

Predicting Spread of COVID-19 by Face Recognition Embedded with Face Mask Detection Using Machine Learning Techniques

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Abstract: Covid-19 pandemic is started from December 2019 to present, still the world is facing with the same problem, virus itself mutation to produce a new variant of virus, due to mutation virus structure may changes day by day, one of them are delta variant, there is no appropriate drug is available in the market to control spread of this virus, few pharmaceutical companies providing vaccinations to improve immunity power, but there is no guaranty those who are taken vaccination are not infected with the coronavirus. these viruses imposed a challenging task of health emergency and the only possible solution is to maintain covid-19 protocols. on this studies paper, we proposed a new technique of face recognition and mask detection and it is working in four phases. the first phase data collection phase where images samples are collected from all employees of an organization and stored in a database, second phase all images of employees are loaded into the proposed system for training where for each employee separate folders are maintained to store images, third phase employee images are captured through webcams or drones and training model is applied to face recognition embedded with face mask detection module, fourth phase output of the third module is presented to end user. To control the covid-19 virus proposed model is used to identify

Keywords: SARS_Cov2, Pandemic, Machine Learning, Mask Detection, Face Recognition, Image processing

I. INTRODUCTION

In the month of February 2020 in China Wuhan city announced a strict lockdown it will give signs of coronavirus to the world that will constitute a big health emergency pandemic situation. First, the virus is named as 2019nCov and later it is originated as SARS-Cov2. After February 2020 virus spread to many countries in the world and the virus also affects more on the economy. Coronavirus belonging to the SARS family of viruses may effect on RNA systems of the human body, and the length of the virus is 30-kilo base. Coronavirus is originated in birds and as well as in animals. Before 2012 seven types of coronavirus are identified (SARS-Cov1). The virus affects on human RNA system and those who are having less immune power are affected more by this kind of virus. In December 2019 Wuhan virology lab SRAS-Cov2 virus was identified.

In china Wuhan many people are admitted to the hospital in the month of December 2019 with unknown causes and all these cases are either directly or indirectly linked to the seafood market. Day by day number of cases are increased and local government Wuhan declared lockdown. In the month of January 2020 China declared that all cases are reported are belong to a coronavirus named SARS-Cov2. At the end of January 2020, World Health Organization alarmed the World of a health emergency. Experiments are conducted on SARS-Cov2 in many laboratories and they identified the size of the virus diameter is from 50 to 120 nm.

Coronavirus (recently named 2019-nCoV), a brand new Covid related illness with a excessive mortality rate, is a pandemic sickness. As of March eight, 2020, COVID-19 has spread to 102 nations and brought about 3584 passing out of 105,586 affirmed instances. There's no modern remedy explicit for COVID-19. Modern-day drugs are usually indicative. Development of possible avoidance and remedy is an earnest need, Specially for unsafe intense cases.

Coronavirus is introduced approximately with the aid of serious intense breathing disorder Covid 2 (SARS-CoV-2). Numerous COVID-19 patients foster intense respiratory misery disorder (ARDS), which activates aspiratory edema and lung unhappiness, and have liver, heart, and kidney harm.

Jyothi et al. the world is still pandemic due to covid-19, to overcome this pandemic situation more testing has to be conducted, and deep learning is one of the useful techniques to analyse images of covid-19 patients. Researchers worked on patient chest images using deep learning approaches, they did the analysis over one thousand patient samples, these samples are collected from healthy persons as well as suspected persons, and they evaluated sensitivity and specificity. In their model, they used 121 layers to analyse patient chest images to decide whether the patient is affected covid-19 or not.

A tribulation study, which assessed infection ingenuity of the COVID-19 infection (SARS-CoV-2), has as of late been distributed in the NEJM. In this exploratory review, vapor sprayers were created utilizing a three-fly nebulizer and taken care of into a Goldberg drum under controlled lab conditions. It is a powerful machine that doesn't reflect typical human hacking or wheezing nor does it reflect spray-creating methods in clinical settings. Moreover, the discoveries don't welcome new proof on airborne transmission with particles conceivably containing the infection was at that point known as a chance during methodology creating sprayers.

In any remaining settings, handy evidence demonstrates that COVID-19 infection is communicated for the duration of near touch thru respiratory drops and by vomits. The infection can unfold straightforwardly from one character to another while a

COVID-19 case hacks or breathes out growing drops that arrive at the nose, mouth, or eyes of person else. but, because the beads are too weighty to in all likelihood be airborne, they land on articles and surfaces encompassing the person. Others emerge as tainted with COVID-19 by way of contacting these sullied articles or surfaces, then, at that factor, touch their eyes, nose, or mouth. As indicated with the aid of the as of now evidence, transmission through more modest bead cores (airborne transmission) that proliferate via the air at distances longer than one meter is restricted to spray producing strategies at some stage in medical consideration of COVID-19 patients. Accordingly, WHO keeps on suggesting that everybody performs hand cleanliness much of the time, follows respiratory decorum proposals, and routinely perfect and sanitize surfaces. WHO moreover continues on suggesting the importance of maintaining actual separations and staying away from individuals with fever or respiration manifestations. Those preventive estimates will restriction viral transmission.

Since the beginning of the COVID-19 flare-up, and an arrangement with accessible proof, WHO keeps up with the proposal, with regards to drop and contact precautionary measures for the utilization of clinical covers for standard consideration of COVID-19 patients and respirators (N95, FFP2, or FFP3) for conditions and settings where spray producing methodology are performed.

As per the recommendations of WHO, vaccinations will improve immunity power to fight with a virus, but not cure 100% of disease, and the only possible way of predicting from Covid delta variant is to follow precautionary measures such as social distance, frequent hand sanitization, wear a facemask, wear hand glove, and so on. Covid-19 created a big health emergency and it is now a pandemic from 2019 to the present. In covid-19 patients, cases use many IoT devices and their applications to reduce the spread of covid-19 to different people by way of diagnosing early, closely monitoring patient health conditions, and after discovery monitor patient conditions. In this research paper, we are working on face mask detection embedded with face recognition to know how many are wearing masks, results are useful to educate them persons who are not wearing masks, and also useful to take necessary actions on time to control the spread of these kinds of virus.

II. RELATED WORK

The critical unfold of the COVID-19 pandemic has brought about a situation of general health crisis and global mindfulness. Demonstrating effects specify that the loss of life fee increment because the age increment and it's miles seen that as the vast majority of the passing cases have a place with the age bunch 60–eighty. Bunch-based investigation of antique sufficient gatherings is likewise led to dissecting the most extreme exact age- gatherings. A relationship among certain COVID-19 instances and expired cases are likewise delivered, with the impact on male and female loss of life cases because of the crown. Furthermore, authors have likewise brought automated reasoning based measurable way to deal with foresee the staying power chances of crown tainted peoples in South Korea with the investigation of the impact at the exploratory elements, which including age-gatherings, sex, worldly advancement, and so on to break down the Covid instances, authors carried out gadget getting to know with hyper parameters tuning and profound gaining knowledge of fashions with an auto encoder-based totally technique for assessing the impact of the extraordinary highlights on the unfold of the illness and anticipate the endurance prospects of the remoted sufferers in separation . The model aligned inside the assessment depends on positive crown infection instances and offers the exam over various perspectives that shown to be great to break down the worldly patterns within the contemporary condition alongside the research of expired cases because of covid. Examination depicts central troubles in the flare-up spreading, demonstrating that the models pushed by using machine insight what is more profound knowing may be possible in giving a quantitative attitude at the epidemical flare-up. Coronavirus arises as a virus contamination with high mortality. infection with high mortality. The advancement of feasible counteraction and remedy is a dire want. The authors investigated TH17 reactions in patients with SARS-CoV-2 and proposed FDA endorsed JAK2 inhibitor fedratinib for lessening mortality of sufferers with TH17 type invulnerable profiles. The arena has been held by way of a plague over the foremost half of 2020. It became identified as a brand new Covid (severe excessive respiration circumstance Covid 2, or SARS-CoV-2), and later named as Coronavirus Disease-19 or COVID-19. While COVID-19 started out inside the metropolis of Wuhan inside the Hubei region of China, it has unfolded quick across the world, bringing about human misfortune and gigantic monetary damage. With the aid of mid-June, there had been extra than eight million times of COVID-19 worldwide, with north of 436,000 deaths. Given the short unfold of COVID-19, countries the world over taken on a few popular wellbeing measures planned to prevent its spread, consisting of social isolating.

As a function of social eliminating, businesses, faculties, schools, public venues, have been had to near down, mass get-togethers had been denied, and lockdown measures had been compelled in numerous international locations, permitting tour just for essential requirements. The objective is that through friendly casting off, international locations will really need to "straighten everything out", reduce the wide variety of recent instances diagnosed with COVID-19 beyond regular time to stop dramatic development and eventually decrease strain on clinical benefits. Ideal lockdown preparations had been focused for the maximum part making use of the examiner of disorder transmission macroeconomic fashions, a number of that are positioned around the polarity between the case wherein the selections (and reactions) are made by private specialists and the case in which the decisions are made by a social organizer.

III. DESIGN

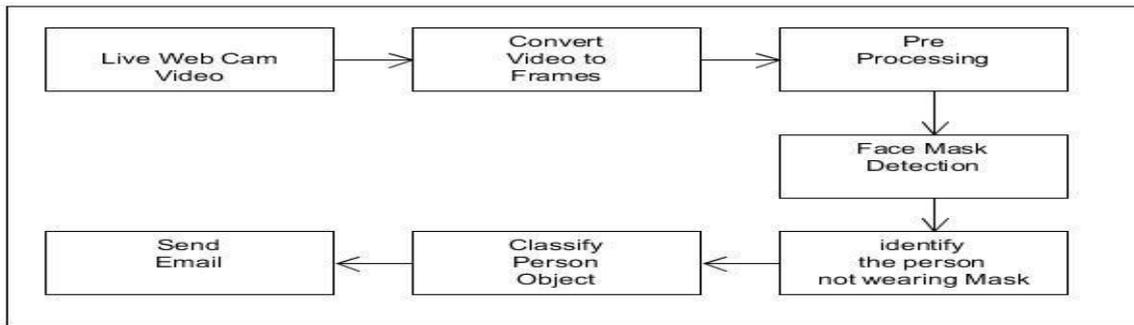


Figure 1: System architecture

Dataset series: The dataset become accrued from Kaggle Repository and changed into break up into training and checking out records after its evaluation.

Training a version to stumble face masks: A default OpenCV module become used to obtain faces followed by education a Kera’s version to perceive face mask.

Detecting the person not wearing a masks: A open CV version was trained to discover the names of the folks who aren’t wearing masks by means of referring the database. Sending the e-mail: The machine turned into designed to send **an e mail**: to the person not sporting a mask using smtpplib.

IV MODEL DEVELOPMENT

Convolutional Neural Network is broadly used Deep Learning algorithms for picture type. It’s capability to categorize devices of two-dimensions picture is specifically appropriate for facial pix mask detection. In view that Convolutional neural network can examine study nearby styles the small place from a picture, it is going to perceive the vicinity of the mask it will practice for the shifting item as well at some stage OpenCV. As depicted in Figure2, here we construct a convolutional neural network version with Convolutional layers, Max pooling layers, and absolutely associated with layers. The 2 convolution layers are set with three × three filters, no-0 padding, stride in (1,1) and Relu and Softmax activation respectively, Constant with Younghak Shin et al. [17], Convolutional Neural Network with 3 convolution layers outperformed Histogram of oriented gradients + Clear vertical grain and support vector machines with recognize to the evaluation criteria which includes Sensitivity, Particularity, Accuracy, and Precision on the same time as the model is carried out to become aware of vicinity and presence of cysts with colonoscopy datasets. The experimenters also carried out equal evaluation in gray to red green blue, and the consequences had been shown to be constantly better for Convolutional Neural Network

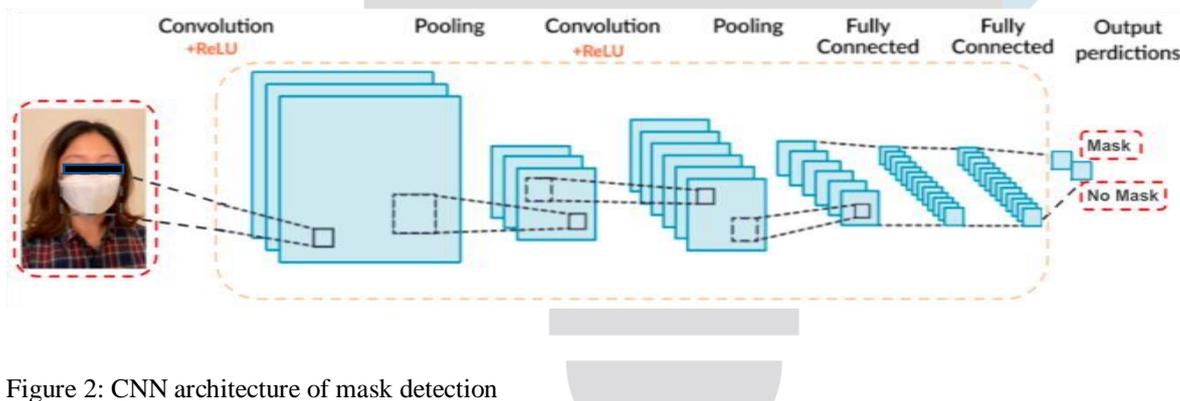
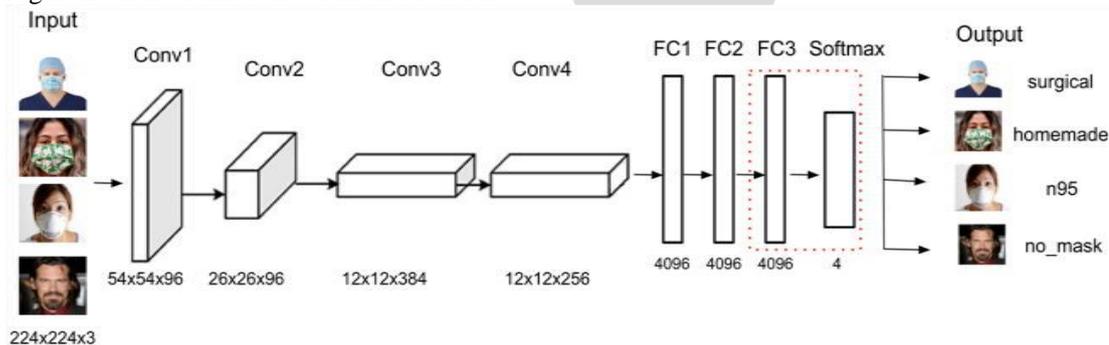


Figure 2: CNN architecture of mask detection



V. FACE RECOGNITION EMBEDDED WITH FACE MASK DETECTION

Spread of Covid-19 virus from human to human is increased due to physical contacts and incubation time slot of virus is one week. Transmission of virus from human to human may occur due to droplets, money circulations in the market, physical contacts of shake hands, material sharing, touching of equipment's, and so on. Someone inflamed with covid-19 virus is travelling from one location to another is main source of transmitting virus with short span of time. Corona virus is infected to patients through nose, mouth, and eyes. Humans cover only nose and mouth with help of face mask, but eyes are not protected, and eyes are also acting as a virus transmission media. Covid-19 infected person can spread virus approximately five hundred per month. In this research paper, we proposed a new method of Face recognition and Mask detection and it is working in four phases.

First phase data, collection phase where images samples are collected from each employee's multiple times and store all images into a database for future usage, and research model in phase I depicted in figure 3.

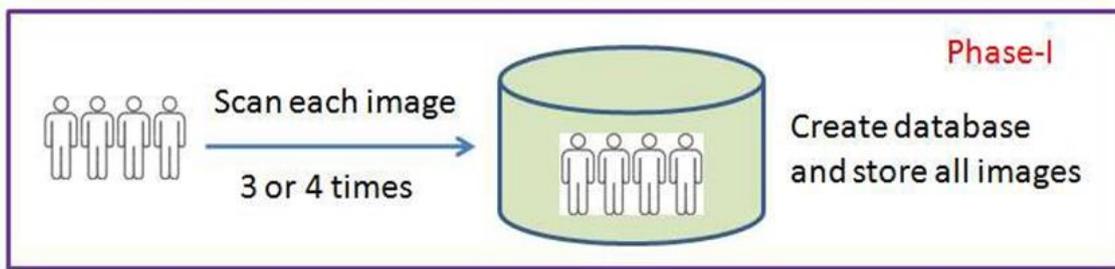


Figure 3: Phase 1 of proposed model

Second phase, where all images of employees are loaded into proposed system, to store each employee image

Separate folders are maintained to store respective employee images, once it is stored all the images are first applied to training model to train and research model in phase II depicted in figure 4. Third phase employee images are captured through webcams or drones and training model is applied to face recognition embedded with face mask detection module, architecture of third phase is depicted in figure 5, and corresponding pseudo code is listed below. Images from webcam and training model data is applied to face mask detection module which is in turn embedded with face mask detection.

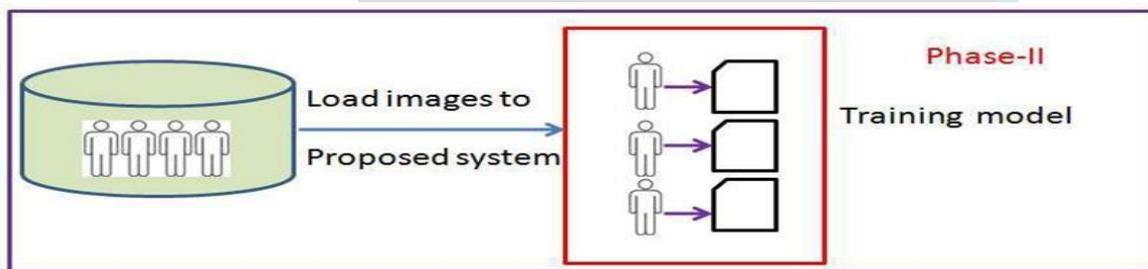


Figure 4: Phase II of proposed model.

Images of webcam or drones are compared with database to match employee, if a match is found then recognized employee id, face mask is also checked, if employee wearing mask not need to record data, only record data of employees who are not wearing mask.

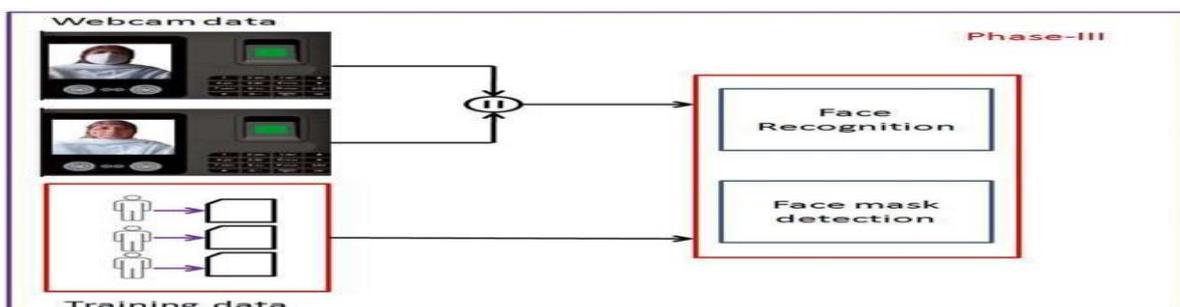


Figure 5: Phase III of proposed model.

Fourth phase output of third module is presented to end user and it is depicted in figure 6. To control covid-19 virus proposed model is used to identify list of employees who are not wearing mask, same list is forwarded to heads, and well as concern employees

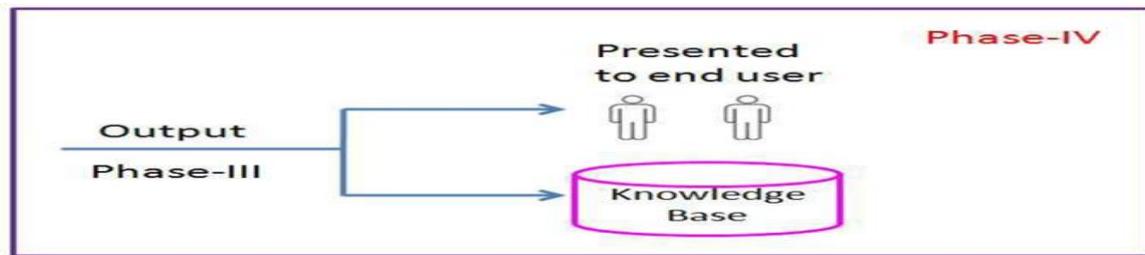


Figure 6: Phase IV of proposed model.

VI. CONCLUSION AND FUTURE WORK

Corona virus mutation with itself to produce new variant of virus, virus muted with same virus double, treble, and multiple times, due to mutation virus structure is changing every day, due to change of its structure it is difficult to manufacture appropriate vaccine, now virus spreading rate is 30% more than SRAS-Cov2 virus, and mortality rate also increased day by day. In this research paper, we proposed a new approach of face identification and mask detection and it is working in four phases. First phase data collection phase where images samples are collected from all employees of an organization and stored into a database, second phase all images of employees are loaded into proposed system for training where for each employee separate folders are maintained to store images, Third phase employee images are captured through webcams or drones and training model is applied to face recognition embedded with face mask detection module, fourth phase output of third module is presented to end user. To control covid-19 virus proposed model is used to identify list of employees who are not wearing mask, same list is forwarded to heads, and well as concern employees. The proposed method gives better results to break pandemic and it is useful to predict spread of virus to other peoples. This system can be readily used by small corporations, organizations and universities with a minimum price under the COVID-19 and help to exercise social distancing. the feasible destiny works is extending the machine with greater functions together with temperature check and social distance take a look at so that the system can be utilized in extra scenarios.

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