Wear A Mask…. Don't Make Us Ask

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Abstract – *With so much Said, Read and Written about the unprecedented times that this world has experienced recently, it is ambiguous that we approach a more rational and scientifically secured way for the larger communities which can benefit the society in the longer regime. Having said that it is worthwhile that we device a robust and standard tool of dealing similar situations in future. One such robust tool is the Face Mask detection tool.*

Key Words: Robust tool, Face Mask Detection, HAAR CASCADE, COVID-19, Real-Time, Deep Learning
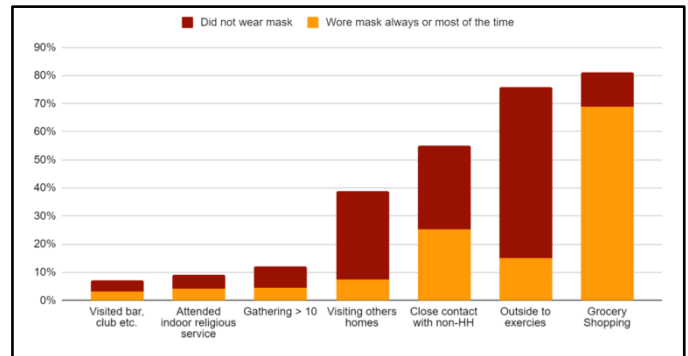
1. INTRODUCTION

As we all know that after the breakout of the worldwide pandemic COVID-19, it has drastically affected the lives of every person living. The world is fighting with Covid19 pandemic. There are so many essential types of equipment needed to fight against Corona virus. One of the initial necessity is Face Mask. Initially there was a much relaxed approach regarding the utility of face mask, however in the eventuality of ever increasing case load of infections it was made a mandatory doctrine by the **WHO** to use a face mask as the first line of defense in combating this vicious disease. Now, it becomes important that this is religiously followed across all the sections of the society. This is where our tool comes handy to detect whether a person is wearing Face Mask or not as we will use **Face Mask Detection Technique**. Face Mask Detection Platform utilizes Artificial Network to perceive if a person does/doesn't wear a mask. Our project will use Machine Learning platform to detect the face of peoples. Machine Learning is software for object detection. A new mask detection project is wishing to have a scope in the upcoming days that will be beneficial for everyone to fight with this pandemic. This project will be easy to use and implement.

1.1 AIM AND OBJECTIVE

During pandemic COVID-19, WHO has made wearing masks compulsory to protect against this deadly virus. In this project we will show a machine learning Real-time Face Mask Detector with Python. The main aim of this project is to ensure increased utility of Face Mask by using the mask detection technique.
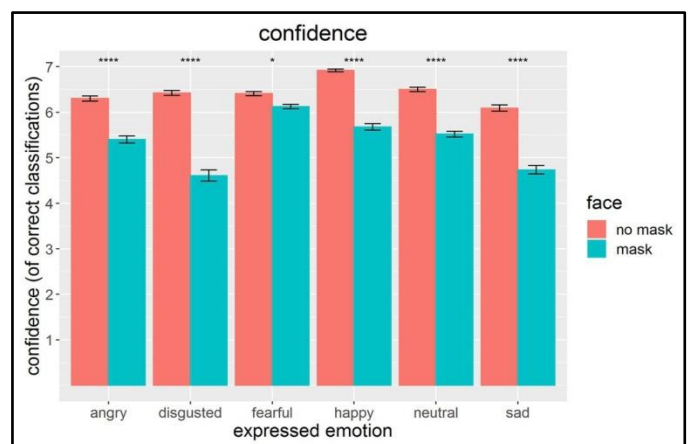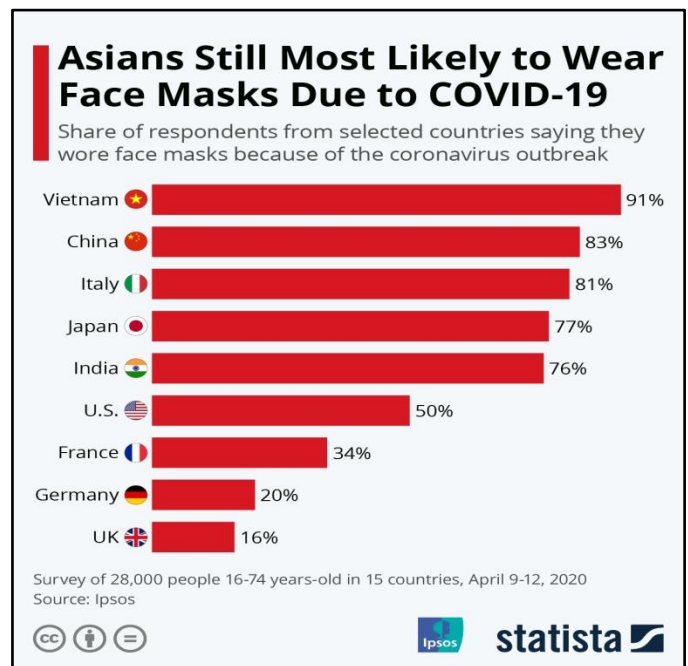
1.2 PROBLEM STATEMENT

People think that their area is safe or has only a few infections and visit shops, apartments, and other premises without wearing mask. Even some of the security guards don't alert people for wearing mask. If you look at the people in videos captured by CCTV cameras, you can see that the faces are small, blurry, and low resolution. People are not looking straight to the camera, and the face angles vary from time to time. These real-world videos are entirely different from the videos captured by webcams or selfie cameras, making the face mask detection problem much more difficult to practice.

2. RELATED WORKS

There are several applications of face mask detection. Which includes the applications which are specific to Covid-19 and others are not related to Covid-19. So let us take a look at all the applications of Face Mask Detection.

2.1- Metro
We have seen on many metro station there is a huge crowd to onboard the train and people would eventually come near each other to board the train, anyhow there will be more security around social distancing but people wearing mask will be most paramount one and to detect this we can use existing camera in trains and platform to take care of violators who are not wearing a mask.

2.2- Airports
The Face Mask Detection System can be utilized at airports to recognize tourists/individual without veils. Face information of tourists can be caught in the system at the passageway. On the off chance that a tourist is seen as without a face cover, their image is sent to the airport authorities so they could make fast move. If the individual's face is stored in the database, for example the face of any worker of an airport, an alert can be sent to the person's phone directly.

2.3- Offices
The Face Mask Detection System can be utilized at office area to recognize if employees are keeping up safety standards at work. It screens employees without masks and sends them a suggestion to wear a cover. The reports can be downloaded or sent via an email toward the day's end to catch individuals who are not consenting to the guidelines or the prerequisites. This ensures complete adherence to the security protocol.

2.4- Educational Institutes
In educational institutes especially where the number of children is more, it is highly recommended to wear face mask for children. Now sometimes due to ignorance and lack of knowledge this is not taken seriously among children's which results in a very dangerous situation for them as it may tends to increase the viral infection. So if we can use face mask detection in classrooms it will yield a great result.

3. METHODS

This project "Face Mask Detector" is developed using multiple approach as follows –

3.1. Anaconda: Anaconda is a distribution of the Python and R programming languages for scientific computing (data science, machine learning applications, large-scale data processing, predictive analytics, etc.), that aims to simplify package management and deployment. The distribution includes data-science packages suitable for Windows, Linux, and macOS. It is developed and maintained by Anaconda, Inc., which was founded by Peter Wang and Travis Oliphant in 2012.

3.2 HAAR CASCADE: Object Detection using Haar feature-based cascade classifiers is an effective object detection method proposed by Paul Viola and Michael Jones in their paper, "Rapid Object Detection using a Boosted Cascade of Simple Features" in 2001. It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images.
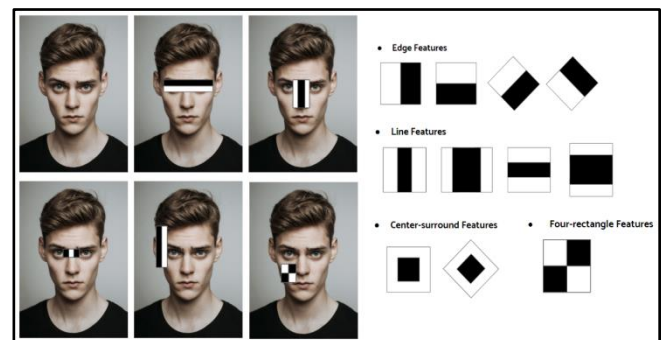
3.3 Tensor Flow: TensorFlow is a free and open-source software library for machine learning. It can be used across a range of tasks but has a particular focus on training and inference of deep neural networks.

3.4 OpenCV: OpenCV is a library of programming functions mainly aimed at real-time computer vision. Originally developed by Intel, it was later supported by Willow Garage then Itseez. The library is cross-platform and free for use under the open-source Apache 2 License.
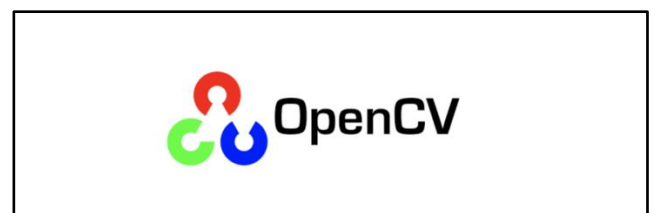
3.5: Machine Learning: Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it to learn for themselves.

4. EVALUATION

Testing's such as Unit testing, Integration testing, Load and Stress testing were performed on the prototype. Some improvements regarding faster response rate were suggested by the testing team. These updates will be done in the next version upgradation, and after Acceptance testing the prototype will be available for end user utility.

5. FUTURE SCOPE

Since we have already established the importance of Face Mask detection, let us do a sneek-peek into it future incremental utilities. Face masks have become a key tool in the global fight against COVID-19 and scientists in Scotland say they've now developed a version that tells the wearer when to stop using it.

Masks are mandatory in public spaces across large swathes of Europe as countries attempt to reduce the spread of the virus via air droplets. However, masks need to be replaced regularly in order for them to be effective, and little advice has been given by countries about how long to wear them.

Scientists at Scottish company Insignia Technologies believe they've now solved that problem by creating a label that changes color when it's time to dispose of masks and other PPE.

6. CONCLUSIONS

The prototype of our Face Mask Detector was developed successfully. The major objectives covered by our application are as follows:-
Our Software, Face Mask Detector is a simple detecting system with which people will be alerted t wear mask. Our CCTV cameras equipped with alarm sensors can be hugely benefitted to the society.
Face Mask Detector which used to have human supervision 24x7 can now be automated with our software.

ACKNOWLEDGEMENT

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