



## A REVIEW FOR DETECTION OF FACE MASK USING DEEP LEARNING TECHNIQUES

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**Abstract:** In computer field security and protection, the recognition of object is very important to take particular action becomes very necessary for making decisions. Due to increase in scientific development in the information, computer vision and programming techniques, which make an image a very important role in multiple zone such as medicine media, education, design, industry, security etc. This proposed system make use of face identification on the basis of dataset and helps in the scenario for detection mask on face, which helps to prevent the spreading of virus at certain level with specific application.

**Index Terms – Dataset, identification, detection, security, application.**

### I. INTRODUCTION

The main objective is to use the system at multiple zones and make it an easy computer vision module at minimum cost. The image processing is used in many computer vision applications. Many researcher trending area nowadays is to provide the security by making use of image processing and provide a simple way of implementation in further system. Storing images in large set of dataset make it easy to provide ore accuracy with reference to the matching image. Some system procedure begin with input image which was already available within the system and help to recognized automatically. The system camera captured a picture to the computer and with help fo model creation it compares with the model and then recognize the face and then applicable to various application. Since the digital image are the good source of input with proper comparison and helps in critical application for proper identification. Same as of the current situation mask became an important part and hence plays a vital role with identification of mask

### 1) Problem Statement

Current situation of pandemic increases with more contagious and spreads vigorously fast. Keeping in mind with the current scenario of infection spreading become necessary to make the prevention which stops spreading and staring with first step of face mask and it becomes very important with certain government rules also. So to identify and verify the mask being the most important aspects and to design it is of that much utmost important which automatically detects the face mask and provides the alarm or alert to the system. In early phases, everyone who recognizes as sick can get treatment and there is no emergency point with proper hospitals causality. So in this pandemic, to get proper detection for not getting infected due to contagious infected person we need to maintain the social distancing and carry mask at the same time.

### 2) Objective

- To detect and identify the mask with proper accuracy percentage.
- To provide an alert system to the authority about without mask identification
- To prevent the spreading of COVID-19 and to help the working system which protect an individual to be infected
- To avoid spreading of virus through initial diagnosis procedure of wearing of mask.
- To detect the location and appearance of one or more faces, regardless of whether or they don't wear a mask, within detected image. Deep learning based face detection system is designed for proper detection of region of interest and can be done using openCV.
- To allow an individual to follow the fundamental wellbeing process.
- To design a classifier framework for superior and more exact identification with reduce cost.
- To design the face Detection system by reducing the issue of proper identification of mask and face
- To generate a model for face identification utilizing divisional semantic of picture by ordering every pixel as face and non-face.



## II. RELATED WORK

Biometrics is physiological features that allow individuals to be identified. Popular biometrics includes fingerprints, faces, and irises. A common use of biometric systems is to authenticate users desiring access to a system or resource. Universal Access can be promoted with biometrics. Biometrics provide a secure way to access information technology, although the use of biometrics presents challenges and opportunities unique to other authentication methods (such as passwords and tokens). Biometric systems are also vulnerable to poor usability. Such systems must be engineered with wide user accessibility and acceptability in mind, but also need to provide robust security. This paper considers the application of biometrics in Universal Access systems with regards to usability and security. [1]

Authentication is a most important component in human computer interaction. Reliable authorization and authentication are becoming essential for many application such as boarding an aircraft (in travel documents & visa), financial transaction into the banks, industry employee, healthcare provider and government organization. Authorization is almost always conferred in a single individual or in a small group of individuals identity verification becomes a challenging task when it has to be automated with high accuracy and hence with low probability of break – in and reliable non- repudiation. The user should not be able to know how transaction carried out and should be unsuitable as little as possible which only makes the task more difficult. Biometric is one such strong authentication technology.[2]

Biometrics technologies are used to identify, verify, or confirm a person's identity based on their physiological (external appearance) or behavioural (how they act) characteristics.

- Physiological characteristics are assessed through morphological identifiers (mainly consisting of fingerprints, the hand's shape, the finger, vein pattern, the eye (iris and retina), and the face's shape) and biological analyses (DNA, blood, saliva, or urine). Behavioural characteristics are commonly assessed using voice recognition, signature dynamics (speed of movement of pen, accelerations, pressure exerted, inclination), gait (i.e. individual walking style) or gestures.
- Biometrics allows a person to be identified and authenticated based on verifiable unique and specific data. Biometric identification consists of determining the identity of a person by capturing an item of their biometric data (e.g. a photograph) and comparing it to the biometric data of several other persons kept in a database, providing an answer to the question 'Who are you?'. Biometric authentication compares data on a person's characteristics to their biometric data to determine resemblance and provides an answer to the question 'Are you Mrs or Mr X?'
- Biometric technologies include 'fingerprint recognition', 'signature recognition', 'DNA matching', 'eyes – iris recognition', 'eyes – retina recognition', 'voice – speaker identification', 'gait', 'hand geometry recognition' or 'face recognition'
- Facial recognition technologies enable a uniquely dangerous and pervasive form of surveillance, and children cannot escape it any more than adults can. Facial recognition technologies have particularly severe implications for privacy, as they can weaponise existing photographic databases in a way that other technologies cannot, and faces are difficult or impossible to change, and often illegal to publicly obscure. Their erosion of practical obscurity in public threat-ens both privacy and free expression, as it makes it much harder for people to navigate public spaces without being identified, and easier to quickly and efficiently identify many people in a crowd at once. To make matters even worse, facial recognition technologies have been shown to perform less accurately for people of color, women, non-binary and transgender people, children, and the elderly, meaning that they have the potential to enable discrimination in what-ever forum they are deployed. As these technologies have developed and become more prevalent, children are being subjected to it in schools, at summer camp, and other child-specific contexts, as well as alongside their parents, through CCTV, private security cameras, landlord-installed apartment security systems, or by law enforcement. [4]
- Facial recognition, as a biometric system, is a crucial tool for the identification procedures. When using facial recognition, an individual's identity is identified using their unique facial features. Biometric authentication system helps in identifying individuals using their physiological and behavioral features. Physiological biometrics utilize human features such as faces, irises, and fingerprints. In contrast, behavioral biometric rely on features that humans do, such as voice and handwritings. Facial recognition has been widely used for security and other law enforcement purposes. However, since COVID-19 pandemic, many people around the world had to wear face masks. This thesis introduces a neural network system, which can be trained to identify people's facial features while half of their faces are covered by face masks. The Convolutional Neural Network (CNN) model using transfer learning technique has achieved remarkable accuracy even the original dataset is very limited. One large Face mask detection dataset was first used to train the model, while the original much smaller Face mask detector dataset was used to adapt and fine tune this model that was previously generated. During the training and testing phases, network structures, and various parameters were adjusted to achieve the best accuracy results for the actual small dataset. Our adapted model was able to achieve a 97.1% accuracy. [5]

## III. PROBLEM ANALYSIS

Traditional method of identification such as fingerprints or keypad typing becomes insecure. So the new concept of facial recognition systems was introduced to adapt the change with routine since it does not required require physical interaction. Along with the system use of the face mask within the systems created a great challenge for artificial vision, because at the time of facial recognition, half of the face is covered and several essential data are lost. The need of algorithm design so such concept with higher accuracy is must to achieve robustness in the current systems. A Deep Learning based design was set with Convolution Neural Network that that helps for processing of image and used in an application of this technology includes such as agriculture, military area, and medicine.



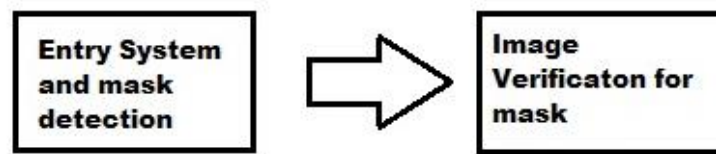


Figure 1 Block Diagram of Proposed Project

### 1) Dataset Description

The quality of the data makes it more effective for successful development, which helps in setting a powerful model for any future applications that may use the same training dataset. Human contribution datasets was used with number of face mask image and non-face mask images to create one independent model to examine and develop the data for machine learning procedures. A supervised learning concept was used to train the model with training data and labeled it properly. When the data is labeled, the dataset usually is marked with fundamental identification parameters. These parameters were very beneficial for the models to train and automatically increase the accuracy of the model and its ability to identify and predictions purpose. Hence, the main purpose of the proposed system to train a model and to classify individuals' faces with masks. [8]

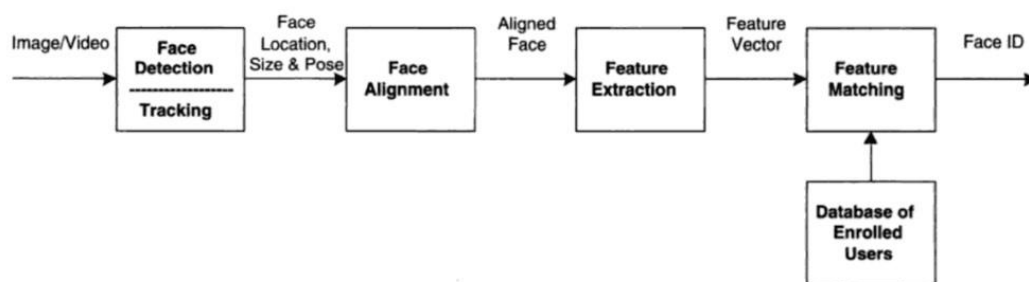


Figure 2 Flow of the program

The system makes use of the following process for further classification and implementation

- Face Detection
- Face Alignment
- Face Recognition
- Facial Recognition Accuracy
- Feature Extraction

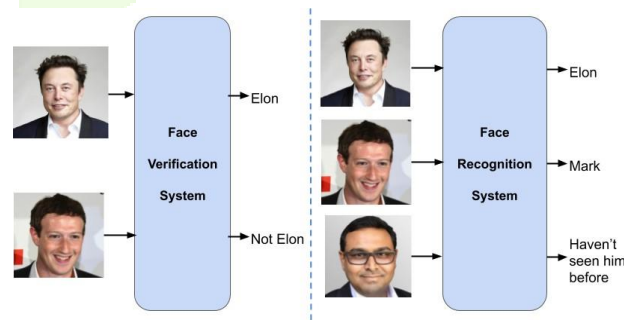


Figure 3 Identification and Verification in Face Recognition

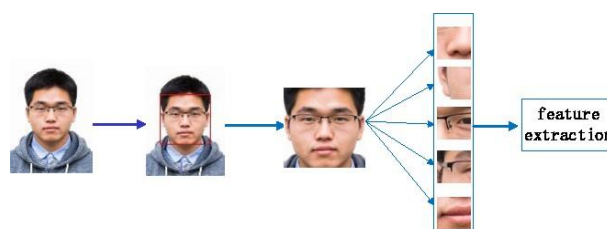


Figure 4 Feature Extraction Techniques



## V. CONCLUSION

As we know the pandemic situation around us and many are doing various efforts to avoid it. Technological background and medical efforts are on the verge to prevent the situation. At least it's our duty as technocrats to provide the proper solution and the proposed system works on that principal. The main intension with the system is to make aware about for maintenance of hygienic conditions of an individual. The main objective is to make use of detection system and implementing on the basis of its condition. The mask was being an important part at the same time washing hand by making use of sanitizer. The system includes camera embedded with sanitizer machine and detect the user about its mask. Also this system installed at the gate which detects the image of the person entering into premises and if the mask was wearing by the person then only the gate will open and sanitizer will drop on the hand of person or else the system will not open the gate. The system will help to monitor the entry of the person and provides the accurate details about its mask position and mark about its wearing and non-wearing. [9][10]

Furthermore use of modern artificial intelligence systems and machine learning algorithms have revolutionized approaches to scientific and technological challenges in a variety of fields. And with advancement in Deep Learning (DL) and Machine Learning (ML) techniques real-time-face mask detection model helps to increase the accuracy about detection of face mask and person not wearing mask

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