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# FACE MASK DETECTION USING OPENCV

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**ABSTRACT:** The COVID-19 pandemic is causing a worldwide emergency in healthcare. Thisvirus mainly spreads through droplets which emerge from a person infected with coronavirus and poses a risk to others. The risk of transmission is highest in public places. Oneof the best ways to stay safe from getting infected is wearing a face mask in openterritories as indicated by the World Health Organization (WHO).In this project, we propose a method which employs Tensor Flow and Open CVto detect face masks on people. A bounding box drawn over the face of the persondescribes weather the person is wearing a mask or not.

## 1. INTRODUCTION

COVID-19 had a massive impact on human lives. The pandemic lead to theloss of millions and affected the lives of billions of people. Itsnegative impact wasfelt by almost all commercial establishments, education, economy, religion,transport, tourism, employment, entertainment, food security and other industries.According to WHO (World Health Organization), 55.6 million people were infectedwith Coronavirus and 1.34 million people died because of it as of November 2020.This stands next to black death which almost took the lives of 60 percent ofpopulation in Europe in the 14th century. After the person gets infected, it takesalmost fourteen days for the virus to growin the body of its host and affect themand in the meantime, it spreads to almost everyone who is in contact with thatperson. So, it is extremely hard to keep the track of the spread of COVID-19.

With the nationwide lockdowns being lifted, it has become even harder totrack and control the virus. Face masks are an effective method to control the spreadof virus. It had been found that wearing face masks is 96% effective to stop thespread of virus. The governments, all over the world, have imposed strict rules theeveryone should wear masks while they go out. But still, some people may notwear masks and it is hard to check weather everyone is wearing mask or not. Insuch cases, computervision will be of great help.

## 2. LITERATURE SURVEY

In [1] the authors used PCA (Principal Component Analysis) method to identify faces with masks, which is essential in the field of security. This is one of the few works whichconcentrated on detection of human faces where they arewearing masks. They found that the accuracy in human face detection decreases by 70% when a face mask is present. In [2] the authors have developed a method to identify how aperson is wearing the face mask. They were able to classifythree categories of facemask-wearing condition namelycorrect facemask-wearing, incorrect facemask- wearing, andno facemask-wearing. This method achieved over 98%accuracy in detection.

In [3], the researchers proposed a method for theidentification of faces using Generalized Intersection over Union (GIoU) based on Mask R-CNN. They

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proposed thismethod to reduce the background noise by correctly identifying the face instead of bounding box which adds noiseto the face features and reduces the accuracy of detection.

Nicolae-CătălinRistea, Radu Tudor Ionescu [4] proposed anovel data augmentation approach for mask detection fromspeech.Original and translated utterances were changed overinto spectrograms were given as inputs to a bunch of Res Netneural organizations with different depths. In [5] the authors have employed a GAN-based network using twodiscriminators for the removal of face mask from a face and Reconstruct the face without the face mask using the Celeb A dataset.

## 3. EXISTING SYSTEM

Added information to present similar content for masks and respirators. Clarified that people can choose respirators such as N95s and KN95s, includingremoving concerns related to supply shortage forN95s. Clarified that "surgical N95s" are a specific type of respirator for health care settings. Clarified that some types of masks and respiratory provide more protection to the wearer than others. The COVID19 pandemic is the most immensely colossal life- transmuting eventthat has stunned the world since the year commenced, according to the year'scalendar.

COVID-19, which has impacted the health and lives of many people, has inductively authorized astringent procedures to be taken to avert the spread ofillness. Individuals do everything they can for their personal and hence the form themost rudimental hygienic standards to medical treatments, society's safety isparamount; face masks are one of the private protective instruments. Face masksare worn when individuals leave their homes, and officials rigorously enforce thewearing of face masks in groups and public areas.

## 4. PROPOSED SYSTEM

Identification is proposed which to surmount the drawbacks of the subsisting system, the proposed system has beenevolved. This projects aim is to monitor that people are following the rudimentarysafety principles. This is done by developing a face mask detector system.In order to predict whether a person has put on a mask, the model requires learningfrom a well-curated dataset, as discussed later in this section. The model usesConvolution Neural Network layers (CNN) as its backbone architecture to createdifferent layers. Along with this, libraries such as Open CV, Keras, and Streamlet are also used. The proposed model is designed in three phases: Data pre-processing, CNNmodel training and Applying face mask detector.

## 5. METHODOLOGY

In the authors used PCA (Principal Component Analysis) method to identifyfaces with masks, which is essential in the field of security This is one of the fewworks which concentrated on detection of human faces where they are wearing masks.They found that the accuracy in human face detection decreases by 70% when a face mask is present.

In the authors have developed a method to identify how a person is wearing theface mask. They were able to classify three categories of facemask- wearing condition namely correct facemask-wearing, incorrect facemask- wearing, and no facemask-wearing. This method achieved over 98% accuracy in detection

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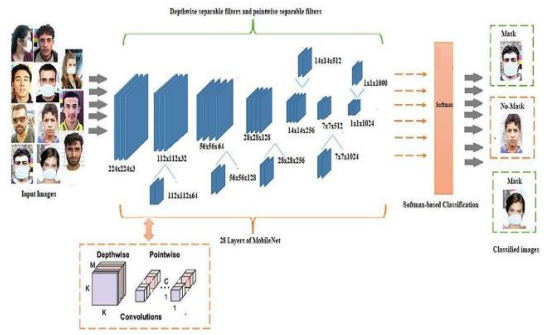


**Fig:** System Architecture

## 6. IMPLEENTATION

### DATASET COLLECTION:

Dataset Collected from COCO Dataset which gives free and livelyimages.

### PREPROCESSING

Preprocessing on images is done to convert image objects into RGB arrays.Then the array is resized to (299,299, 3).Preprocessing in the caption isperformed to make sentences that were previously in the form of the word intoa sequence oftokens based on a unique word index in the dictionary. At thetraining phase, the model has two inputs.The first input is an image feeding into the pre-trainedInception-v3 modelwith the removed output layer and will outputting extracted images features.

### TRAINING THE IMAGES

The inception V3 model is employed as the encoder to extract CNNfeatures of the target imageand the training images. During the training stage,CNN features of the training images under the proposed weighted likelihoodobjective is identified. In the generation stage, the trained GRU plays as adecoder role, which takes the CNN features of the target image as input andgenerates identification of the images.

## 7. CONCLUSION &FUTURESCOPE

With the increasing number of COVID cases all over the world, a system toreplace human to check masks on the faces of people is greatly needed. This systemsatisfies that need. This system can be employed in public places likerailway stationsand malls. It will be of a great help in companies and huge establishments where therewill be a lot of workers. This system will be of a great help there becauseit is easy toobtain and store the data of the employees working in that Company and will very easyfind the people who are not wearing the mask and a mail will have sent to that respectiveperson to take Precautions not wearing mask.

### FUTURESCOPE:

To deploy this system at locations of mass populations remotely so as to maintainthe observations of rules and regulations in a strict manner.To integrate the system with a GSM module so that it can raise an alert to theauthentication if mass violation happens.

**Public Spaces:** With the ongoing pandemic, the need for face mask detection systems inpublic spaces has become more critical than ever before. Open CV-based face mask detection systems can be installed in malls, airports, hospitals, and other public spaces toensure that people are following proper safety protocols.

**Transportation:** Face mask detection systems can also be used in transportation settingssuch as trains, buses, and airports to ensure that passengers are wearing masks beforeboarding.

**Offices and Workplaces:** Open CV-based face mask detection systems can be installed inoffices and workplaces to ensure that employees are following safety protocols while atwork.

**Education:** Schools and universities can install face mask detection systems to ensure thatstudents and staff are following safety guidelines.

**Sporting Events**: Face mask detection systems can be installed at sporting events to ensurethat spectators are wearing masks while watching the game.

In addition, the use of Open CV-based face mask detection systems can help to reduce thespread of COVID-19 and other

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infectious diseases by enforcing safety protocols in publicspaces. As technology continues to evolve, there is a growing need for reliable and efficientface mask detection systems, and Open CV is poised to play a significant role inmeeting this demand.

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