Smart Facial Mask Detector

Dr.K. Kishore[1], G. Jyothi[2], Dr. Vasanthakumari Sundarajan[3], Dr Sudharani B Banappagoudar[4], Dr S P Subashini[5], Dr. Sridevy[6]

Faculty Of Commerce, Voorhees College, Vellore[1]
Department Of Pharmaceutical Engineering, B V Raju Institute of Technology, Narasapur[2]
Associate Professor in Pediatric Nursing, Institute of Health Sciences, Wollega University, Ethiopia[3]
Professor, School of Nursing Science, ITM University, Gwalior(MP)[4]
Dean, Galgotias School of Nursing, Galgotias University[5]
Associate Professor, Collegeof Nursing, Mother Theresa Postgraduate and Research Institute of Health Sciences, Puducherry[6]
kishore130@gmail.comJyothi.g@bvrit.ac.invasanhar@yahoo.comsudharani.sons@itmuniversity.ac.in
subashiniphd2014@gmail.comdr.s.sridevy@gmail.com

ABSTRACT
The COVID-19 pandemic has resulted in a significant loss of human life throughout the globe, and it poses an unprecedented threat to public health, food systems, and the workplace. This coronavirus, according to the World Health Organization, emerged in late December 2019 in Wuhan, China. The virus has been identified as infectious and transmissible by air or close contact with an infected person after extensive investigation. Many precautions have been recommended to prevent the transmission of this virus, including maintaining a social distance, or keeping a suitable physical space between individuals and avoiding close contact, and wearing a face mask to prevent the virus from spreading via the wind. As a result, the goal of this research work is to develop and implement a Face Mask Detection System. Object detection and face identification will be included into the video footage of college campuses by these systems. OpenCV, Image preprocessing, and KNN algorithms are among the models employed. An individual whose face was discovered without the use of face masks. The number of persons violating or non-violating the relevant activities is shown on the complete results board in the output. This research endeavor received a 100 percent confidence score after applying and building the models. As a result, this study effort culminates with the established fact that wearing face masks reduces viral spread and so creates a model to assist identify these behaviors.
Keywords: Covid, Pandemic, Mask, Detection.

INTRODUCTION

As per the experts, this virus may spread if it comes into direct touch with an infected individual. Since with many other infectious respiratory disorders, experts recommend that intimate contact be avoided at all costs, as the virus is most likely to spread by airborne droplets [1]. As a result, researchers have devised a new social norm, Social Distancing, as well as the wearing of a face mask, to combat the spread of coronavirus. Wearing an

antibacterial mask is really important in this COVID-19 situation. The public should know whether to use the mask for source control or to avoid COVID-19. Throughout the pandemic, everyone must wear a mask to prevent the spread of the CORONA virus. Possible benefits of mask use include lowering the chance of infection from a hazardous individual during the "pre-symptomatic" stage and defamation of those who use masks to control virus transmission [2]. Face mask detection has therefore become a critical job in today's global society. In these difficult times of COVID-19, it is necessary to develop a model that recognizes persons wearing and not wearing masks in real-time as a simple preventive step to avoid virus propagation. We design this method for college campuses so that when colleges reopen after a pandemic, the coronavirus is not disseminated among students due to a lack of masks. Face mask detection entails recognizing the position of a face in the real world, identifying whether or not it is wearing a mask, and telling the user to stay in contact [3]. TensorFlow, Keras, and OpenCV are among the Machine Learning (ML) packages used in this system. This machine learning technology aids frontline fighters in simplifying their task and preserving their lives.

METHODOLOGY

On the college campus, we recommended an automated approach for detecting those who aren't wearing a face mask. All areas of the college campus are monitored by CCTV cameras. The cameras are used to collect photographs of the campus, which are then sent into a system that determines if any people without face masks appear in the image [4]. If a person without a face mask is spotted, our database is checked, and an alert message is sent along with an electronically issued fee.

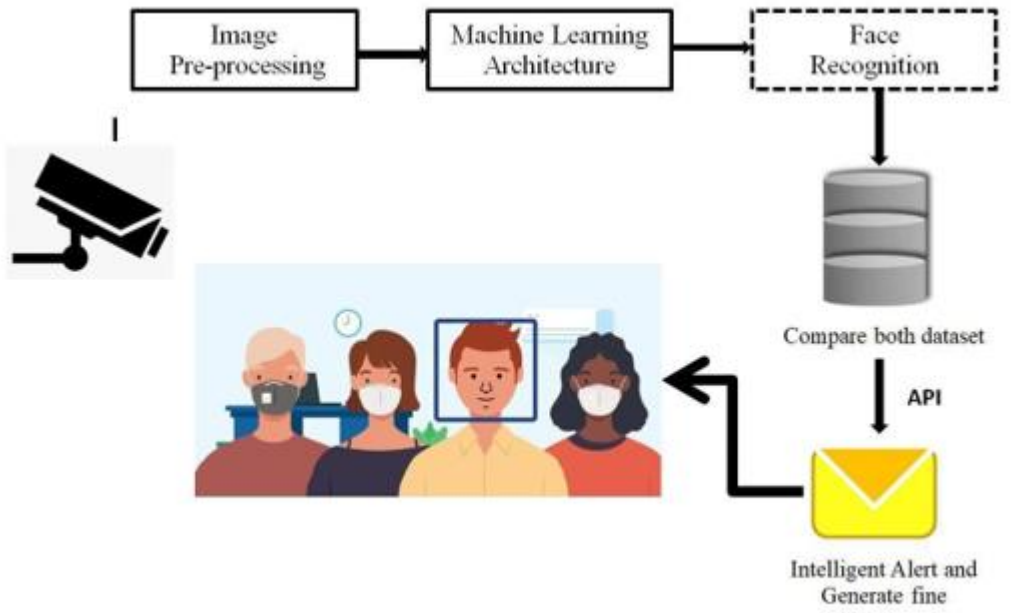

Fig 1: Methodology of Face Mask Detection

Image Preparation

Before moving on to the next phase, the pictures captured by the CCTV cameras needed to be pre-processed. Because the RGB colour picture includes so much unnecessary information

for face mask identification, it is transformed to a grayscale image during the pre-processing stage. Normalization aided the learning algorithm in learning quicker and capturing the pictures' needed attributes [5].

Architecture for Machine Learning

From the supplied samples, the machine learning architecture derives a variety of key nonlinear properties. The learnt architecture is then utilized to anticipate samples that were previously concealed. We collect photos from campus CCTV cameras as well as student or staff data as part of our machine learning architecture work [6]. KNN plays a significant role in the learning technique's architecture. The following sections cover all aspects of deep learning architecture.

I Dataset Collection: For the model, data is gathered from two separate sources. For dataset1, we gathered photographs from our college students or staff, while dataset 2 is CCTV video and system take images from it.

ii) Facial Recognition: The system reads the characteristics of the user's face. Depending on the mapping approach used by the database and algorithm, key parameters that play a part in the detection process might vary from one another. Typically, they are either vectors or points of interests, which map a face using pointers (one-dimensional arrays) or a person's unique facial traits. This procedure makes use of both 2D and 3D masks. Faces are verified using the learning algorithm, which encodes them into a facial signature (a formula, a strain of numbers, etc.) and compares it to our two databases. Instead of sending a single picture, a succession of photos is provided to increase the precision of the match [7].

Intelligent Warning

If not wearing faces corresponds to data in the system, the system administrator produces a fine and sends a text message to the person's save data (mobile number) through the API.

WORKING

When colleges reopen after a pandemic, the coronavirus should not be disseminated among students due to a lack of masks, thus we created this method for college campuses. We use this system on college campuses, therefore we need to add data such as photographs of individuals, mobile phone numbers of certain persons, and so on [8].

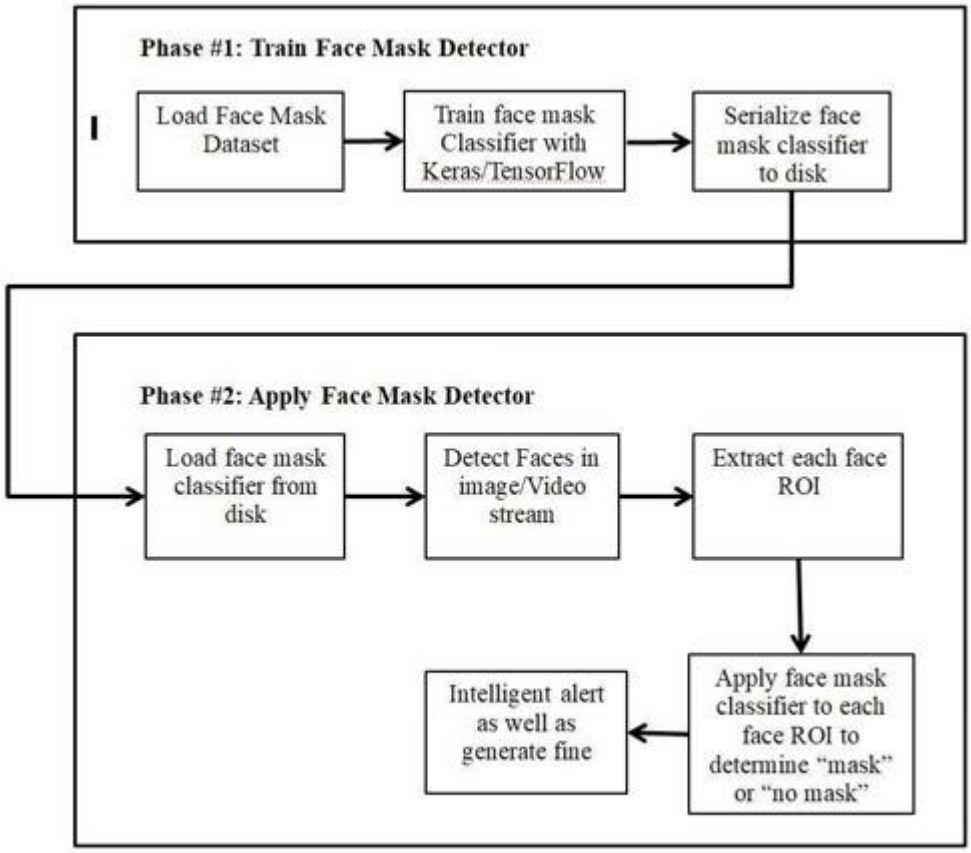

Fig 2: Model Structure of System

There are students, instructors, and all members of a college campus who use this system. It will need to capture a live video to determine whether or not someone is wearing a mask. As a result, install CCTV throughout the campus area. CCTV cameras are utilized to gather real-time video footage of various college locations [9]. Facial pictures are extracted from the camera clip, and these images are utilized to identify the mask on the face. The data from CCTV cameras may be consolidated and accessed by authorized individuals. OpenCV is used by the system to deal with image and video data [10]. A video system collects an image after recording it and performs various actions on it. The learning method KNN is used to extract features from pictures, and then many hidden layers are utilized to learn these features. It uses knowledge sharing and insight discovery via encodings to turn abstract data into meaningful representations [11]. The total number of images in the dataset is visualized in both categories, and each face ROI is classified as 'with mask' or 'without mask' using a face mask classifier. When the system identifies someone who is not wearing a mask, it compares the picture to the save database and calculates a fine for that individual, as well as sending an alarm to that person through text message [12]. On occasion, certain visitors to the college campus do not wear a mask, which is incompatible with the system database. The system then alerts the administrator, who subsequently communicates with the security personnel to request that they wear masks[13].

CONCLUSION

We have a revolutionary face mask detector that might potentially contribute to the public health care department, as technology advances with accelerating trends [14-16]. Faces of people who were not wearing face masks were discovered. The number of persons breaching or not violating the relevant measures is usually shown on the results board in the output. Face mask detection is based on KNN models, and we utilize Oven CV, Tensor Flow, Keras, and Python to determine whether or not someone is wearing a mask [17-20]. This leads us to the conclusion that if this procedure is done correctly and efficiently, it will be successful. As a result, this study project culminates with the proved fact that wearing face masks reduces the spread of the virus, and so establishes a model to aid in the detection of these measures [21-23].

FUTURE WORK

Researchers will be able to look forward to some exciting future directions as a result of this study. To begin with, the suggested approach is not restricted to mask identification and may be included into any high-resolution video observation apparatus. Second, using a facemask, the model may be extended to identify facial landmarks for biometric reasons.

REFERENCE

[1] Le Perchec J, Badano G. Opaque pixel mask with a broadband absorbing metasurface: application to infrared detectors. Applied Optics. 2022 Jan 10;61(2):330-7.

[2] Toppo K, Kumar N, Kumar P, Tanwar L. Face Mask Detection Using MobileNetV2 and Implementation Using Different Face Detectors. InComputer Networks and Inventive Communication Technologies 2022 (pp. 287-303). Springer, Singapore.

[3] Gupta A, Srivastava B. Towards Developing Better Object Detectors for Real-World Use. In5th Joint International Conference on Data Science & Management of Data (9th ACM IKDD CODS and 27th COMAD) 2022 Jan 8 (pp. 280-281).

[4] Kamath V, Renuka A. A Proposed Exploratory Study of Object Detectors to Learn the Influence of Datasets on Model Performance. InJournal of Physics: Conference Series 2022 (Vol. 2161, No. 1, p. 012076). IOP Publishing.

[5] Kummar S, Mohanty A, Chakraborty S. Real Time Face Mask Detection using Google Cloud ML and Flutter. InJournal of Physics: Conference Series 2022 (Vol. 2161, No. 1, p. 012020). IOP Publishing.

[6] Mehta A, Pandya S, Patel S. Detection of Face Mask During Pandemic of Covid-19. InAdvances in Distributed Computing and Machine Learning 2022 (pp. 352-361). Springer, Singapore.

[7] Kanna RK, Kumari TS. Non-Invasive Monitoring of Gastrointestinal Tract Using Respiration Patterns. Solid State Technology. 2020 Feb 29:2327-34.

[8]Gawande U, Hajari K, Golhar Y. SIRA: Scale illumination rotation affine invariant mask R-CNN for pedestrian detection. Applied Intelligence. 2022 Jan 13:1-9.

[9] Wang CP, Lin BJ, Wu PJ, Shih JR, Chih YD, Chang J, Lin CJ, King YC. Embedded Micro-detectors for EUV Exposure Control in FinFET CMOS Technology. Nanoscale Research Letters. 2022 Dec;17(1):1-7.

[10] Banappagoudar SB, Kangeswari P, Vasanthakumari Sundararajan D, Gauba A, Kanna RK. MODERN APPROACH FOR ANTI VIRAL TREATMENT USING CLINICAL APPLICATIONS. NVEO-NATURAL VOLATILES & ESSENTIAL OILS Journal| NVEO. 2021 Dec 18:10932-40.
[11]Nawaz M, Nazir T, Javed A, Tariq U, Yong HS, Khan MA, Cha J. An Efficient Deep Learning Approach to Automatic Glaucoma Detection Using Optic Disc and Optic Cup Localization. Sensors. 2022 Jan;22(2):434.
[12] Vetrimani E, Kishore RG, Kanna RK. Detection of Covid 19 by CT imaging using Artificial Intelligence application. Design Engineering. 2021 Nov 26:16799-806.
[13] Dr Sudharani BB. Corona virus-A Narrative Review Journa. Nurs Pract Educ. 2020;6(4):59-62.
[14] Kanna RK. Deploying digital-to-analog converters using signed symmetries.
[15] Banappagoudar MS, Pillai DS. Plan of Action in Combating Myths related to Menstruation in context with Indian Society. Int J Mult Discip Educ Res. 2020;9(6):137-41.
[16]Du P, Egana-Ugrinovic D, Essig R, Sholapurkar M. Sources of Low-Energy Events in Low-Threshold Dark-Matter and Neutrino Detectors. Physical Review X. 2022 Jan 13;12(1):011009.
[17] Davis J, Dipuglia A, Cameron M, Paino J, Cullen A, Guatelli S, Petasecca M, Rosenfeld A, Lerch M. Evaluation of silicon strip detectors in transmission mode for online beam monitoring in microbeam radiation therapy at the Australian Synchrotron. Journal of Synchrotron Radiation. 2022 Jan 1;29(1).
[18] Sudharani BB. Health Education Needs for Pregnancy a study among women attending PHC's. Journal of nurse midwifery and maternal health, Delhi J. J nurse midwifery Matern Heal Delhi J. 2016;2(1):5.
[19] Kanna RK, Vasuki R, Kripa N. MODERN SMART MEDICINE DISPENSER KIT BASED ON EMERGENCY ALERT SYSTEM.
[20] Hasan I, Liao S, Li J, Akram SU, Shao L. Pedestrian Detection: Domain Generalization, CNNs, Transformers and Beyond. arXiv preprint arXiv:2201.03176. 2022 Jan 10.
[21]Ramachandran G, DIXIT CK, Kishore K, Arunraja A. Performance Analysis Of Mantissa Multiplier And Dadda Tree Multiplier And Implementing With Dsp Architecture. In2021 International Conference on Artificial Intelligence and Smart Systems (ICAIS) 2021 Mar 25 (pp. 1583-1587). IEEE.
[22]Kishore BB. Low-cost Portable Heart Rate Monitoring Module. Design Engineering. 2021 Nov 26:16807-11.
[23]Rajkumar D, Kishore K. Crowdsourcing a technique to Sustain in Educational Industry. SPAST Abstracts. 2021 Oct 8;1(01).