correctly able to load the face mask classifier model.
- The system must be able to detect faces in images or video stream.
- The system must be able to extract each face’s Region of Interest (ROI).
- There must not be any object between the system and the face of the user for a successful facedetection and hence the face mask detection.
- The end position of the face must be fit inside the webcam frame and must be closer to the camera.Correctly able to detect masks in ‘png’, ‘jpg’, ‘jpeg’, and ‘gif’ format images.
- The system must be able to detect face masks on human faces on every frame in a live video.The results must be viewed by showing the probability along with the output of ‘Mask’ or ‘NoMask’.

1.2 NON-FUNCTIONAL REQUIREMENTS:

2.2.1 Product Operation:

- The face should be localized by detecting the facial landmarks and the backgroundmust be ignored.
- The system will be implemented in Python script with an accuracy of the model ofover 90%.
- The user must not move his/her face out of camera's sight in order to get correctresults.
- The background must not be too bright or too dark while detecting the face mask.

2.2.2 Product revision:

- The system must be portable and can be applied to embedded devices with limited computational capacity (ex., Raspberry Pi, Google Coral, NVIDIA Jetson Nano, etc.).
- The output response operation must be fast and under 5 seconds per person.
- The system must be able to correctly detect more than one face if present, and hence the presence of mask in the frame

CHAPTER 3

3. DESIGN

3.1 TWO- PHASE COVID-19 FACE MASK DETECTOR

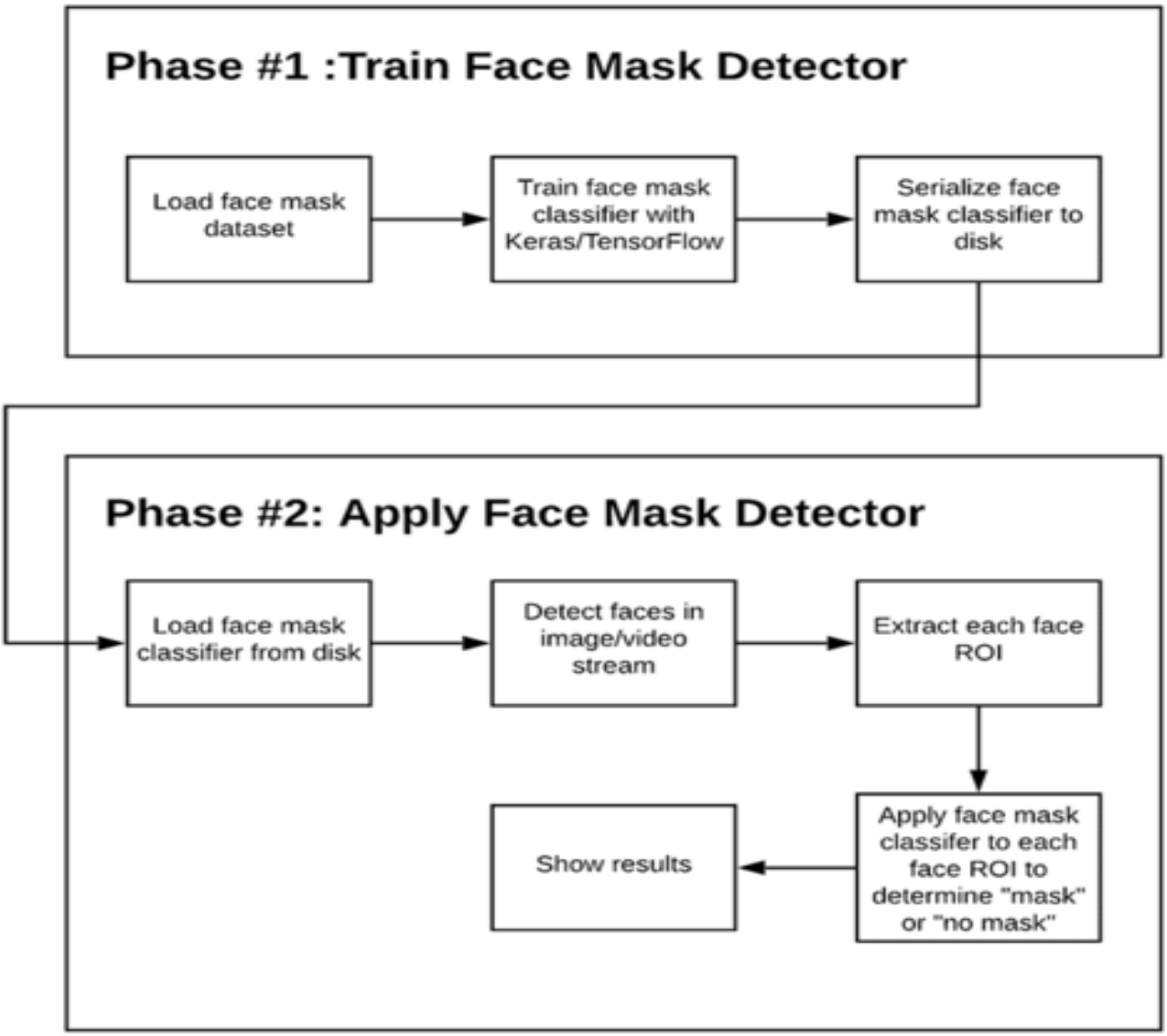

Figure 1.0

In order to train a custom face mask detector, we need to break our project into two distinct phases, each with its own respective sub-steps (as shown by **Figure 1.0** above):

3 **Training:** Here we'll focus on loading our face mask detection dataset from disk, training a model (using Keras/TensorFlow) on this dataset, and then serializing the face mask detector to disk

4 **Deployment:** Once the face mask detector is trained, we can then move on to loading the mask detector, performing face detection, and then classifying each face as `with_mask` or `without_mask`.

CHAPTER 4

4. IMPLEMENTATION

4.1 TWO MAIN APPROACHES FOR FACE DETECTION:

4.1.1 Feature Base Approach

Articles are generally perceived by their interesting highlights. There are numerous highlights in a human face, which can be perceived between a face and numerous different items. It finds faces by removing primary highlights like eyes, nose, mouth and so on and afterward utilizes them to identify a face. Regularly, some kind of factual classifier qualified then accommodating to isolate among facial and non-facial areas. Also, human countenances have specific surfaces which can be utilized to separate between a face and different articles. Also, the edge of highlights can assist with distinguishing the items from the face. In the coming segment, we will actualize a component based methodology by utilizing Open CV.

4.1.2 Image Base Approach

When all is said in done, Image-put together strategies depend with respect to procedures from factual examination and AI to locate the important qualities of face and non-face pictures. The learned qualities are as appropriation models or discriminant capacities that is thus utilized for face location. In this technique, we utilize various calculations, for example, Neural-organizations, HMM, SVM, AdaBoost learning. In the coming area, we will perceive how we can distinguish faces with MTCNN or Multi-Task Cascaded Convolutional Neural Network, which is an Image-based methodology of face identification.

CHAPTER 5

5 SUMMARY AND CONCLUSION

Our proposed system can detect and recognize human face(s) in real-time world. Compared to the traditional face detection and recognition system, the face detection and recognition based on CNN model along with the use of Python libraries has shorter detection and recognition time and stronger robustness, which can reduce the miss rate and error rate.

It can still guarantee a high test rate in a sophisticated atmosphere, andthe speed of detection can meet the real time requirement, and achieve good effect. The proposed CNN model shows greater accuracy and prediction for detecting and recognising human faces. The results show us that the current technology for face detection and recognition is compromised and can be replaced with this proposed work.

Therefore, the proposed method works very well in the applications of surveillance.

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