

MACHINE LEARNING BASED IMPLEMENTATION OF FACE DETECTION AND SECURED AUTHENTICATION

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Abstract - In Human identification the Face is Most widely used for detection and Authentication. Among the biometric authentication face recognition is growing applications. This is useful for data retrieval, video surveillance, access control and social media. Compare with other biometric systems, facial recognition based systems work independently without involving the individual, due to which it does not add unnecessary delay. Its ability of recognizing multiple faces at a time further adds to its speed. There are so many face recognition methods available based on concept of machine learning. Improvisation are made with the constant developments in CV. and machine learning. Similarly spreading of COVID-19 all over the world, the people who wear mask is it is very difficult to identify them for this we need to develop new technologies to analyses and fight against the disease spread.. The project with logical proof and applications. proposed face detection are update artificial network to detect the person with and without mask. If a person is not wearing a mask, then proposed work will give you alert to the person if he or she is in the database of the platform. This paper provide accuracy to identify and authenticate the person.

Keyword: Face Detection, Machine Learning ,Face recognition, face mask detection, Security.

1.INTRODUCTION

Face detection and secured authentication systems have been conducted from many years. Face detection with mask and without mask is one of the researches in area pattern recognition & computer vision due to its think of practical applications in the zone security Information, minimize enforcement, smart card and any other system. The Florida was first introduced big application of face recognition. Biometric-based techniques have most widely used technic with face , instead of certifying people and allowing them access to physical and virtual domains based on passwords, PINs, smart cards. Unique code and Password are very difficult to memories, so unique key ,card, password and the like pay be replaced duplicated, magnetic cards can become corrupted and unclear.

For improving the security for all the stage with human part, face identification and authentication will be more accurate value given for perform high level task and with mask identification is the additional part to growth of identification for secured person which working is cleanly sharply with this idea, It will hammering the all economic cycle and daily routine life of humans The main source of spreading for the corona pandemic is not wearing the mask to avoid spreading the COVID-19, while maintaining their Propose system, the covid virus can be spread by touching a hand and body that has it active , and also by touching of mouth, nose, and eyes. We can protect our self by avoiding getting the corona virus. According to who the best procedure to avoid spreading or infected with the disease is to practice social distancing and wearing face mask when go to public areas . So the every government releasing the guidelines and trying to convince the peoples to wear the mask on face but due to population of India resolve this amount of population is very hard job. So to making the our system more effective we can use our software execution technique which helpful for government to detect the person and watch on person who wear mask or not wearing mask peoples.

Mask detection and authentication is process which might be implemented through open CV and image processing technics and algorithm within which the face goes to be processed which helps to search out out the mask on face and also display that person what proportion accurately wear the mask on face. Open Computer Vision is that the big platform which helping us for the execution compilation determination. So the particular implementation is completed ..These rules However, The methods changes into lots of adverse. the method under the guidance finding of anyone who isn't playing a mask on face. Here we introduce a mask detection model that's supported machine learning and image process techniques. The model can perform be operation on detection the face with mask and non mask with image and real time detectermination of population wearing mask or not wearing a mask. The model is developed between deep learning and advance machine learning techniques with Open CV. Actually we are providing effective security for face detection and face mask detection for making more stronger application...

2. LITERATURE REVIEW

This paper titled Intelligent face prediction system uses the face detection model. In this work, Biometric based individual ID frameworks are utilized to give elective answers for Authentication and calculations for biometric acknowledgment technics and Albeit numerous methodologies has been created and given to writing, relation lot of biometric highlights until now concentrated not in the field . In this investigation, they have examined the presence of any connection between biometric highlights and they have attempted to get a biometric highlight of an individual from another biometric highlight of a similar individual. They have organise and presented keen framework utilizing a novel technics dependent on fake neural organizations for creating face expression that are eyes, nose and mouth from fingerprints with 0.75-3.60 outright percent blunders. The external energy counteracts with internal energy and enables the contours to deviate from the natural evolution and eventually assume the shape of the knn features head boundaries at a state of equilibrium. Two main considerations for forming snakes i.e. selection of energy terms and energy minimization [2] They have designed a paired face classifier which can identify any face present in the casing independent of its arrangement. Including this research to generate face division covers with any self-massive size info image or picture. Proceed from the RGB images of different sizes. making is performed through best technique Convolutional Networks that is CNN to similar piece of the faces present in that image , Descent utilization angle is for making with Binomial. Investigations were performed on Multi Parsing Human Dataset getting mean pixel level exactness of 93.884 % for the portioned face covers 3] Security being of most extreme significance, video reconnaissance has become a functioning examination point. Video determination upgrade process can spare HR, cost and increment the adequacy of the reconnaissance framework activity. The best that the Video Analytics for security process is to detect presence of object. In this paper, we put front a procedure for known face recognition process utilization four unique strategies of ways from camera, location, eyeris facial part discovery and distance between two eyeris . Standards utilization is done in paper the each person usually accessible calculations of every face identification and authentication . [4]. Facemasknet is a learning technique Utilized, got an exactness of 98.6 %. The Face mask net can work with still pictures and furthermore works with a live video transfer. In some cases objets in appropriately worn are the point at which the face part nose and mouth are secured half. The covering face detection is nominal in structure and gives screeny outcomes and hence it is utilized in CCTV film to recognize the picture if an every person is wearing a mask .

Problem Statement the prevailing system deals with CNN (convolutional neural network) within the mask detection

models, they use clustering, classification, max pooling to coach the machine on what's what. The CNN trains the machine with the assistance of dataset, around 20% of the photographs in dataset are wont to train the machine and also the remaining 80% is employed for testing the results. thanks to COVID-19, The face detection model improvised with the issues occurrence by humans within the world. This application provide an outsized thanks to stop the items from spreading and festering in our lives. The Person face detection model uses the face recognition library of java to match picture by similarity detection process. **Proposed** add proposed this face structure or shape is additionally determine. Also to take care of the list of person people who found and detect with no mask . if we track the persons with no persons dataset then it very critical to take care of the info set and different values. So proposed the face detection and authentication will work with face mask detection. so we determine the face yet as mask by which we determine the person and person code and can track the person who we wish .

3. METHODOLOGY

3.1 OpenCV it is a library ties which is employed to settle computer vision problems. The CV2 module of open CV is utilized for perusing and composing pictures from the video transfer. [1]. This framework has an in-built Face Detector that works in roughly 90-95% of clear photos of someone looking forward at the camera. Detecting a face of person when that person is viewed from an different angle is harder. Also, lack of proper brightness of a picture can greatly increase the issue of detecting a face, or increased contrast in shadows on the face, or even the picture is blurred, or the person is wearing goggles, etc. Face recognition however is far less reliable than face detection, with an accuracy of 30-70% normally. Face recognition has been a powerful field of research since the 1990s, but remains a far way off from a reliable method of user authentication. More and more techniques are being developed annually. The Eigenface technique is taken into consideration the only method of accurate face recognition, but many other (much more complicated) methods or combinations of multiple methods are slightly more accurate.

3.2 K nearest Neighbors (KNN) It is a calculation utilized for grouping objects dependent on the nearest preparing models in a component space.

3.3 Face Detection Based on HAAR Cascades and AdaBoost Algorithm Haar Cascade Classifier: It is utilized for object discovery; it identifies the face in a picture dependent on different highlights. With the image preprocessing procedure accomplished, we carry out the face detection process to determine whether the image includes the face. If there is a face, output its position and size, and then cut out the background part to obtain the face region. Since the distance between the face and the camera device is variable, the

position and proportion of the detected face are unfixed. In order to ensure the consistency of the detected face image size, we employ the geometric normalization to resize it with a uniform size. Feature-based face detection methods, [25] possess good detection efficiency and accuracy and have been widely used in many practical applications. In consequence, we employ Haar cascades and AdaBoost algorithm to realize the face detection task. Haar features are generated in accordance with the difference of image pixel gray values, which can reflect the gray variance of the face image well.

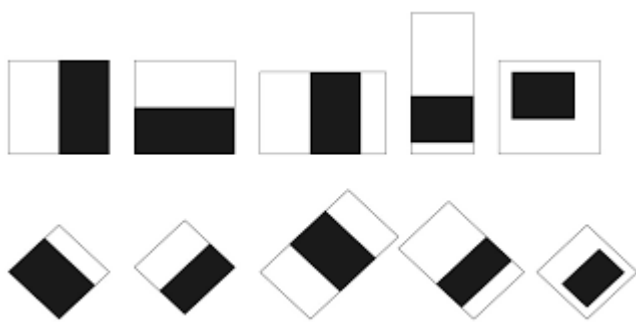


Figure haar feature template

3.4 Face ID: Haar cascades and AdaBoost algorithm is a precise classification method based on the cascade of multiple weaker classifiers. The basic principle is to concatenate several classifiers with weaker classification performance one by one to form a classifier with excellent performance. This algorithm can effectively increase the discrimination accuracy by using the feedback mechanism among different classifiers. For each weaker classifier, if the detected target is diagnosed as the negative sample, it is abandoned and no longer inputted into the next level classifier. Otherwise, it is inputted into the next level classifier for further discrimination. This not only greatly reduces the time consumption, but also lowers the false positive probability of the final output positive sample. For a face image, it initially detects and discards a large number of negative samples, which can greatly reduce a mass of data and speed up the efficiency of the algorithm. It is easy to see that the employed face detection method achieves a higher detection accuracy (i.e. 96.60%) compared with the method of histograms of oriented gradients (HOG) plus support vector machine (SVM) and it can effectively meet the practical application requirements.

3.5 Facial Feature Extraction Based on Improved LBP Algorithm

Real-time Local Binary Pattern-based Face recognition: Face Recognition isn't straightforward as of discovery and it burn-through time and requires complex handling. This work use java which runs on android this makes our work faster than the window based and other different level language. In this theory work, we proposed Real-time Local Binary Pattern (RT-LBP) a computational model for face acknowledgement,

which is quick, sensibly basic, and precise in obliged conditions, for example, an office or a household. Face recognition utilizing Local Binary Pattern have been proposed and fast. In this a different picture with information dataset is worked for each person. Results noticed for RTLBP system having 99.93% fruitful face acknowledgement for standard FERET information base and having throughput for 246.99 Kbps.

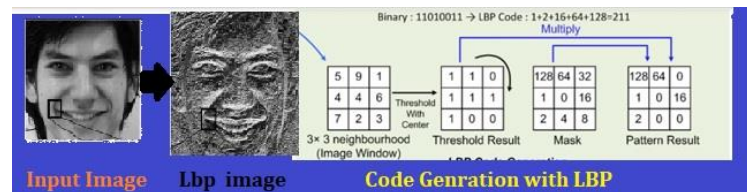
Proposed method calculation as follow:-

Stage 1: Input the RGB image with pixel values design.

Stage 2: improve the image quality and with more taking values for each piece of person face and store using the binary pattern which compare minimum and maximum values with formula .

Stage 3: Face recognition fast method OpenCV based methodology which work with Boosted Cascade of Simple Features finder to recognize face for an each in the picture. find the center and using naive bias algorithm determine face conversion with gray scale .

Stage 4: local Binary Patterns (LBP) is evaluate for a recognized and improved image processing. The process includes Thresholding ith image. After thresholding lbp generates the the code with binary values.



Step 5: Arrnge multiple copies in dataset

Step 6: perform row and column relation confirmation

Step 7: Identify more matched image with row of matrices one by one and recognized image.

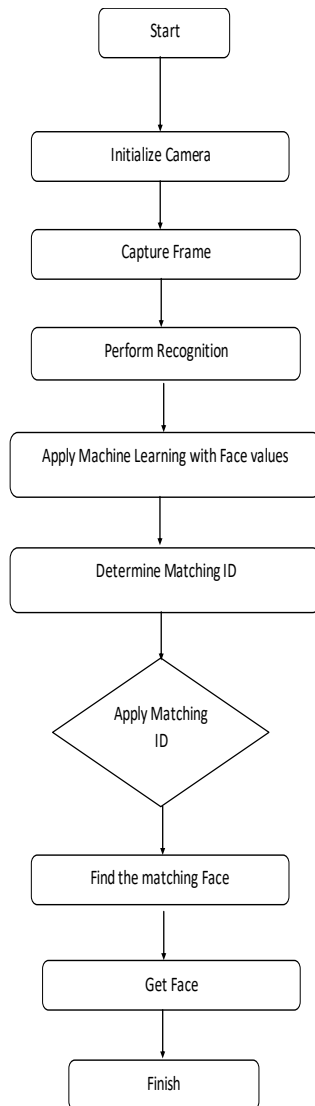
3.6 Face Matching Metric Rule

Match the matrix with inputted image using array concept and we used the CNN for improvisation of it

Convolutional Neural Network (CNN) is a deep class neural network, used of applied to analyze visualization imaginary.[1] it is also called as known as shift invariant or space invariant artificial neural networks based on the shared-weight architecture. It used as applications in image and video recognition process in system ,[5] it is used as medical image analysis, image classifier, Different segmentation, , natural language processing network ,[6] brain-computer interfaces,[7] and financial time series

4. MODELING AND ANALYSIS

4.1 Flowchart

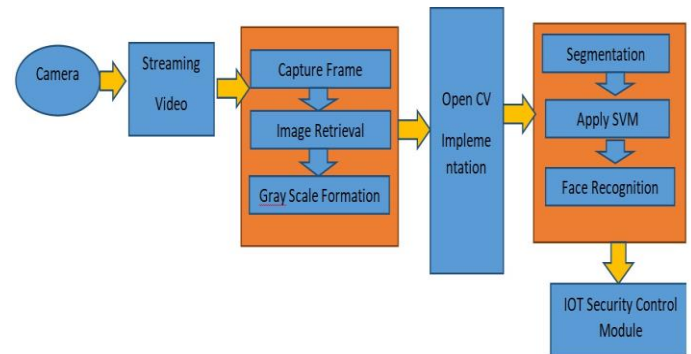


Description of flowchart

Camera plays an important role in face recognition system. so First of all we initialise a camera for capturing the image. After that capture the image or start the video. Here the process of recognition is started. This process is started with the value of extraction. This extracted value form the matrices. Then apply machine learning with the face value of input images. In machine learning firstly we create open CV training set in which the numerous images are stored with their ID. Then determine the matching ID of extracted face value. Now apply matching ID. Here we compare the input face value with the face value stored in our training set. Now find the matching ID. Here we apply the SVM (support vector machine) which is supervised

machine learning model in which we subtract input face value matrix from existing face value stored in the training set. Here we get the face of authenticate person.

4.2. Architecture:-





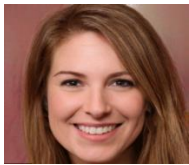

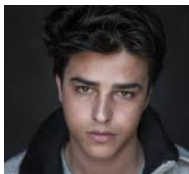
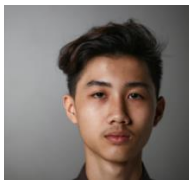

Description of architecture


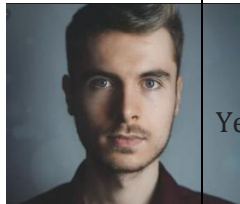


As shown in the figure of architecture first of all we initialise a camera. Then started capturing the streaming video or images. Then it started the process of capturing frames. In image retrieval we started the face value extraction. For this we convert colour image into gray scale images and form the matrices. After that we apply open CV implementation for image processing. This processing image is then converted into gray scale image and form matrices. Here we apply SVM to subtract the input value from existing data value stored in the open CV training set for getting authenticate face and here the process of face recognition is done. This output is then feeded to IOT security control module in which we can take the final decision. for example if we use it in the door lock system iot security control module take the decision either to open or close the door for given data value i.e given face value image.

5. RESULTS AND DISCUSSION

5.1. Training data Set


Name	Face Id	Trained image
Raken	254	
Rima	255	

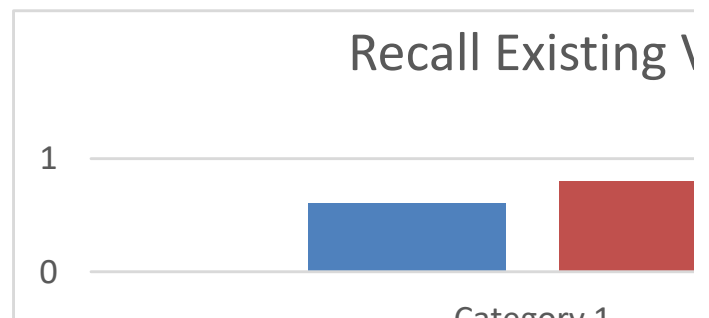
Sana	256	
Raghav	257	
James	258	
Riyo	259	
Sam	260	

	Yes	255	Yes	255	Yes
	Yes	257	yes	257	Yes
	Yes	255	No	NA	Yes
	Yes	257	No	258	No

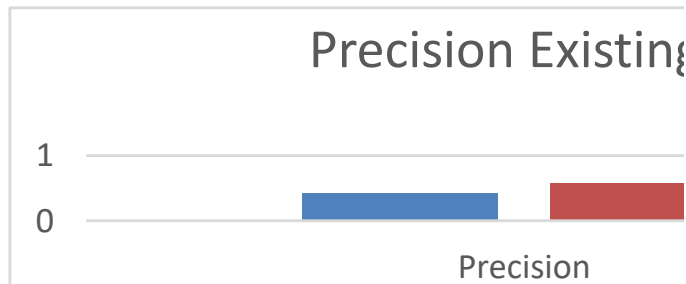
Total Scan: 5
 Positively Record Retrieved By Existing: 3
 Positively Record Retrieved By Existing: 4
 Recall of Existing = $3/5 = 0.6$
 Recall of Proposed = $4/5 = 0.8$

5.2. Test Data:

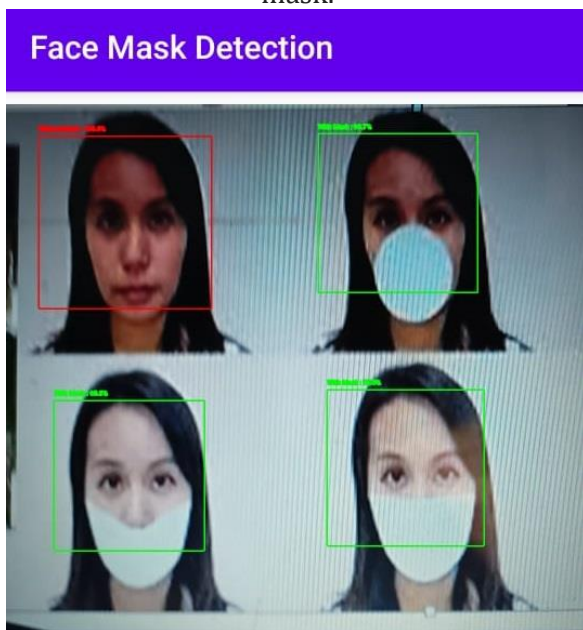
Inputted image	Is image found	ID Extracted By Existing	Is Right	ID Extracted By Proposed	Is Right
	Yes	260	Yes	260	Yes



Precision = Total Positive Retrieved Record / Total Available Dataset
 Precision By Existing: $3/7 = 0.42$
 Precision By Proposed: $4/7 = 0.57$



Face Mask Detection : it detect face with mask and without mask also provide percentage of wearing mask.



6. CONCLUSION

The work proposed in the system focuses on the important challenge faced by the world during the current times due to the ongoing COVID-19 pandemic. The proposed research work has successfully combined the face mask detection model with the person identification model, which is also able to send mail notifications to the registered people on our platform who are not wearing a mask. Also, this research work has successfully detected multiple people without wearing a mask or with a mask in a single frame of video. This third eye technology focuses on the complicated work of detecting multiple people at once to ensure that people stay safe in these troubled times follow by government. Also, this research work has successfully detected multiple people with out wearing a mask or with a mask in a single frame of video. This third eye technology focuses on the complicated work of detecting multiple people at once to ensure that people stay safe in these troubled times by ensuring that they follow the guidelines which are issued by the government. Newest research focuses in field of face detection and authentication is the detection of faces in

presence of illumination. A many of work has been OK in face detection. If it happens, it will help a lot to face recognition, face expression recognition etc. Different companies gives face biometric detection in mobile phone for authentication. In future it will be used for security, healthcare, advertising, payments, criminal burglars identification etc.

7. REFERENCES

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