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Masked Face Recognition

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Abstract: *The World is facing a huge health crisis due to the rapid transmission of coronavirus (COVID-19). In order to effectively prevent the spread of COVID-19 virus, almost everyone have to wear a mask as its one of the most important element to prevent from this virus as per World Health Organization (WHO). It makes conventional facial recognition technology almost ineffective in several cases, such as community access control, face access control, facial attendance, facial security checks at airports, etc. Thus, there's an immediate requirement to improve the recognition performance of the existing technology on the masked faces. The current advanced face recognition approaches are architected based on deep learning, which depend on or requires a large number of face samples. With no publicly accessible datasets or database of face samples available, a dataset needs to be created for the recognition system.*

Keywords: Convolution Neural Network, COVID -19, Deep Learning, Face Recognition, Face Detection, Machine Learning.

I. INTRODUCTION

The infectious disease known as covid-19 is caused by the new finding. Most infected people have mild to moderate breathing problems that recover with no special treatment or care. Individual with underlying disease such as cardiovascular disease, diabetic, chronic, respiratory disease, cancer, or the elderly are more likely to develop a serious illness due to covid-19. The main way covid-19 spread is through saliva droplets or runny noses, when an infected person coughs or sneezes, so it is important to follow the respiratory label. With this in mind the world health organization has advised to ensure that their citizens wear masks in public places around the world. Having been advised, to prevent the spread of infection, people constantly wear masks. Before covid-19, a few people were wearing masks for health and air pollution protection reasons, as well as practitioner in hospitals. The WHO has identified covid-19 as a global pandemic, as it has spread rapidly. According to the world health organization, the number of cases worldwide is nearly 2 million. Positive cases occur in areas such that are crowded and overcrowded for the most part. Consequently, scientists have ordered masks to be worn in public places that prevent the transmission of the virus. Since the current recognition system does not apply to mask facial recognition, the use of masks has caused a serious safety problem in surveillance system. The main means of identification, facial recognition techniques, have all but fallen apart. The authentication application that rely on recognition, such as community entry and exit, face access control, face attendance, face gates at train stations, face authentication based mobile payment, face recognition based social security investigation. Removing the mask in order to pass authentications is too big a risk for fear of infection. Password and fingerprint unlocking systems are not secure as the covid-19 virus spreads through contact as well. Touch-free facial recognition is much more secure, but when wearing a mask, existing facial recognition solutions are not reliable anymore. Any optimized facial recognition system using convolutional neural networks for masked individuals is proposed to address the aforementioned challenges. The system uses CNN vignettes to enhance facial recognition accuracy.

II. MODELING AND ANALYSIS

The face detection we a capturing the images and images will be given to a Viola Jones recognition. To identify face location this face location will be given to a neural network to identify a person wearing a mask or a not if the person in

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image is not wearing a mask than that particular image is remove by the system and another person wearing a mask then that images is processed. These processed images are then given to the convolutions neural network where in all the folder with their name will be used and each of these names will be the classes of convolution neural network. The conventional neural network trains than the entire the database will be stored inside the python with the help of Python internal database. Whenever a new person images will come then some mapping process will be repeated and the convolution neural network will be your evaluated. The evolution will give us the output whether the person in the image is present in the train database or not if the image present in the database than their name will be given an output as recognition person. If the image is not present in database then there is no output provide and this make the convolution neural network evolution.

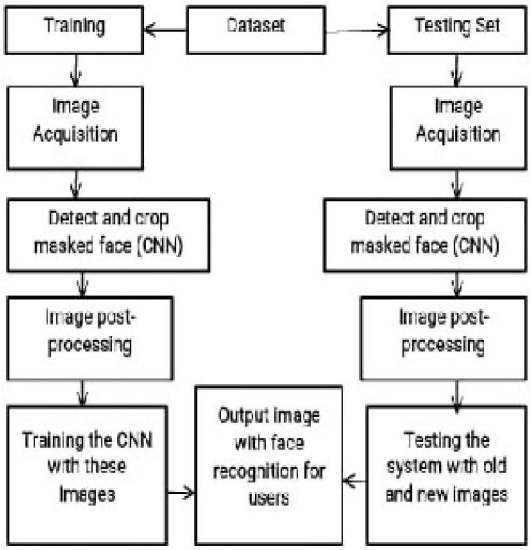

Figure 1: Working flowchart

III. METHODOLOGY

3.1 Data Set

During the COVID-19 pandemic, the World Health Organization imposed the mandatory wearing of masks to prevent the deadly virus. In this tutorial, we will develop a machine learning project a live mask detector with Python. We will construct a system in real time to determine whether the person on the webcam wears a mask or not. We are going to train the face mask detector model with the help of OpenCV. The dataset consists of 1376 images with 690 images containing images of people wearing masks and 686 images with people without masks. It is an excellent dataset for people who want to try learning techniques of deep learning for face mask detection.

Image Net is a dataset of over 15 million high-resolution labeled images in approximately 22,000 categories. The images were collected from the web and tagged by human labellers using Amazon's participatory Turk mechanical procurement tool. From 2010, as part of the Pascal Visual Object Challenge, an annual competition known as ImageNet Large-Scale Visual Recognition Challenge (ILSVRC) took place. ILSVRC uses a subset of ImageNet with approximately 1,000images from each of the 1,000 categories. Overall about 1.2 million training images account for 50,000 validation images and 150,000 test images. Image net is made up of images with varying resolution. As a result, the images were sampled downwards to a fixed resolution of 256*256. With rectangular images, the image is re-scaled and the middle patch 256*256 is cropped from the resulting images.

3.2 Proposed Method

This system allows for masked face detection in this COVID-19 situation to play an important role in the transformation of the coronavirus from one person to another. For detecting the face mask the CNN algorithm is used

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in our project which gives greater precision. This project is able to detect facial masks very quickly from all possible angles. When a person arrives in the monitoring area without wearing a mask, the system provides a safety alert to alert the authority.

The geminate mask face detector that can able to detect mask face and it regardless of arrangement and train it in a proper neural system to get precise outcomes. The primary work of this function is feature extraction and class forecast for images. In the feature extraction system, the image is mapped and created in a new image where the resulting image is more efficient than the previous image. In this part, a large number of images are reduced sizing to an effective representation in which an interesting part of the image is a snapshot.

After extracting the functions in each convolutional layer, it gives an output that works better for the image and represents these images a set of labeled images. In our proposed model facial mask can be detected from the segmented image or by means of the webcam. Firstly, the size of the input image resizes 100*100 and performs functionality extraction and prediction. Background noise also reduces and filters to suppress the high frequency of the input frame. Once the training process is completed, it provides us with model data with their level of precision. In this system three-parts work out to complete the process, the first part is connected with the dataset, the second is created some model with accuracy, and the third part is to detect the mask.

3.3 Architecture

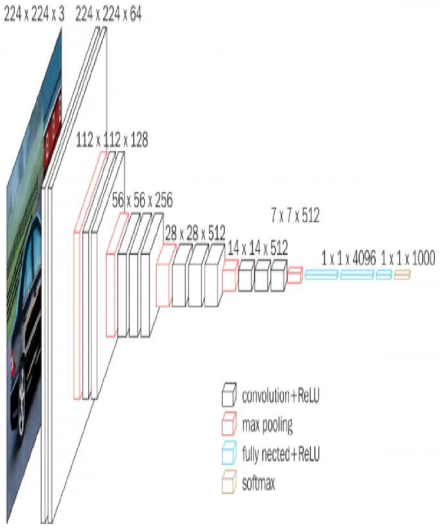

Figure 2: Architecture of VGG

The input to convolute 1 layer is of fixed size 224 x 224 RGB image. The image is passed through a stack of convolutional (convolutional) layers, where the filters were used with a very small receptive field: 3×3 (which is the smallest size to capture the notion of left/right, up/down, center). In one of the configurations, it also utilizes 1×1 convolution filters, which can be seen as a linear transformation of the input channels (followed by non-linearity). The convolution step is set at 1 pixel conv space fil; the spatial padding of conv layer input is such that the spatial resolution is preserved after convolution, i.e. the padding is 1-pixel for 3×3 conv layers. Spatial pooling is done with five max-pooling layers, which follow some of the conv. Layers (not all the conv. layers are followed by max-pooling). The maximum pool is made on a window of 2*2 pixels with a stride of 2.

Three Fully-Connected layers (CF) follow a convolutional layers pile (which has a different depth in different architectures): the first two have 4096 channels each, the third performs 1000-channel ILSVRC classification and therefore contains 1000 channels. The final layer is the soft-max layer. The configuration of the fully connected layers is the same in all networks.

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All masked layers are fitted with non-linearity grading (ReLu).All hidden layers are equipped with non-relinearity of grinding (ReLu). It should also be noted that none of the network (with the exception of one) contains local response normalization (LRN), such standardization does not improve the performance of the ILSVRC but leads to higher memory consumption and calculation time.

IV. CONCLUSION

The issue of recognizing masked Faces through existing face recognition system with reliable accuracy.to mitigate the spread of COVID-19 pandemic, measures must be taken. We have modeled a face mask detector using SSD architecture and transfer learning methods in neural networks. To train, validate and test the model, we used the dataset that consisted of 1916 masked faces images and 1919 unmasked faces images. These images were taken from various resources like Kaggle and RMFD datasets. The model was inferred on images and live video streams. To select a base model, we evaluated the metrics like accuracy, precision and recall and selected MobileNetV2 architecture with the best performance having 100% precision and 99% recall. It is also computationally efficient using MobileNetV2 which makes it easier to install the model to embedded systems. This face mask detector can be deployed in many areas like shopping malls, airports and other heavy traffic places to monitor the public and to avoid the spread of the disease by checking who is following basic rules and who is not.

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