REVIEW ON FACE MASK DETECTION

A PROJECT REPORT

by

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REVIEW ON FACE MASK DETECTION

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Abstract:

As we all know how the people are getting affected day by day due to Covid- 19.And the death rate is also getting increased day by day. We are in requirement of a system that detects whether the person is wearing mask or not . so in the more crowded areas like people in shopping malls ,people working in companies , and markets ,railway stations ,bus stops ,schools ,colleges where ever in the public places this system is mandatory .A person cannot monitor all the time because a single person cannot watch thousands of people in a place . So in this case this system works really well.This system is designed for ensuring people safety .There are only three possible ways for stopping the spread of the corona virus .

1. **Wearing mask**
2. **Hand sanitizing**
3. **Social distancing**

Here in this we use two models (deep learning and cascade classification) for face detection. This article describes how we use deep learning in identifying the faces and cascade classification for identifying the live images .we use open cv for importing the dataset .in deep learning we use Caffe frame work.

Keywords: Deep learning, cascade classification, face mask detection, caffe framework ,open cv.

I. INTRODUCTION:

In this article it is written about the face mask detection, using various algorithms like deep learning and cascade classification and in the deep learning it uses caffee model for the face detection. Covid 2019 has influenced the world truly. One significant assurance strategy for individuals is to wear masks in open zones. Moreover, numerous public specialist co-ops expect clients to utilize the administration just in the event that they wear masks effectively.
The Caffe model in this face mask checking.There has been a ton of conversation around deep learning based methodologies for individual location. This urged us to think of our own calculation to tackle this issue. Our work on facemask involves information assortment to handle the difference in sorts of face masks worn by the laborers. The face mask identification model is a blend of face location model to distinguish the current appearances from camera feeds and afterward running those countenances through a mask discovery model.

An effective and monetary methodology of utilizing AI to make a sheltered domain in an assembling arrangement. A model utilizing deep learning for face mask discovery will be introduced. The face mask location dataset comprises of with cover and without mask pictures , we will utilize OpenCV to do continuous face discovery from a live stream through our webcam. We will utilize the dataset to construct a COVID-19 face cover locator with PC vision utilizing Python, OpenCV,and Tensor Flow and Keras. Our objective is to recognize whether the individual on picture/video transfer is wearing a face mask or not with the assistance of deep learning.

According to information got by the World Health Organization, the worldwide pandemic of COVID-19 has seriously affected the world around 8,000,000 individuals around the world. Wearing face masks and following safe social removing are two of the improved security conventions should be continued out in the open puts in request to forestall the spread of the infection. To make safe condition that adds to public security, we propose a productive .using deep Learning Face Mask Detection in Public Areas for COVID-19 Safety Guidelines Adherence.

The spread of COVID-19 Pandemic Disease has made a most critical worldwide wellbeing emergency of the world that has deeply affected mankind and the manner in which we see our reality and our regular day to day existences. In December 2019 the spread of extreme intense respiratory disorder Covid 2 (SARS-CoV-2), another serious irresistible respiratory ailment rose in Wuhan, China and has tainted 7,711 individuals and 170 revealed passings in China before Covid was announced as a worldwide pandemic, was named by the World Health Organization as COVID-19 (Covid sickness 2019).

Till now there is no report about any clinically affirmed antiviral medication or immunizations that are powerful against COVID-19. It has spread quickly over the world, bringing enormous wellbeing, monetary, ecological and social difficulties to the whole human populace.

Right now, WHO suggests that individuals should wear face mask to evade the danger of infection transmission and furthermore suggests that a social separation of in any event 2m be kept up between people to forestall individual to-individual spread of the pandamic. Moreover, numerous public specialist organizations expect clients to utilize the administration just in the event that they wear masks .
Accordingly, face mask identification has become an essential PC vision errand to support the worldwide society. This article portrays way to deal with the spread of the infection by checking progressively if individual is wearing face masks out in the open spots.

The COVID-19 pandemic is causing a worldwide wellbeing emergency so the viable assurance techniques is wearing a face cover in open zones as indicated by the World Health Organization (WHO). The COVID-19 pandemic constrained governments across the world to force lock downs to infection transmissions. Reports show that wearing facemasks while at work obviously diminishes the danger of transmission.

Motivation:

The motivation for doing this work is as we all know that covid-19 has become a greatest fear for every citizen throughout the world .So there are only three possible ways as per the government suggestion for stopping the spread of this the three things are Wearing mask, Hand sanitizing ,social distancing .So we have decided to design a system for face mask detection for entry into any public places .Like we are in requirement of this system at present .So our main motto is to design a system which checks for mask on a person face and detects the person without mask.

So the motto of this project came from the present scenario that is happening in the society .So to stop we have decided to implement this system. So this system is useful it is not a costly system this system can be in any places so it is not expensive also.Si this sytem can be used at any place.

Related Works

This paper provides some of the related works that were done in this field at the past and provides a comparative study based on various other schemes.

Du xia(2019) Research on face recognition using deep learning
The idea of profound taking in started from the fake neural organization, generally, alludes to classof neural organizations with profound structure of the successful preparing methods. As an amazing innovation to acknowledge man- made reasoning, deep learning has been broadly utilized in penmanship advanced acknowledgment, measurement improvement, discourse acknowledgment, picture understanding, machine interpretation, protein structure forecast and feeling acknowledgment.

Amit varma, (2019)A study on Face mask detection (conference paper)
The model worksvery well for pictures having frontal faces as well as alsofor non-frontal appearances. The paper additionally centers around removingthe mistaken forecasts which will undoubtedly happen.Semanticsegmentation of human face is performed with the assistance of a fully convolutional network.

II. BACKGROUND

This includes the frame works of Cascade classification and deep learning algorithm.Do do this we have to be familiar with these concepts first.so the frame work of these algorithms are mentioned below.

- **Framework Of cascade classification algorithm**

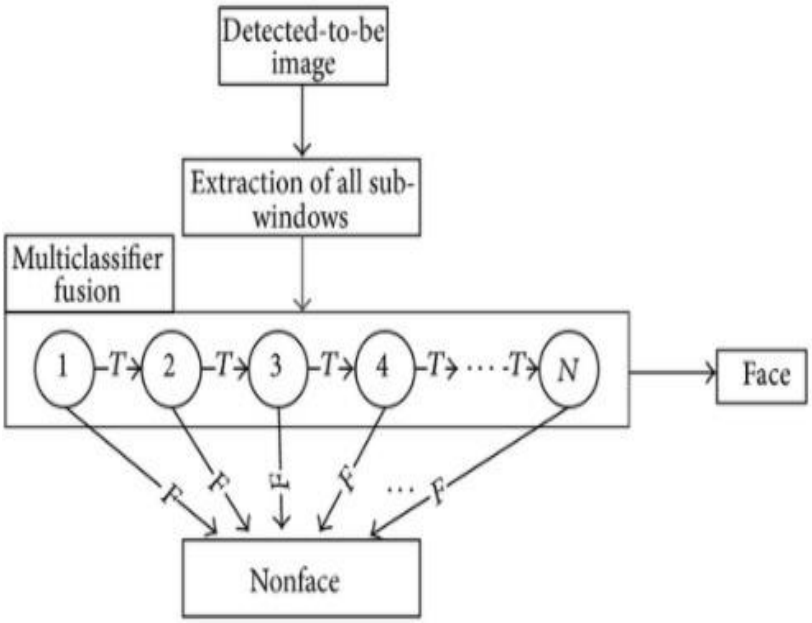

Fig. 1. Process of cascade classification algorithm

- **Framework of Deep Learning algorithm**

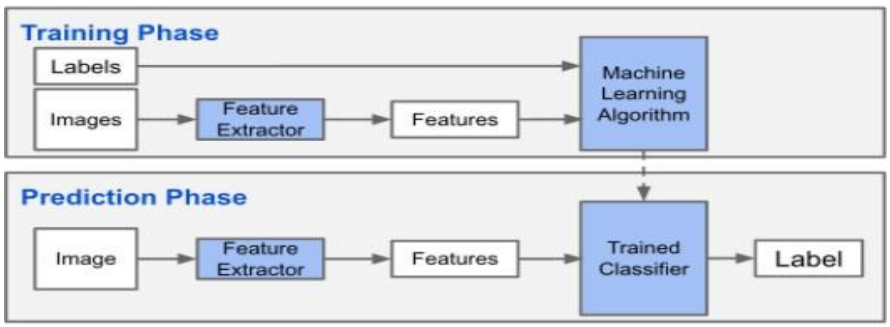

Fig.2. Process of deep learning algorithm.

III. LITERARTURE SURVEY:

Table 1: comparison of all the previous works

AUTHORS	METHODOLOGIES /TECHNIQ UES USED	ADVANTAGE S	ISSUES	METRICS
Peng Hong Zhao, yang Xi-Jun (2018) TITTLE: "Face Recognitio n Based on AND using Embedded System",	Eigen	No information on calculation and reflectance of countenances is required;	the strategy is exceptionally touchy to scale, in this manner, a low- level preprocessing is as yet important for scale standardization the eigenface portrayal is, in a least-squared sense, dedicated to the first pictures, its acknowledgment rate diminishes for acknowledgment under shifting posture and brightening.	Finding the euclidean separation at that point the mth section in the information base is an up-and-comer of acknowledgmen t. If e1<d<e2 then U may be an obscure face and can be added to the information base. If d>e2
FACE RECOGNI TION SYSTEM authors are li pe Yang (2019) TITTLE: FACE RECOGNI TION SYSTEM	Convenuti onal neural netwoks,b ay esian classificati on	Ease face acknowledgment framework.	Same individual with various posture even shows .64% divergence	Distinguishing proof and check measurements: Exactness and simmilarity
R.Raghavendra rao K. B. Raja and C. Busch, March 2016, TITTLE:" Attack Detection in for Face detection and Recognition Using Light Field Camera,"	Gradient based methods	No possibility of wrong person entry.	Cannot be used for large datasets	Average Classification ErrorRate (ACER) ACER = (APCER + NPCER)/ 2
U. Park, Y. Tong and A. K. Jain,(2018) TITTLE: "Age-Invariant Face Recognition,"	Neural networks	Commotion resistance in neural organizations is adaptable when Contrasted with others	Contains a ton of ambiquity in foreseeing	Meausres similarity

Hasan, S M Kamrul& Chowdhury, Tanvir. (2018). TITTLE:Face Recognition Using Artificial Neural Networks.	Artificial neural networks	ANN was the model that resulted in high accuracy with an accuracy of 98%	The poor performance in the training and testing of the face detection data resulted in insufficient data	Confusion matrx,ROC CURVE
R.Ranjanth ,(2019) TITTLE: "A simple and Accurate System for Face Detection and Identificat ion,and Verificati on	End-to-End Face Identificat ion and Verificati on	The results obtained are fast and accurate Robustness is high	Detailed knowledge /experience is Needed to implement this system	ROC bends are utilized to gauge the presentation of face check(1:1 coordinating) strategies, and CMC and TPIR-FPIR bends are utilized for assessing face distinguishing proof (1:N hunt)
l. eh.Kastur i et al., (2017) TITTLE: "the methodol ogy for Performa nce Evaluatio n of Face, Text, and Vehicle Detection and Tracking in Video: Data, Metrics, and Protocol,	evaluating object detection and tracking algorithm s	Priorfollowing innovation assessments either centered around the spatial part of the assignment. Presently in this a spatiotemporal methodology toward the assessment of global positioning frameworks was embraced.	This requires more calculatio n knowledge that denotes what output represent s what.	Casing Detection Accuracy
Shang- Hung Lin, Sun-Yuan Kung and Long-Ji Lin, (2015) TITTlE:" Face recognitio n/detectio n by probabilist ic decision-based neural network,"	probabilist ic choice based neural organizati ons (PDBNN)	In the event that the relationship surpasses a specific edge, at that point a face is confirmed,so the location doesnot contain any ambequity	The central question and trouble in face recognition is to represent a wide scope of varieties in facial pictures.	False rejection and mis classification
Du xia(2019) Research on face recognition using deep learning	Deep learning algorithms give more accurate results	The idea of deep taking in started from the fake neural organization,gener ally, alludes to a classof neural organizations with profound structure of the successful preparing	Many methods are there .so in order to understand all the methods the person need to be expert in understanding all algorithms.	Accuracyand false rejection

		methods. As an amazing innovation to acknowledge man-madereasoning, deep learnin has been broadly utilized in penmanship advanced acknowledgment, measurement improvement, discourseacknowledgment, pictureunderstanding, machineinterpretation, protein structure forecast andacknowledgment.		
Amit varma, (2019) A study on Face mask detection (conferenc e paper)	Semantic segmentation	The model worksvery well for pictures having frontal faces as well as alsofor non-frontal appearances. The paper additionally centers around removingthe mistakenforecasts which will undoubtedly happen. Semanticsegmentation of human face is performed with the assistance of a fully convolutionalnetwork	Accurate face masks are not dtetected like if a person moves the face from the systemit doesnot recognizes properly	Verification and perdormnace metrics like accuracy .
Kin jua ,machine learning methods for face mask detection(2019)	Support vector machine ,decision tree	Here decision tree is used for predicting the values so it can give the results in a clear graph format.so that every one can understand	No accurate system is developed yet there are some basic system that are still evolving	Accuracy,precisi on ,recall

Fang bah,medhi (2017) Improved face recognitio n in attendance monitorin g	Convoluti onaty neural networlks and Dual cross pattern,	Accurate and system is reliable and the sytem also has robustness	Facial expressions are not taken into consideration here	Auto correlation matrix
Face recognition by tun ki yo(2015)	Recurrent neural networks	RNN can deal with contributions of any length.	Training and testing is very difficult.	Gradiant based mutation function
S. M. H. Anvar, W. Yau and E. K. Teoh, (2015) TITTLE:"Multiv iew Face Detection and Registration Requiring Minimal Manual Intervention	Insignifi cant MANUA L INTERV ENTION	require physically marked pictures for preparing,	Initial investment is more	Proliferation Error:Those highlights
K. Jeong, J. Choi and G. Jang, {2015) TITTLE:"Semi- Local Patternsfor Robust Face Detection	Adaboos t Feature Selection Method	System is very much accurate	It takes a lot of time for training	beneficiary working trademark (ROC) bends: The bend is made by two information bases with four highlights.It speaksto the connection between various bogus positives and the discovery rate. At the point when the bogus positive per picture (FPPI) is 0.1, the discovery pace of the LBP, MCT, SLBP, and SMCT highlights 0.874, and 0.911, individually

[1]. From the first I infer that the face detection is done through eigen face recognition algorithm and in this algorithm eucilidean distance for calculating the similarity whether the face detected is matched or not .in this it has both advantages as well as disadvantages the advantage is that normalization is very simple and the disadvantage is that if pose varies it doesnot give the accurate result

[2]. From the second we can infer that they used convulutionary neural networks for the detection and here it is of low cost but the thing is it doesnot predit accurately ,this can be calculated using the identification and verification metrics

[3]. From the third , I infer that they used minimal manual interevention algorithm and here we calculate the propogation error and based on that the prediction is said like whether the predicted one is accurate or not here the error should not be less than 1 .if it is less thsan 1 those are removed.

[4]. From the fourth ,I infer that they used neural networks but it had an issue like Contains an ambequity while implementing and it uses similarity measure

[5]. From the fifth , I infer that they used ANN but the issue is The poor performance in the training and testing of the face detection data resulted in insufficient data and they used ROC curve as metrics

[6]. From the sixth ,I infer that they used End-to- End Face Identificat ion and Verification and the issue is Detailed knowledge /experience is Needed to implement this system and the metrics used is verification ,identification,ROC curve

[7]. From the seventh, I infer that they used evaluating object detection and tracking algorithms and the issue is This requires more calculation knowledge that denotes what output represent s what.and the metrics used is Casing Detection Accuracy

[8]. From the eight ,I infer that they used probabilistic choice based neural organizations (PDBNN)and the issue is The central question and trouble in face recognition is to represent a wide scope of varieties in facial pictures.and the metrics used is false rejection and mis classification.

[9]. From the nine, I infer that they used Deep learning and the issue is Many methods are there .so in order to understand all the methods the person need to be expert in understanding all algorithms.and the metrics used is false rejection.

[10]. From the tenth , I infer that they used Semantic segmentation and the issue is Accurate face masks are not dtetected like if a person moves the face from the system it doesnot recognizes properly and the metrics used is Verification and perdormnace metrics like accuracy

[11]. From the eleven, I infer that they used Support vector machine,decision tree and the issue is No accurate system is developed yet there are some basic system that are still evolving and the metrics used is Accuracy,precision,recall.

[12]. From the twelve ,I infer that they used Convoluti onaty neural networks and Dualcross pattern,and the issue is Facial expressions are not taken into consideration here and the metrics used is correlation matrix

[13]. From the thirteen,I infer that they used Recurrent neural networks and the issue is Training and testing is very difficult.and the metrics used is Gradiant based mutation function

[14]. From the fourteen ,I infer that they used Insignificant manual intervention and the issue is Initial investment is more and the metrics used is propogation error.

[15]. From the fifteen,I infer that they used Adaboost Feature Selection Method and the issue is It takes a lot of time for training and the metrics used is ROC,FAR,FRR.

IV. PROPOSED ALGORITHM:

Deep Learning is a standard worldview of Machine learning, accurately one of its calculations. For the best degree, it depends on an idea of a human mind and the cooperation of neurons. While customary AI calculations are straight, profound learning calculations are stacked in a progressive system of expanding unpredictability and reflection. The very idea of profound learning includes the feeling of obtaining information about any article. It is modified so that it can characterize objects into various classes.A completely associated layer that utilizes the yield of the convolution layer to foresee the best depiction for the picture.
The process can be clarified as:

- Convolutional layer—creates a component guide to foresee the class probabilities for each element by applying a channel that filters the entire picture, scarcely any pixels all at once.

- Pooling layer (downsampling)—scales down the measure of data the convolutional layer produced for each element and keeps up the most fundamental data (the cycle of the convolutional and pooling layers as a rule rehashes a few times).

- Fully associated input layer — "straightens" the yields created by past layers to transform them into a solitary vector that can be utilized as a contribution for the following layer.

- Fully associated layer — applies loads over the info produced by the component examination to anticipate a precise name.

- Fully associated yield layer—generates the last probabilities to decide a class for the picture.

The dataset comprises of two envelopes with_mask and without_mask separately. All out number of pictures are 1376, while the quantity of pictures with_mask is 690 and that of without_mask is 686.

Split the dataset into Train and Test information

Considered to one of the main advance in Machine-Learning, parting the dataset into preparing and testing information makes it simpler to prepare the face-indicator model and test it later.
We are saving 80% of the information for preparing, while the rest goes to test information. Notice the way at which the dataset is accessible and furthermore the way where you need to spare the information in the wake of being part. This is the means by which the organizer looks:

train-test information

The code scrap underneath shows the split activity and quantities of pictures being allocated to prepare and test information.
We characterize our face-indicator utilizing the Sequential model in CNN which permits the simple stacking of the apparent multitude of repetitive layers all together from information and yield. We are utilizing 2 convolutional layers with 'Relu' as the actuation capacity and 'MaxPool2d' as the pooling layer. The model is then leveled and a 'dropout' estimation of 0.5 is utilized to evade overfitting.
The CNN model is presently prepared. In any case, before we really utilize the model to prepare, the information must be enlarged to improve result with great exactness. In this way we use 'ImageDataGenerator' to the preparation and the testing set to get training_generator and validation_generator which has the first just as expanded information.

The model is currently fit to be prepared. We use fit_generator whose sole object is to prepare a lot of information because of information growth which is done to keep away from overfitting and increment the capacity of our model to sum up. We are preparing the model with 30 ages.
After the preparation is finished we see that the exactness accomplished is 98%, which demonstrates that the model is being prepared very acceptable.
Testing the model on pictures

So as to test the model in genuine information, we need a face locator model is hearty to all the impediments of the face. For this reason we have OpenCV, which has pretrained models. The ones utilized here is the deploy.prototxt and res10_300x300_ssd_iter_140000.caffemodel.
The prototxt file(s) which characterize the model engineering (i.e., the layers themselves) and the caffemodel document which contains the loads for the genuine layers. These face-indicator help give the best outcomes with MobileNetV2 which is utilized for versatile visual acknowledgment including characterization, object recognition and semantic division.

To run deductions on a picture, we will utilize our spared model from the past segment, and cycle each edge:

- Extract the countenances
- Pass them to our face veil identifier model
- Draw a bouncing box around the distinguished appearances, alongside the forecasts processed by our model.

Proposed architecture with the proposed algorithm :

WITHOUT DATA SET (EXTRACTING LIVE IMAGES OF PERSON FOR DETECTING)

IT INCLUDES MODULES LIKE

1. IMAGE ACQUISITION:
2. FEATURE EXTRACTION
3. COMPARISON

Module 1: Image Acquisition Module:
system and then capture the live images.An advanced picture is delivered by one or a few picture sensors. different kinds of light-touchy cameras, incorporate range sensors, tomography gadgets, radar, super sonic cameras, and so on.
Depending on the sort of sensor, the subsequent picture information is a normal 2D picture, a 3D volume, or a picture grouping. The pixel esteems commonly compare to light force in one or a few unearthly groups (dark pictures or shading pictures), however can likewise be identified with different physical measures, for example, profundity, retention or reflectance of sonic or electromagnetic waves, or atomic attractive reverberation.

Module 2: Feature Extraction Module:
Here from the image that is captured it needs to detect only the face area .so trimming here is called the extraction of features from the face.Trimming: The fundamental kind of preprocessing alludes to picture editing. Editing alludes to the expulsion of the external pieces of a picture to improve outlining, emphasize topic or change perspective proportion. At the end of the day, it alludes to eliminating undesirable regions from a computerized picture catch. This is required in the venture in the aspect of the face enrollment . Face detection: it shows the box on the face detected .And then we apply the cascade classification algorithm for detecting the face mask in the persons face.

Module 3: Comparison

Verifies whether the person is wearing mask or not by the cascade classification algorithm.so here it verifies the person face first and then in the face it takes some points and identify at that points whether the mask is present in the persons face or not. It can take the live images and then verifies each persons face and checks for mask if mask is there it tells mask is there and if there is no mask it tells no mask present.

Here we do not need any database/matching module as it captures the live image through the web cam in the system and does not save any where it just verifies the person through web cam and then tells whether the person face contains mask or not

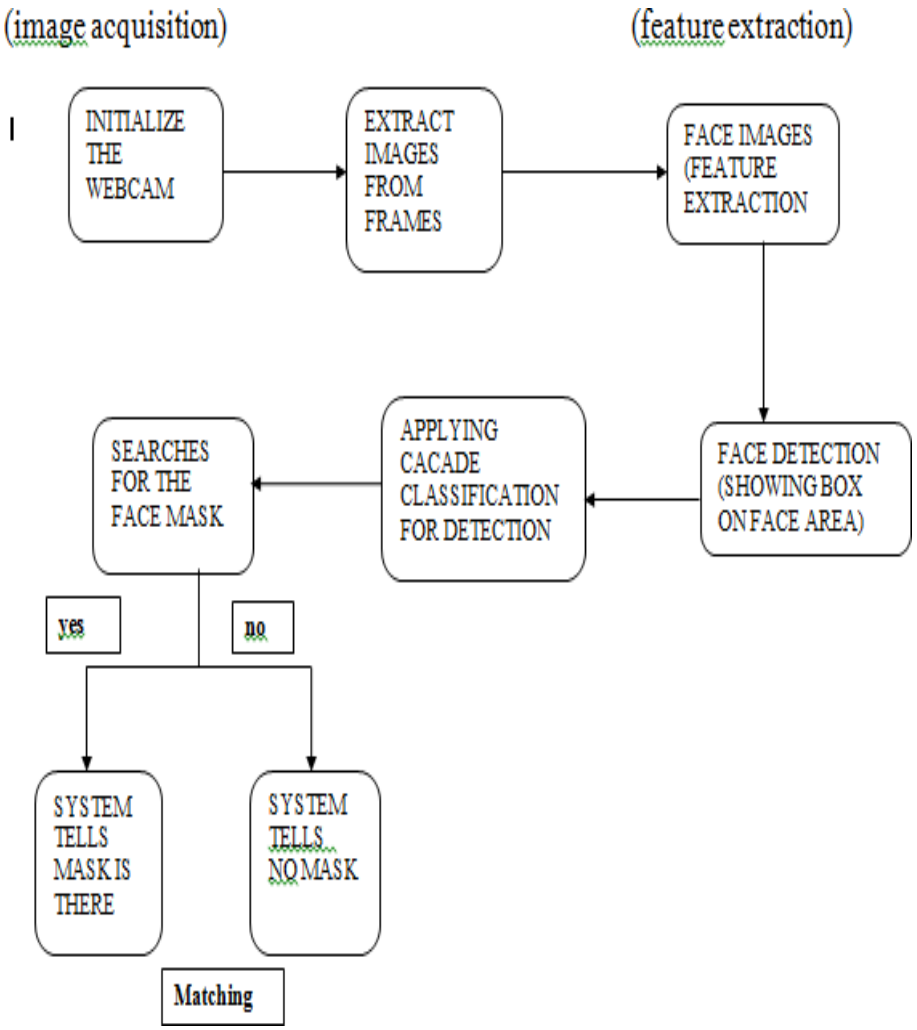

Fig.3. General architecture for without dataset

WITH DATASET ARCHITECTURE:

IT INCLUDES MODULES LIKE:

1. CAPTURE(image acquisition)
2. FEATURE EXTRACTION
3. COMPARISON
4. MATCHING(data base)

ENROLLMENT:

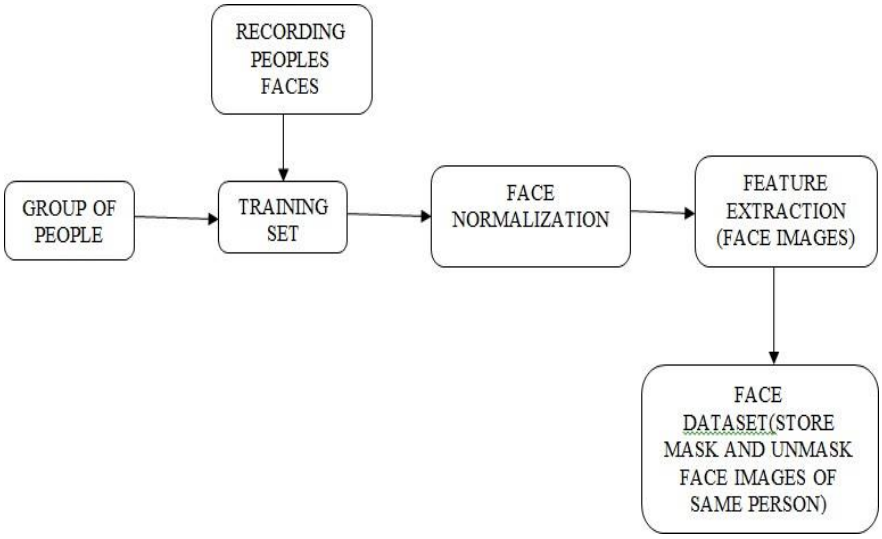

Fig. 4. Enrolllment process

AUTHENTICATION/VERIFICATION:

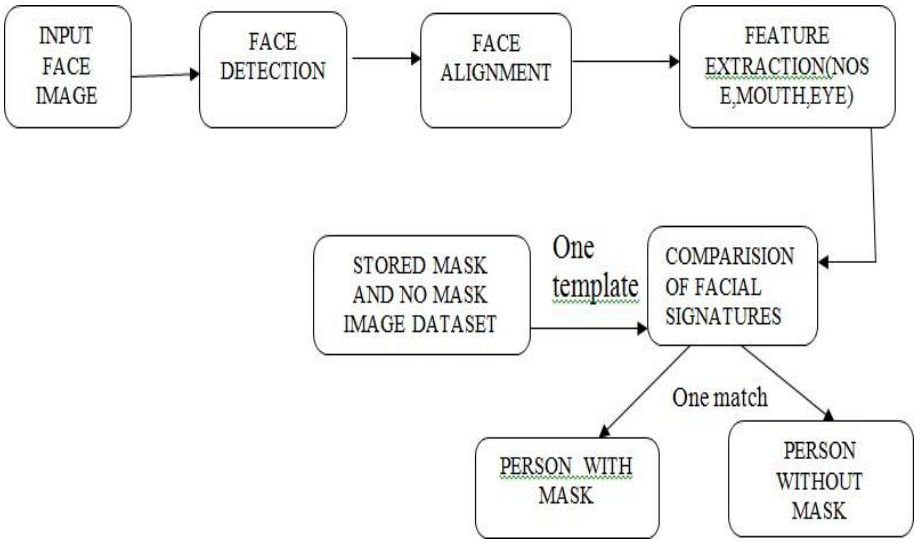

Fig. 5. Authentication/verification process

IDENTIFICATION:

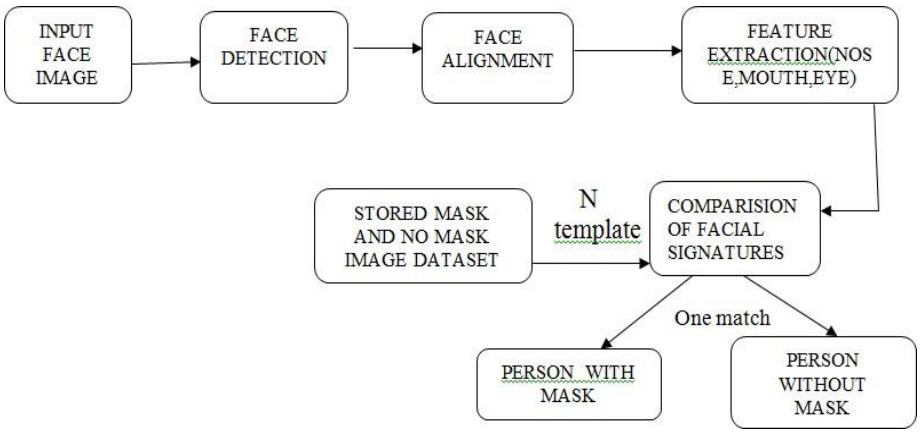

Fig. 6. Identification process

TRAINING AND TESTING DATASET:

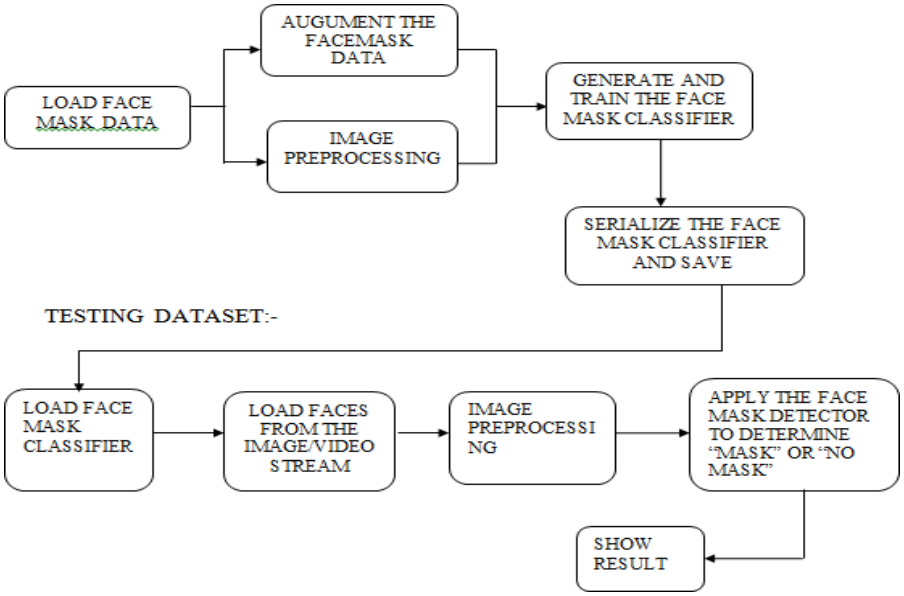

Fig. 7. Training and testing process

MODULES DESCRIPTION:

- CAPTURE:

Here the image is captured through the webcam or camera in the system.firstly we have to initialize the web cam and then all the images of persons will be captured and then the mage will be saved in database with different types like the person with mask and the person with NO mask.

- FEATURE EXTRACTION:

The facial features are extracted using the deep learning by using Caffee model and then The box will be displayed on the face of the person.

➢ COMPARSION :

Here the comparison of facial signatures happens like a picture of person with mask and the person with no mask are compared. Apply the face mask detection techniques to detect the persons face has face mask or not.

➢ MATCHING:

Here in the matching module it checks for the facial signatures like a person with mask And the person with no mask . and the images are classified into mask images and no Mask images and then store it in the database. and the images under go training and Testing and then an image is taken and then predicts the image of the person is Classified into mask or no mask.

➢ ENROLLMENT:

In Enrollment stage here the faces of all the persons are stored in the dataset and all the Faces in the dataset gets enrolled. From a group of people the faces gets recorded and Then it undergoes training and then stored in the dataset.

➢ AUTHENTICATION:

The person image from the dataset is authenticated and verified .if the person had mask Is authenticated and then the authenticated user(here in this case) the person with Face mask is allowed to enter.

➢ IDENTIFICATION:

without face mask Is also identified from the crowd/group of people.and then the person without the mask Is identified and then the system tells no mask . and then the person with mask is also identified and the system tells mask is there you can enter.

V. EXPERIMENTS RESULTS

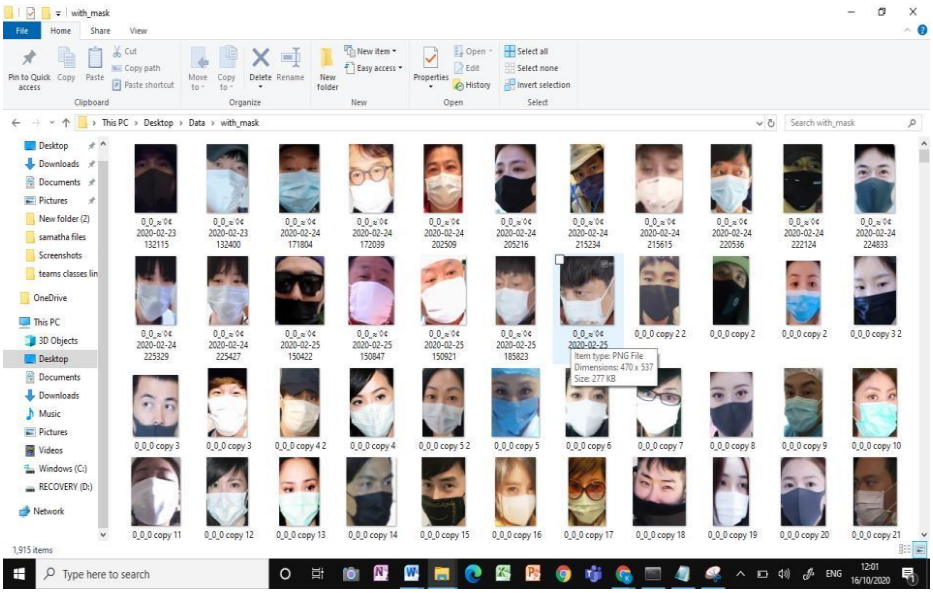

Fig. 8. Dataset of with mask images

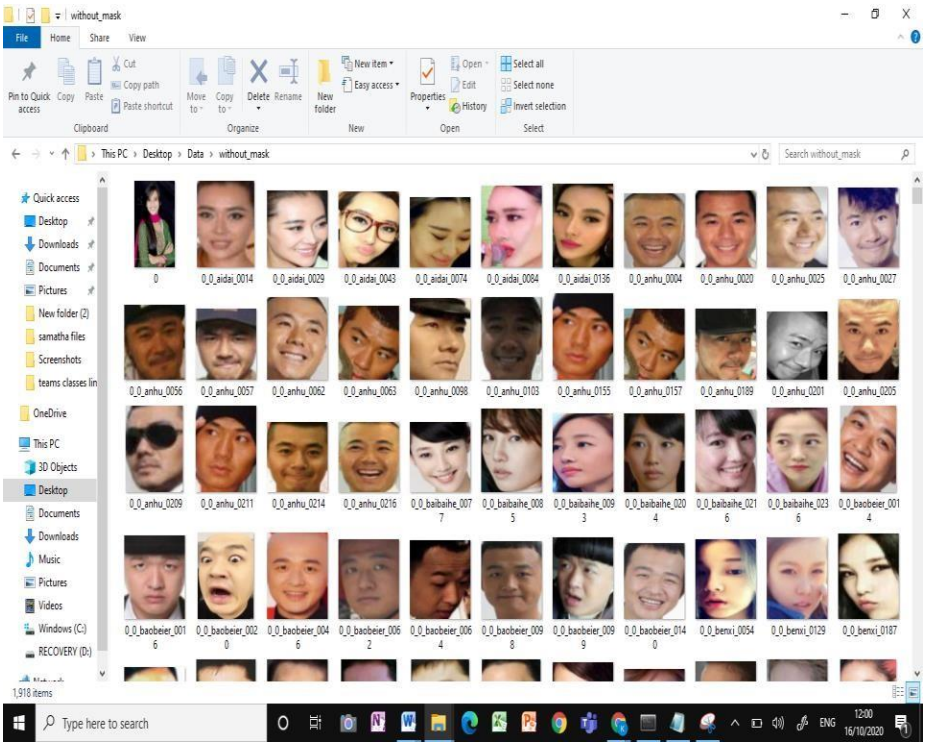

Fig. 9. Dataset of without mask images

Through deep learning it is identified and the following will be the output:

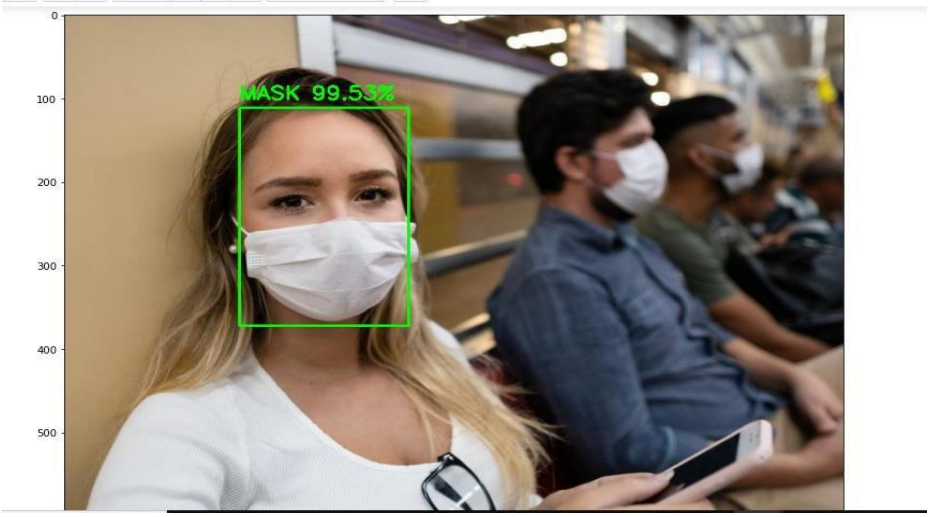

Fig. 10. Mask detection with accuracy percentage

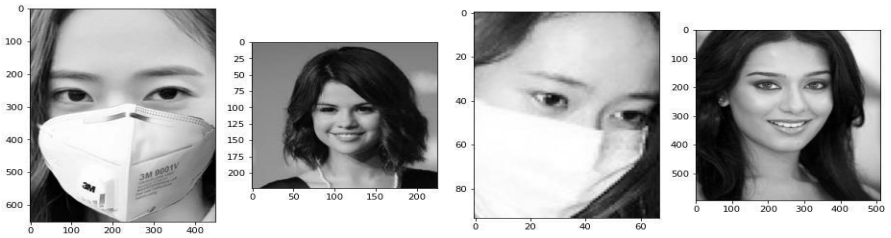

Fig. 11. Face images with boundaries for testing and training.

```
In [6]: model = model_builder()
```

```
Model: "sequential_1"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d_1 (Conv2D)            (None, 200, 200, 32)      320
_________________________________________________________________
max_pooling2d_1 (MaxPooling2 (None, 100, 100, 32)      0
_________________________________________________________________
dropout_1 (Dropout)          (None, 100, 100, 32)      0
_________________________________________________________________
conv2d_2 (Conv2D)            (None, 100, 100, 32)      9248
_________________________________________________________________
max_pooling2d_2 (MaxPooling2 (None, 50, 50, 32)        0
_________________________________________________________________
dropout_2 (Dropout)          (None, 50, 50, 32)        0
_________________________________________________________________
conv2d_3 (Conv2D)            (None, 50, 50, 32)        9248
_________________________________________________________________
max_pooling2d_3 (MaxPooling2 (None, 25, 25, 32)        0
_________________________________________________________________
flatten_1 (Flatten)          (None, 20000)             0
_________________________________________________________________
dropout_4 (Dropout)          (None, 20000)             0
_________________________________________________________________
dense_1 (Dense)              (None, 128)               2560128
_________________________________________________________________
dense_2 (Dense)              (None, 2)                 258
=================================================================
Total params: 2,579,202
Trainable params: 2,579,202
Non-trainable params: 0
```

Fig. 12. Visualizing data

```
Epoch 00011: ReduceLROnPlateau reducing learning rate to 0.0004218749818392098.
Epoch 12/15
64/64 [==============================] - 62s 967ms/step - loss: 0.1579 - accuracy: 0.9307 - val_loss: 0.1810 - val_accuracy:
0.9387
Epoch 13/15
64/64 [==============================] - 72s 1s/step - loss: 0.1440 - accuracy: 0.9443 - val_loss: 0.0387 - val_accuracy: 0.
9401
Epoch 14/15
64/64 [==============================] - 74s 1s/step - loss: 0.1331 - accuracy: 0.9480 - val_loss: 0.0617 - val_accuracy: 0.
9264

Epoch 00014: ReduceLROnPlateau reducing learning rate to 0.00031640623637940735.
Epoch 15/15
64/64 [==============================] - 73s 1s/step - loss: 0.1368 - accuracy: 0.9507 - val_loss: 0.0743 - val_accuracy: 0.
9441
```

Fig. 13. Iterations

Accuracy of Model

```
In [10]: print("Accuracy Score:" , round(accuracy[-1]*100))

Accuracy Score: 95.0
```

Fig. 14. Final average accuracy.

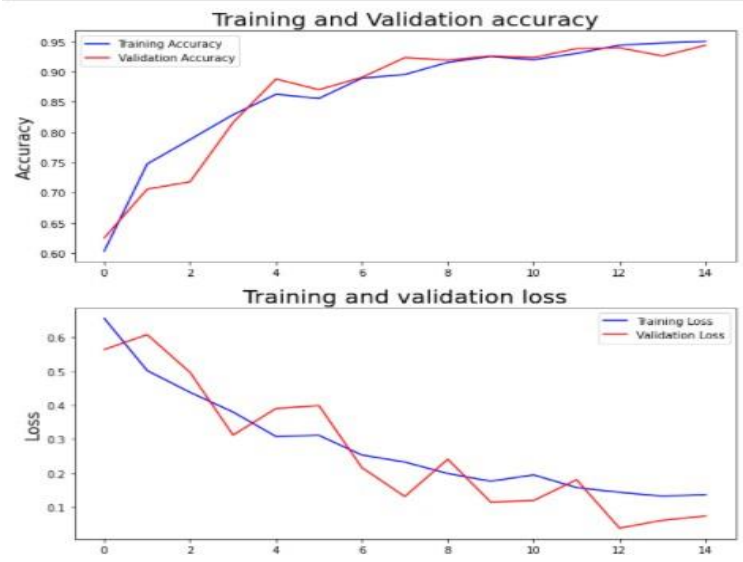

Fig. 15. Learning curve based on Accuracy and Loss

Fig. 16. Output from cascade classification algorithm(No Mask image)

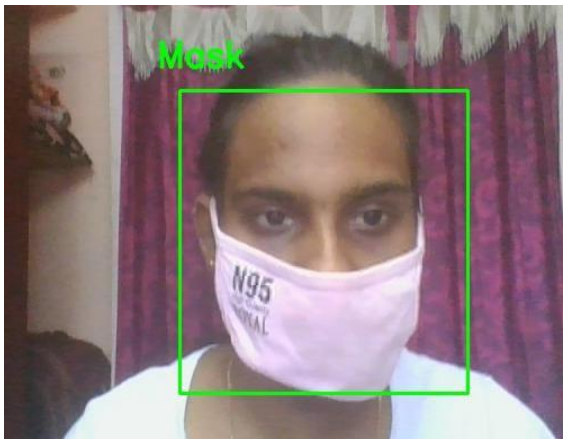

Fig. 17. Output from cascade classification algorithm (Mask image)

VI. COMPARATIVE STUDY

So , this system has high accuracy as shown in the experimental analysis .so this is highly accurate system and there is no existing system that is developed for the face mask detectetion .so the algorithm that we used here is deep learning technique which resulted in high accuracy compared to other algorithms. Deep learning Caffee model it has an accuracy of 99.5% and an average accuracy of 95%.

So like wise they are many techniques stated in the table but none of the techniques are best suited for our application so in this system that we are going to design we thought of choosing deep learning techniques as it is highly accurate and in the deep learning is captures the image and then it stores in the dataset this process is done using the caffee model. And here the metrics that is used is accuracy .this tell how accurate the predicted results are and based on that we come to a conclusion that the predicted value does not contain any error

Here we are also using the cascade classification algorithm for the ;live images without dataset .here it captures the live images of the person using the web cam and then in the image it verifies for the mask in the persons face if mask is there it tells the person is wearing mask if no mask it tells the person in not wearing the mask.

ALGORITHM	DESCRIPTION	ACCURACY
YOLOv3 algorithm for face detection	It was trained on CelebA and WIDER FACE dataset including more than 600,000 images	93.9%

Table 2 : Accuracy for previous algorithm

ALGORITHM	DESCRIPTION	ACCURACY
DEEP LEARNING USING CAFEE MODEL	To identify the person on image/video stream wearing face mask with the help of deep learning	Average accuracy of 95%

Table 3 : Accuracy of algorithm implemented

VII. CONCLUSION AND FUTURE WORK

CONCLUSION:

As the innovation are blossoming with rising patterns the accessibility so we have novel face veil finder which can add to public healthcare.The precision of the model is accomplished and, the enhancement ofthe model is a persistent cycle and we are building a profoundly exact arrangement by tuning the hyper parameters.

This framework can along these lines be utilized continuously applications which require face-cover identification for wellbeing purposes because of the episode of Covid-19. This task can be incorporated with installed frameworks for application in air terminals, railroad stations, workplaces, schools, and public spots to guarantee that public security rules are followed.Caffe Model is utilized to get highlights of picture. These highlights are gotten utilizing recently prepared preparing.

A portion of the capacities utilized incorporate article arrangement, considering the semantic highlights of a picture, and item identification. Caffe gives a reference model to tackling visual problems.In this investigation, the Caffe Model is utilized to play out a face determination in the picture created by the information device.

This should be done so the forecast cycle that has been completed at the preparation information stage produces the normal worth. To utilize Caffe Model, it is important to utilize a few documents that OpenCV requires:a record with the augmentation .prototxt containing the neural organization setup, and the document with the *.caffemodel which contains the weight estimations of the recently prepared model.

In the fitting cycle, the batch_size utilized is 15, the means per age are resolved as the measure of preparing information separated by bunch size. At that point, in this fitting cycle, we characterize approval information where the quantity of approval steps is equivalent to the quantity of approval information isolated by the quantity of group measures that we characterize.

After preparing model is finished, the model is put away in a record so it very well may be handily used to do the errand of ordering pictures from cameras, pictures, and video pictures.

The face location picture utilizes the Caffe Model. The identified face is grouped utilizing a model that has been tweaked to see whether there is a cover or not on the face picture.

With regards to the presentation of the model, the framework can identify facial pictures without a cover, with a cover, and incomplete veil (remembered for the characterization without a cover). The model that has been made has had the option to work appropriately.

There is a distinction in preparing time for pictures without face pictures and there are face pictures. The time required for the framework to handle data without a facial picture in it is at a normal season of 0.0943

seconds per outline. The more extended time experienced by the framework when there is one face picture, which is 0.3471 seconds per outline. This is common on the grounds that the program does some pre-preparing so as to acquire a precise grouping esteem. A model is coordinating the components of the picture taken through the camera, at that point picture handling which is like picture preparing before the model is made.

The results are followed in three phases as face detection, Face recognition and Face classification.Each phase is explained as below for better understanding. The ability to recognize real time human faces is done by using latest software and database built on computer technology.

The Human face detection involves objects, landscapes and background etc. The work is carried out in three different phases where in the first phase the camera reads the image and captures it based on the openCV haar cascade detection .Now the face is detected and then it recognizes and detects the mask is present in the persons face or not.

FUTURE WORK:

The future work includes improvising the face mask detection which includes face mask as well as social distance signaling With the face mask detection we can also integrate the hardware which includes the sensors for alarm sound when a person with no mask is detected and also if the person is not wearing mask and not wearing mask is detected and to the person who is recognized it verifies for the social distance is mainatained or not if not maintained then it will be giving some alarm sound throughthe hardware component.

VIII. REFERENCES

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