JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue

JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

An International Scholarly Open Access, Peer-reviewed, Refereed Journal

NOVEL REALTIME FACE MASK DETECTION USING MACHINE LEARNING TECHNIQUES TO CONTROL COVID 19

[1]Satya Kiranmai, [2]Kratika Sharma

[1]IT Department, Chaitanya Bharathi Institute of Technology(A), Hyderabad, Telanga, India
tskiranmai_it@cbit.ac.in[1]

[2]IT Department, Chaitanya Bharathi Institute of Technology(A), Hyderabad, Telanga, India
kratikasharma_it@cbit.ac.in[2]

Abstract : At present time i.e., during covid pandemic, people are more negligent about wearing masks and maintaining social distance from others. As people fail to look after wearing masks, we can see there is a rise in cases, this leads to risk factors for human life. To overcome this problem people should not be missed wearing masks and our project is about face mask detection i.e., it analyses the people who are wearing masks and who are not. This project can be used in various places i.e., at the mall entrances or airports, exhibitions, public transport where the crowd gets accompanied. We can figure out whether the person is putting on a mask or not. This project uses the Convolutional Neural Network (CNN) model. We first train our system to recognize the people who are wearing masks and who are not and this can be achieved by giving the large number of inputs and testing it by giving new faces with masks and without masks.

***IndexTerms* - COVID-19 pandemic, Face mask detection, Object recognition, Machine learning, Environment safety.**

I. INTRODUCTION

Face mask detection, as the name suggests this project refers to detecting whether the person is wearing a mask or not. At present, it has been necessary to wear a mask to protect oneself from COVID - 19.As people are becoming negligent to wear a mask, this causes a rise in COVID cases . To address this situation this project brings great relief. This project helps in many places where the crowd assembling is more such as airports, exhibitions, malls, theatre etc.

1.1 MOTIVATION

The motivation of taking up this project - **"FACE MASK DETECTION"** is to contribute to society for easing the work of the front-line workers like cops to figure out the people wearing mask and without masks in absence of their presence. This project helps in many places where the crowd is more such as malls, exhibitions, education institutes etc.

1.2 OBJECTIVE OF THE PROJECT

The year 2020 has shown the fear of COVID-19 in the eyes of people. This pandemic made people maintain physical distance from each other and wear a mask to protect their life. To monitor the people following the basic rules is the objective of this project.

As monitoring large groups of people in public areas, we introduced a Face Mask Detection model which uses a camera to detect people wearing and not wearing masks. The first step to detect the person wearing a mask or not is to detect the face, which makes the strategy divided into two parts : to detect faces and to detect masks on those faces.

1.3 PROBLEM STATEMENT

At present, it has been important to wear a mask to protect oneself from the covid-19. As people are becoming negligent to wear a mask, this causes rise in covid cases. To address this situation this project brings great relief. As it is difficult for human beings to check whether people are wearing masks or not, this project eases our work. The Face Mask Detection helps in identifying or differentiating people wearing masks and without masks. This project helps in many places where the crowd assembling is more such as airports, exhibitions, malls, theatre, education institutions etc.

II. EXISTING SYSTEM

Face mask detection is a subgroup of image object recognition that comes with image processing algorithms. Digital image processing can be classified into two categories: traditional image processing and deep learning AI based image analysis. As opposed to traditional image analysis, which uses complex formulas to recognize and interpret pictures, deep learning-based approaches utilize models that mimic the workings of the human brain. The year 2020 shown us some mind-boggling series of events amongst which the COVID-19 pandemic is the most life changing event which has startled the world since the year began. Affecting the health and lives of masses, COVID-19 has called for strict measures to be followed in order to prevent the spread of disease. From the very basic hygiene standards to the treatments in the hospitals, people are doing all they can for their own and the society's safety; face masks are one of the personal protective equipment. People wear face masks once they step out of their homes and authorities strictly ensure that people are wearing face masks while they are in groups and public places. Loey et al. [1] introduced a face mask detection model that works on deep transfer learning and classical ML classifiers (classical ML classifiers refer to the ML algorithms that work on handcrafted extracted and engineered features from the input data). They used the Residual Neural Network (ResNet 50) algorithm for feature extraction. The extracted features were then used to train three classical ML algorithms, i.e., Support Vector Machine (SVM), Decision Tree (DT), and Ensemble Learning (EL). Three different face mask datasets have been used in the study for the investigation, i.e., (i) Real-World Masked Face Dataset (RMFD), (ii) Simulated Masked Face Dataset (SMFD), and (iii) Labeled Faces in the Wild (LFW) dataset. Finally, the trained classifiers were tested for possible face mask detection. During the testing experiment, the SVM classifier achieved the highest detection accuracies as compared to DT and EL classifiers. In RMFD and SMFD, it achieved and detection accuracies, respectively, while, in the case of LFW, it achieved 100% detection accuracy.

III. PROPOSED METHODOLOGY

The system architecture is divided into two stages. The first step of our design includes a Face Detector, which locates several faces in photos of varying sizes and finds faces even in interlaced settings. The detected faces (ROI) are then grouped together and sent to stage 2 of our architecture, a CNN model for masked or non-masked Face Classification. The Stage 2 results are then post-processed, yielding an image with all of the faces correctly located and classified as masked or unmasked faces.

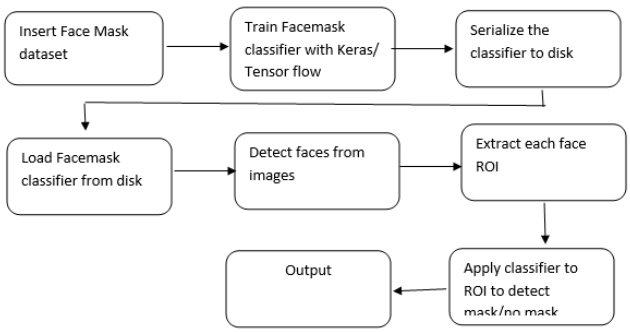

Fig.1. System Architecture

A face detector is the first stage of our system. As an input, this stage receives a raw RGB image. The face detector extracts and outputs all the faces detected in the image, as well as their box coordinates. Our design relies on the ability to reliably recognize faces. A reliable face detector necessitates a large amount of high-quality data, plenty of time, and adequate computing resources. For speedy generalization and consistent identification, we chose a pre-trained model that was trained on a large dataset.

Dataset:

We acquired the photographs for masked and unmasked faces and generated our datasets using data from other publically available datasets as well as data scraped from the internet. Images were masked and taken from the real world. Considered the Face Mask Detection dataset from Kaggle.

For the second stage, three CNN classifiers were trained to categorize photos as masked or unmasked faces. Keras was used to create our models. Instead of using Xavier Initialization, we used ImageNet weights as our initial weights. The dataset was partitioned into training, cross validation, and testing sets using an 80:10:10 ratio. To supplement the data, the Image Data Generator class in Keras was employed. The input image was 224 by 224 pixels in size.

Fig.2. Kaggle dataset Sample images

IV. RESULTS AND DISCUSSION

The accuracy in this paper by using proposed model is about 93.14 when the number of complete passes through the training dataset or Epochs equals 10.

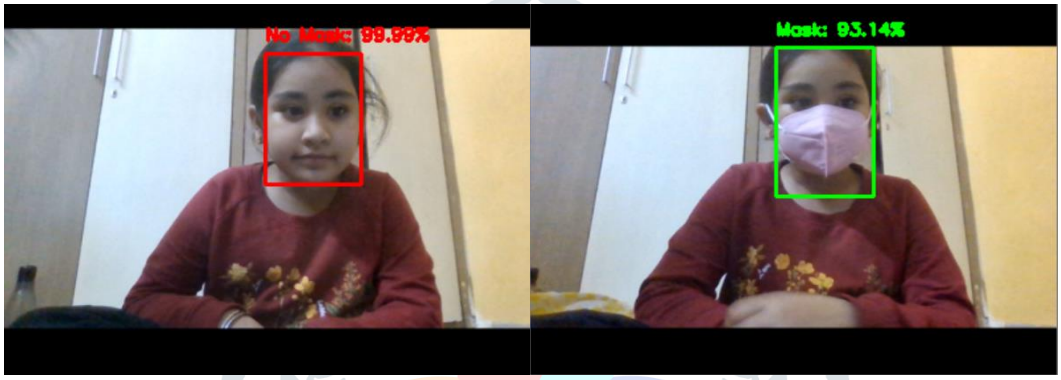

Fig 3: The result will be show at the screen as a rectangle frame that detect a face, text, and percentage of accuracy.

V. CONCLUSION

The proposed approach has satisfied its results. As the results are fruitful the system can predict or differentiate people with and without masks, it can be used for real time problems i.e. in this pandemic. This project not only able to differentiate people wearing mask or not but also it gives the accuracy of how the mask is worn i.e. it can tell if the person wore the mask properly or not. This project can be used in the crowd as it can figure out the people wearing masks or not who are in front of the camera at the same time. We can conclude that the project - "FACE MASK DETECTION" works in real time and is very useful in the present situation.

VI. REFERENCES

[1] M. Loey, G. Manogaran, M. H. N. Taha, and N. E. M. Khalifa, "A hybrid deep transfer learning model with machine learning methods for face mask detection in the era of the COVID-19 pandemic," Measurement, vol. 167, article 108288, 2021.

[2] Dostdar Hussain, Muhammad Ismail, Israr Hussain, Roobaea Alroobaea, Saddam Hussain, Syed Sajid Ullah, "Face Mask Detection Using Deep Convolutional Neural Network and MobileNetV2-Based Transfer Learning", Wireless Communications and Mobile Computing, vol. 2022, ArticleID 1536318, 10 pages, 2022. https://doi.org/10.1155/2022/1536318

[3] Sroison, Pornphat (2022): Face Mask Detection using Machine Learning. TechRxiv. Preprint. https://doi.org/10.36227/techrxiv.19549546.v

[4] Keras as a simplified interface to TensorFlow: tutorial

[5] https://ieeexplore.ieee.org/document/9216386

[6] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3925736

[7] https://www.youtube.com/watch?v=Ax6P93r32KU&t=844s

[8] https://github.com/balajisrinivas/Face-Mask-Detection

[9] An Automated System to Limit COVID-19 Using Facial Mask Detection in Smart City Network | IEEE Conference Publication | IEEE Xplore

[10] https://www.pyimagesearch.com/2020/05/04/covid-19-face-mask-detector-with-opencv-keras-tensorflow-and-deep-learning/