FACE MASK DETECTION

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Abstract: A complete face mask recognition system includes two patterns of face mask detection and face mask recognition. The biological characteristics of the face have overall structural similarity and individual local difference. Therefore, it is necessary to extract the structural features through the face mask detection process and to separate the faces from the background pattern and face recognition of the separated faces. The concept of deep learning originated from the convolution neural network method. In this project, based on deep learning the face mask detection loads dataset from disk, training the dataset then serializing the face mask detector to disk. Once it detects, it classify each face as with mask or without mask. If the person not wearing the face mask voice alert will be activated.

Keywords: **Convolutional Neural Network(CNN), Segmentation, Detection, COVID-19.**

I INTRODUCTION

The spread of COVID- 19 pandemic disease has created the most crucial global health crisis of the world that has deep impact on humanity and the way the user perceive our world and our everyday lives. A novel corona virus has resulted in person-to-person transmission but as far as we move, the transmission of the novel corona causing corona virus disease 2019 (COVID-19) can also be a form an a symptomatic carrier with no COVID-19 symptoms. Till now there is no report about any clinically approved antiviral medicines or vaccine that are effective against COVID-19virus cCOVID-19. It has spread rapidly across the world bringing massive health, economic, environmental and social challenges to the entire human population.

The trend of wearing face masks in public is rising due to the COVID- 19 corona virus epidemic all over the world. Before Covid-19, People used to wear masks to protect their health from air pollution. While other people are self-conscious about their looks, they hide their emotions from the public by hiding their faces.

Scientists proofed that wearing face masks works on impeding COVID-19 transmission.

COVID-19 (known as corona virus) is the latest epidemic virus that hit the human health in the last century. In 2020, the rapid spreading of COVID-19 has forced the World Health Organization to declare COVID- 19 as a global pandemic. More than five million cases were infected by COVID-19 in less than 6 months across 188 countries. The virus spreads through close contact and in crowded and overcrowded areas.

The monitoring process involves the finding of anyone who isn't sporting a face mask. To monitor that people are following this basic safety principle, a strategy should be developed. A face mask detector system can be implemented to check this. Face mask detection means to identify whether a person is wearing a mask or not. The first step to recognize the presence of a mask on the face is to detect the face, which makes the strategy divided into two parts: to detect faces and to detect masks on those faces. Face detection is one of the applications of object detection and can be used in many areas like security, biometrics, law enforcement and more. There are many detector systems developed around the world and being implemented. However, all this science needs optimization; a better, more precise detector, because the world cannot afford any more increase in corona cases.

Here the user introduce a mask face detection model that's supported Artificial intelligence using image process techniques. The planned model may be detect the mask with image and real time detection people wearing mask or not wearing a mask. The user have introduced a

comparison between them to seek out the foremost appropriate algorithm program that achieved the very best accuracy

II   LITERATURE SURVEY

Various authors have proposed and discussed much advancement in educational field using technology that has helped in improving educational field.

[1]S. Ge, J. Li, Q. Ye and Z. Luo, "Detection of Masked Faces in the Wild with LLE-CNNs,"XXXune 2016 .

The growth rate. Z., Luo studies the identification of people with full-face or partial occlusion. This approach categorizes into way, people with hand over their faces or occluded with objects. This approach is not suited to our scenario, which requires, in essentially, to detect faces that have their mouths covered with masks such as scarves, mufflers, handkerchiefs, etc

[2]Glass RJ, Glass LM, Beyeler WE, Min HJ. Targeted social distancing face mask july 2017

Compared to Open CV which is used in a number of computed components, it is unable to resolve the imbalanced workload issue experienced during the implementation of the viola ones face detection algorithm in GPUs. Glass et al. addressed the importance of social differencing and how the risk of pandemic growth can be slowly decreased by successfully preserving social distance without the use of vaccines or antiviral drugs.

[3]Ensemble Feature Selection in Face Recognition: ICMLA 2012

Challenge Ensemble feature selection is known for its robustness and generalization of highly accurate predictive models. In this paper, we use different filter-based feature selection methods in an ensemble manner to improve face recognition. The goal is to distinguish human faces from avatar faces

[4]P. Viola and M. Jones, "Rapid object detection using a boosted cascade of simple features," may 2018

Viola Jones detector optimized the features of Haar , but failed to tackle the real world problems and was influenced by various factors like face brightness and face orientation. Viola Jones could only detect frontal well lit faces. It failed to work well in dark conditions and with non-frontal images. These issues have made the independent researchers work on developing new face detection models based on deep learning, to have better results for the different facial conditions.

III   EXISTING METHOD

A well-known technique of Principal Component Analysis (PCA) is used for face recognition. Face images are projected onto a face space that encodes best variation among known face images. The face space is defined by Eigen face which are eigenvectors of the set of faces, which may not correspond to general facial features such as eyes, nose, lips. The system performs by projecting pre extracted face image onto a set of face space that represent significant variations among known face images. The variable reducing theory of PCA accounts for the smaller face space than the training set of face.

IV   PROPOSED SYSTEM

The proposed system is based on deep learning algorithm. Using input video processing and Segmentation is the process of isolating object of interest from the rest of the real video. The face segmentation and detection using semantic segmentation on any arbitrary RGB image. Finally, the generated facial masks are demonstrated in experimental results. Post processing on the predicted images has also been discussed at length which also entails the removal of erroneous prediction .Here the user is using CNN algorithm , set of trained images is divide into 2 parts that have a positive images and negative images and then classifying the face has with mask or without mask. If the person has not wearing the mask the voice alert will be activated.

ADVANTAGES:
The advantage of this project with twin objective of creating a descriptors which can detect face mask in any orientation respective of alignment and train it in an appropriate neural network to get accurate results.
The project also focuses on removing the erroneous predictions which are bound to occur.

By the development of face mask detection the user can detect if the person is wearing a face mask would be of great help the society.

V   SYSTEM FUNCTION

In the first step, the total number of images in the dataset is categorized. The dataset can be separated according to the stage and send it into the training set which will contain the images on which the Convolutional Neural Network(CNN) model will be trained and the test set with the images on which our model will be tested. After training the model,
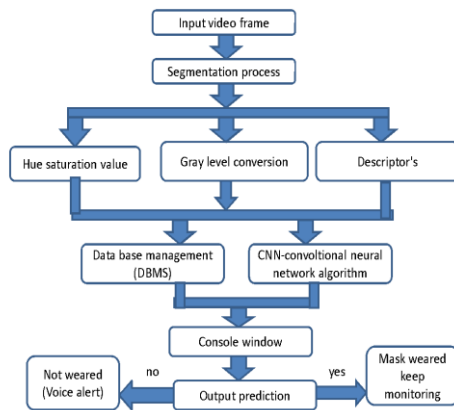

Fig.5.1: Flow Chart

VI   ALGORITHMS

Face Mask Detection:

       The proposal module extracts and characterizes face candidates by cascading two CNNs for proposal generation and feature extraction, respectively. The proposal generation CNNs are built on the first four layers adopted in the P-Net of which consists of three Convolutional layers and a soft max layer. Considering masked faces are very difficult to directly localize, the user set a low threshold in the last layer to generate massive candidate proposals with such shallow CNNs. After that, the user deliver each candidate region Fi into the pre-trained Face networks to extract a 4096d descriptor from the FC7 layer, which is then normalized to a vector xi . Since Face is trained on a large-scale face dataset, the extracted high-dimensional descriptor encodes both valuable facial cuts as well as the noisy features from mask regions.
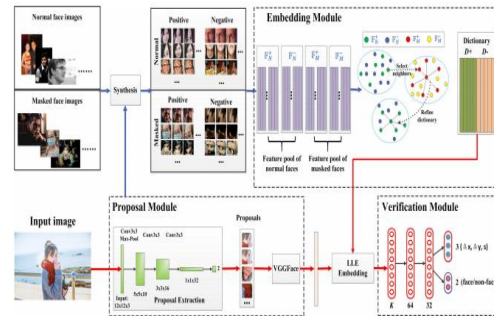

Fig.6.1: CNN algorithm based face mask detection

Facial Landmarks:

       Landmarks are unique points on an object which can be easily identified for different forms of the object. E.g. for hands, it can be the finger tips.

For faces, there are many points which can be detected irrespective of age, gender, race, etc. These points usually are located on the eyebrows, eye corners, nose tip, mouth corners, and chin. These points usually have a high contrast or edge present; and this fact is exploited for landmark detection.

Facial landmarks can be used for determining facial expressions, face pose and extracting parts of the face.

Fig. 6.2: Facial land marks

VII   SYSTEM SPECIFICATION

HARDWARE SPECIFICATION
Processor   : INTEL I4 (7th generation)
RAM   : 4GB
Hard Disk : 1TB
Monitor   : 20' color monitor
SOFTWARE SPECIFICATION
Front end   : GUI
Back end   : Python
Software   : pycharm

Platform   : windows 8

VIII   SYSTEM SOFTWARE

Pycharm:

PyCharm is the most popular IDE used for Python scripting language. This chapter will give you an introduction to PyCharm and explains its features.

● Code completion and inspection
● Advanced debugging
● Support for web programming and frameworks such as Django and Flask

Features Of Pycharm:

Besides, a developer will find PyCharm comfortable to work with because of the features mentioned below

Code Completion

PyCharm enables smoother code completion whether it is for built in or for an external package.

SQL Alchemy as Debugger

The user can set a breakpoint, pause in the debugger and can see the SQL representation of the user expression for SQL Language code.

Git Visualization in Editor

When coding in Python, queries are normal for a developer. The user can check the last commit easily in PyCharm as it has the blue sections that can define the difference between the last commit and the current one.

Code Coverage in Editor

The users can run **py** files outside PyCharm Editor as well marking it as code coverage details elsewhere in the project   tree, in the summary section.

PACKAGE OF MANGEMENT

Git Visualization in Editor

All the installed packages are displayed with proper visual representation. This includes list of installed packages and the ability to search and add new packages.

Local History

Local History is always keeping track of the changes in a way that complements like Git. Local history in PyCharm gives complete details of what is needed to rollback and what is to be added.

Refactoring

Refactoring is the process of renaming one or more files at a time and PyCharm includes various shortcuts for a smooth refactoring process.

User Interface of PyCharm Editor

The user interface of PyCharm editor is shown in the screenshot given below. Observe that the editor includes various features to create a new project or import from an existing project.

IX   HARDWARE REQUIREMENTS &   SPECIFICATIONS

I4 PROCESSOR

Intel core is the processors I4 family which is famous for its latest revolutionary structure and integrated architecture which also provide the advantage of the parallel computing. It's also wonderful in providing the users with the excellent graphical user interfaces.

BASIC FEATURE AND   ADVANTAGE OF THE I4

The basic feature of the I4 features are highly improved as compared to previous version of the processor by Intel. Some of the popular and leading features of I4 processors are listed below.

● I4 processors offers the perfect accuracy and high performance and response rate which in result provide the users with the high throughput rates, and also reduced time in executing the programs by the processor.
● The Intel I4 processor is fully equipped by the latest HD graphics with powerful and advanced video engine that provides smooth high quality display along with the 3d graphics capabilities. On the whole I4 processors can be considered as the high graphical and multi media display processors for daily computing.

MORE ADVANTAGES OF I4

I4 processors have remarkable advantages that are of great use in the field of computers and technology. Some of them are listed below.

● Dual core processing has the ability to run two independent programs with one hardware.
● I4 processors have improved Pentium base, they have totally new architecture with more integrations and high speed performance structure.

X   EXPERIMENTAL RESULT

Face Mask Detection System uses Artificial Network to recognize if a user is wearing a mask or not wearing a mask. If the camera capture an unrecognized face, a notification can be sent out to the administrator. If the application identifies a user that he/she was not wearing a mask, AI alerts are sent with the picture of the person.

Fig.10.1: Face without mask

Fig.10.2: Verified output

Fig.10.3: Face with mask

Fig.10.4: Verified output

XI   CONCLUSION

Corporate giants from various verticals are turning to AI and ML, leveraging technology at the service of humanity amid the pandemic. Product development companies launching API services mask detection which help developers to develop a face mask detection system quickly to serve the people. The reliable and real-time face detection of users wearing masks has been revealed by the technology. While keeping the safety and privacy of users' data the system is easy to deploy into any existing system. Therefore, the digital solution for most industries and healthcare will be the face mask detection system in leading. With the help of the digital solution the community can overcome with the current scenario.

SCOPE FOR FUTURE SCOPE

Depending upon the requirements, the system is also adaptable to the latest technology and tools (i.e) the user can add the contact numbers and email addresses in the system to sand an alert to the one who has not weared the mask. The user can also send an alert to the person whose face is not recognizable in the system.

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