



LIGHTWEIGHT AI BASED FACEMASK DETECTION TOOL



TEAM MEMBERS

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Abstract

With the pandemic having such a widespread impact on the globe there is a great need for all of us to wear masks. The latest forecast from the Institute of Health Metrics and Evaluation suggests that 33,000 deaths could be avoided by October 1 if 95 percent of people wore masks in public. However, intentionally or unintentionally we seem to remove our masks while entering public places. This tool will be able to detect if a person is wearing a mask properly covering the vital areas of nose and mouth with a data set that we plan to find online. Then based on the results of the AI we will be able to trigger further actions such as open the door, or send an alert message saying that the either mask isn't worn properly or not worn at all.

Problem Statement

- Over 40% people people in a democratic don't wear masks. 70% of those who wear masks wear it incorrectly and mouth and nose are exposed.
- Surveillance by security guards in all regions is not feasible. Employing so many guards is not a issue but managing each security guard is uneconomic as well as includes excess manpower and hierarchical systems.
- Guards may not miss out people without masks but it is a possibility that they may not consider vital spots that mask should properly cover.
- It is not possible to make guards do manual surveillance as it poses a risk and is time-consuming.

Scope & Objectives



LIGHT-WEIGHT AND QUICK FACE
DETECTION AND ANALYSIS.



CAN BE INTEGRATED WITH
SECURITY CAMERAS AND
MICROPHONES TO GIVE ALERTS.



REAL-TIME MONITORING.

Introduction And Proposed System

- Through this proposed Face mask recognition software, we aim to track and precisely compute the % of face covered by mask and classify it as safe or unsafe, among some other options.
- Then based of the results of the AI we will be able to trigger further actions such as open the door, or send an alert message saying that the either mask isn't worn properly or not worn at all.
- We are going to use video stream in real-time using and will use photos as data set.
- The tool will be able to generate the output(with mask/without mask) without the need of storage of the video stream.

Literature Survey

- The forecast shows 179,106 deaths (with a range of 159,497 to 213,715). Those numbers drop to 146,047 (with a range of 140,849 to 153,438), if at least 95 percent of people wear masks in public.
- New IHME COVID-19 Model Projects Nearly 180,000 US Deaths
- However, high levels of mask wearing could reduce forecasted deaths by nearly 33,060
- An experiment using high-speed video found that hundreds of droplets ranging from 20 to 500 micrometers were generated when saying a simple phrase, but that nearly all these droplets were blocked when the mouth was covered by a damp washcloth. Another study of people who had influenza or the common cold found that wearing a surgical mask significantly reduced the amount of these respiratory viruses emitted in droplets and aerosols.
- Thus the need of masks is extremely high especially in today's times and thus the motivation for creating such a tool came about

Literature Survey- Proposed system

The work we propose to do refers a research paper that proposes a real-time face mask detection system by applying computer vision and machine learning concepts like convolution neural networks (CNN) and refined Mobile Net V2 architecture to ease the deployment of the proposed model in embedded devices with limited computational capability.

The data set utilized here contains about 12000 images (6000 with mask 6000 without mask).The model is trained using Adam optimizer algorithm which is best suited for deep learning models and is built using keras , TensorFlow and open CV.

The proposed model touches 99% accuracy under various training to testing ratios like 70% training and 30% testing 50% training and 50% testing etc. Precision , recall,F1 score support are calculated for all trials.

This means that the system is computationally effective and could potentially be used in places like railway stations , airports , ATMs and other public places to detect people not wearing face mask and ensure the safety to certain extent in this pandemic.

If our system is able to detect that the person does not wear mask a small speaker or other such hardware devices could be used and an alert message could be sent or an alert audio could be played in front of the person to alert on notify the person to wear the mask.

System Requirements

Development environment

- Laptop with following software
 - Python
 - Jupyter Notebook
 - Tensorflow
 - Keras
 - Numpy
 - MobilenetV2
 - OpenCV
 - Frontal Face Classifier API

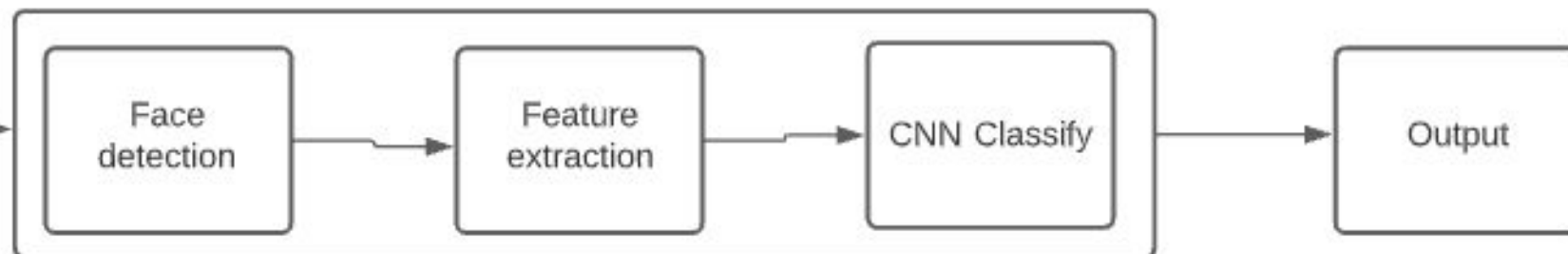
Hardware Requirements

- Configured GPU (optional)
- Webcam

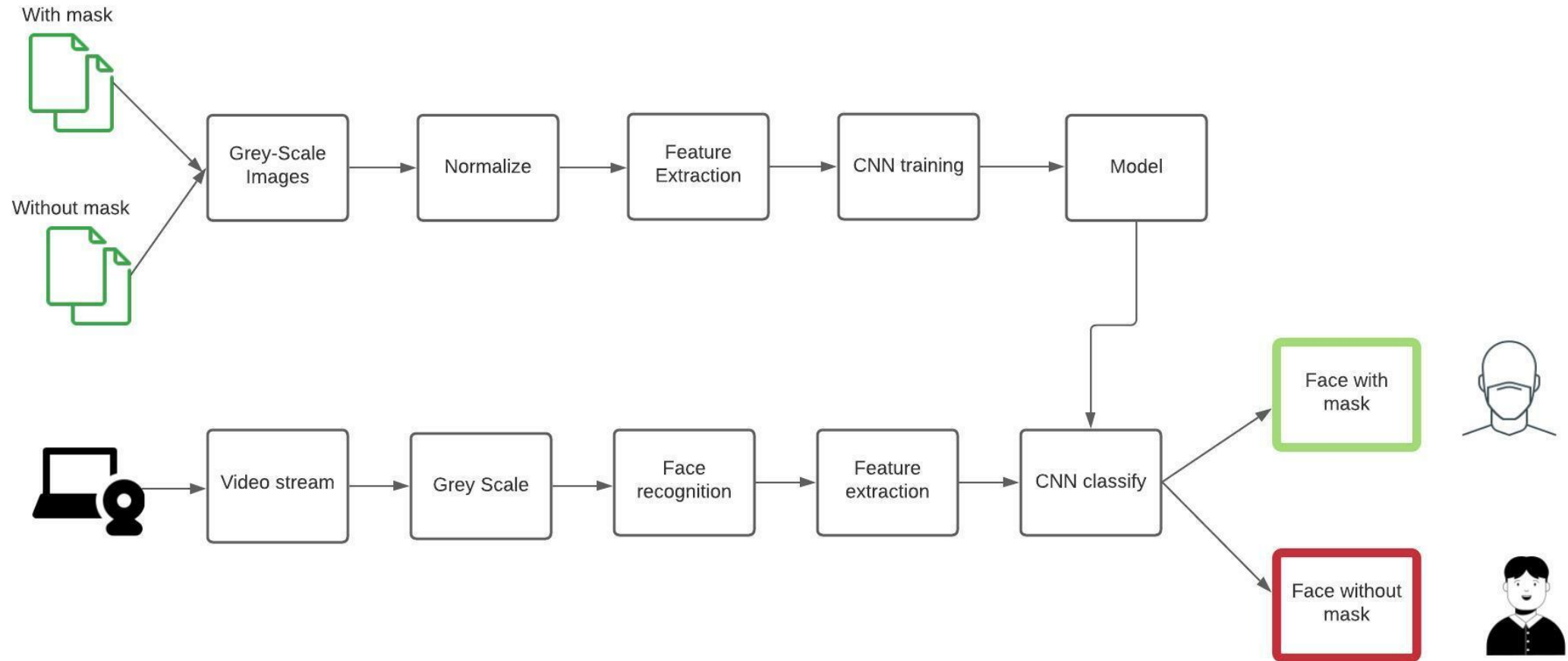
System Architecture

Face mask recognition

Video Stream



System Design



System Implementation

List of modules

1. DataSet
 1. With mask
 2. Without mask
2. Face Detection essentials
 1. Contains data models that capture and identify important features of a human face
3. Data Preprocessing
4. Train model
5. Model
6. Detect face mask

References

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4. <https://keras.io/api/applications/mobilenet/>
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6. <https://www.tensorflow.org/guide>