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MINI PROJECT SYNOPSIS

On

"FACE MASK DETECTION"

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Abstract

The new Coronavirus disease (COVID-19) has seriously affected the world. By the end of November 2020, the global number of new coronavirus cases had already exceeded 60 million and the number of deaths 14,10,378 according to information from the World Health Organization (WHO). To limit the spread of the disease, mandatory face-mask rules are now becoming common in public settings around the world. Additionally, many public service providers require customers to wear **face masks** under predefined rules (e.g., covering both mouth and nose) when using public services. These developments inspired research into automatic (computer-vision-based) techniques for face-mask detection to help monitor public behavior and contribute to constraining the COVID-19 pandemic. Although existing research in this area resulted in efficient techniques for face-mask detection, these usually operate under the assumption that modern face detectors provide perfect detection performance (even for masked faces) and that the main goal of the techniques is to detect the presence of face-masks only.

INTRODUCTION

Face-mask detection represents both detections as well as a classification problem because it requires first the location of the faces of people in digital images and then the decision of whether they are wearing a mask or not.

Example images from the MAFA dataset.

All the presented examples are labeled as masked faces, while only the ones marked green have correctly placed masks. In this work, we compile a dataset of masked faces, annotate it manually concerning the mask placement, and then build a computer vision model for the detection of properly worn face-masks.

PROBLEM STATEMENT

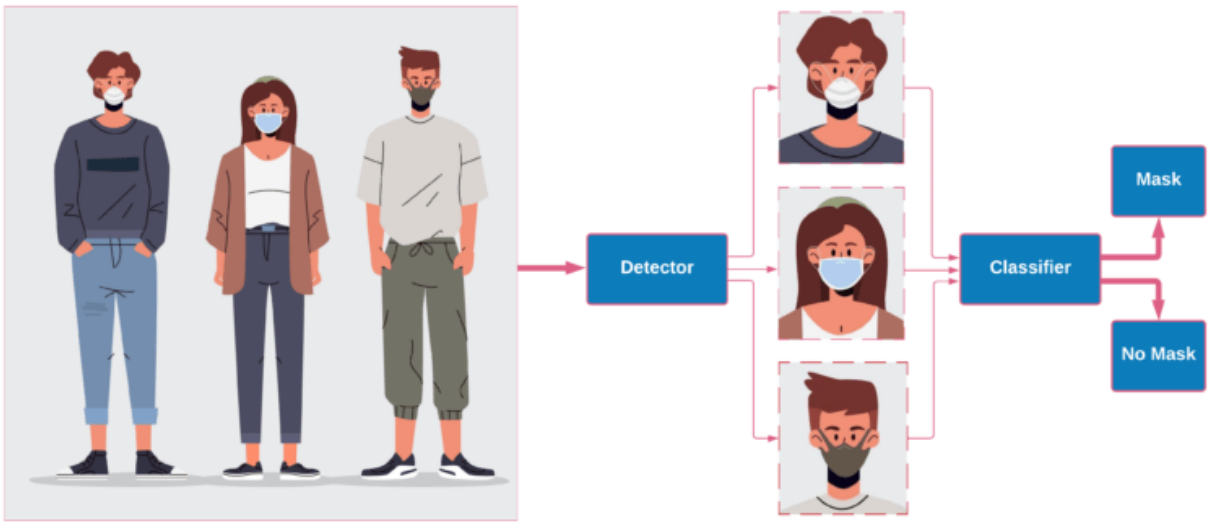
Detect people that pass through a security-like camera and identify their face mask usage.

LITERATURE SURVEY

- **Real-time Face Mask Detection and Tracking using OpenCV,** International Journal of Soft Computing and Artificial Intelligence, ISSN: 2321-404X, Volume-2, Issue-1, May- 2014
  "MAMATA S. KALAS"
- **Face Recognition: A Literature Survey** by
  "W. ZHAO - Sarnoff Corporation, R. CHELLAPPA - University of Maryland, P. J. PHILLIPS - National Institute of Standards and Technology and A. ROSENFELD - University of Maryland"
- **An Automated System to limit COVID-19 using Facial Mask Detection in the smart city network** by
  "MOHAMMAD MARUFUR RAHMAN, JONG-HOON KIM, SAIFUDDIN MAHMUD, Md. MOTALEB HASSEN MANIK"
- **Face Mask Detection in the Era of COVID-19 Pandemic by**
  "SAMUEL ADY SANJAYA, SURYO ADI RAKHMAWAN"
- **SSDMNV2: A real-time DNN-based face mask detection system using a single shot multi-box detector by**
  "PREETI NAGRATH, RACHNA JAIN, AGAM MADAN"
- **Covid-19 Facemask Detection with Deep Learning and Computer Vision** by
  "R SUGANTHALAKSHMI, A HAFEEZA, P ABINAYA, A GANGA DEVI"

MOTIVATION OF THE PROJECT

Several online sources for face mask detection are currently available on the internet. These systems can detect face masks in videos where people are placed in front of the camera. Since no dataset annotated for face mask detection is currently available, a model cannot be trained to detect faces and do a mask/ no mask classification simultaneously. Thus, most current solutions divide the face mask detection system into two sub-modules; 1- the face detector and 2- the mask/ no mask classifier. The detector detects faces in the video stream, regardless of wearing a mask or not, and then outputs bounding boxes that identify the faces' coordinates. Next, the detected faces are cropped and passed to the classifier. Finally, the classifier decides if the cropped face is wearing a mask or not.



We were curious about building a face mask detector that can generalize well to real-world data. We tried different datasets with several detectors and classifiers to come up with the right solution. No mask dataset and build a face mask classifier that can work well on real-world data.

OBJECTIVE AND SCOPE OF THE PROJECT

- Check Individuals And Crowds Wearing Masks In Public.
- Use Digital Screens To Remind Visitors To Wear Masks.
- Alert Staff When No Masks Are Detected - Distress Signal deployment.
- Works With Existing USB Or IP Cameras With RTSP Streams.
- Anonymous & Spoof Proof.

METHODOLOGY

The classification of the images is done by training the model in 2 phases:

Phase 1: The face mask dataset is loaded into the system. A classifier like **Haar Cascade** is used to generate a trained model.
Phase 2: Load the face mask classifier model.

Detect faces in the images/video stream. Apply the classifier to each face. Classify the images to be With Mask and Without Mask.

This system may then be interfaced with
Case 1: Existing access control system so that violators can be restricted.
Case 2: There could be some scenarios in workplaces where,
people may forget or just put off the mask when it becomes uneasy for them to get accustomed to the new face masks. In such cases, alarm by the system may be disturbing other workers. Hence the concerned authorities can take proper measures to alert the user so that they can wear the mask again.

HARDWARE REQUIREMENTS

- Desktop or Laptop with Windows/Linux/macOS having specs:
  - 4 GB RAM (or higher).
  - Minimum of 2 GB of memory (HDD or SSD).
  - High-speed Internet Connection.
  - Integrated or a separate Webcam.
  - Graphics Card 512 MB (or higher).
- Facemasks for testing.

SOFTWARE REQUIREMENTS

- Python IDE (Spyder or PyCharm).
- pip installer to install modules.
- Modules like TensorFlow, Keras, NumPy, CV2, etc.
- Haar Cascade Classifier and SVM algorithm

CONTRIBUTION OF THE PROJECT

Since the COVID-19 pandemic has created a lot of chaos, wearing masks and preventing the spread of the virus should be one's top priority. In social gatherings, people usually tend to loosen their masks for their comfort. This increases the spread of the virus.

It requires a lot of manpower to control the crowd and check if they're wearing masks properly or not. Instead, we can use this project to alert the staff so that they can make people wear masks properly or keep a penalty so that people wear them properly. This reduces the spread of the virus which in turn brings an end to this pandemic.

REFERENCES

1. World Health Organization. Coronavirus Disease (COVID-19): Advice for the public.
2. Centers for Disease Control and Prevention. Considerations for Wearing Masks.
3. TensorFlow Documentation.