TO PREDICT TRAIN AND TEST DATASET USING PRINCIPAL COMPONENT ANALYSIS

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ABSTRACT

The proposed system is to classify face mask detection using covid19 precaution in images using convolution neural network. Face mask detection using Machine learning and Deep learning achieved results however the existing methods need to be more robust in the real-time environment. The lack of suitable datasets and DL-based models for face mask detection that can detect a person without a face-mask in real-time to avoid the spread of covid19 is still ongoing. For this purpose, a large-scale dataset that contains of two classes of with mask and without mask, then it will test and train the model of the image. This paper represents an implementation of Principal Component Analysis (PCA) on masked and non-masked face recognition.

Keywords – Principal Component Analysis (PCA) algorithm, Machine leaning, Deep Learning, Convolution Neural Network, Face Recognition.

I.INTRODUCTION

A face mask is developed containing images of different people and then different face masks are designed that are applied on these face images to create a custom dataset consisting of two classes(mask and non-mask). Recognition rate continue to be unsuccessful. Recognition rate decreases for low pleasant image. pre-processing is used for higher reputation price. Some pre-processing strategies like cropping, resizing, sprucing, normalizing, improving are utilized in face recognition system, certain algorithms have been developed for reliable face popularity. Different strategies rely upon exceptional methods and that they have exceptional popularity accuracy. Principal Component Analysis (PCA) offers a higher accuracy and is a dimensional reduction method that is often used to reduce dimensions on a large dataset. The advantage of using PCA is the low complexity in grouping images, the small database representation because it is used only image trainees that are stored in the form on a reduced basis. For face recognition, at first is to detect the face from image. After detecting face, it can recognize the person and it is easy for human to detect a face but harder for a system to detect face. For this reason, train the system for detect face portion from images. After detecting face from input image, then use PCA algorithm for feature extraction from image, which are used for training. This work also presents a statistical difference of accuracy between masked face recognition and non-masked face recognition using the algorithm of Principal component analysis.

II.OBJECTIVE

The proposed technique uses the principal component analysis at first is to detect the face from image. After image preprocessing the pca algorithm is used for feature extraction for to test and train the image.

III.RELATED WORKS

M.S. Ejaz, M.R. Islam, 2019, Implementation of principal component analysis on masked and non-masked face recognition. This paper represents an implementation of Principal Component Analysis (PCA) on masked and non-masked face recognition. Security is an essential term in our today's life. In various Biometric technology, face recognition is widely used to secure any system because it is better than any other traditional techniques like PIN, password, fingerprint etc. and most reliable to identify or verify a person efficiently.[6]

Z. Wang, G. Wang, 2020, Masked face recognition dataset and application. In order to effectively prevent the spread of COVID-19 virus, almost everyone wears a mask during coronavirus epidemic. This almost makes conventional facial recognition technology ineffective in many cases, such as community access control, face access control, facial attendance, facial security checks at train stations, etc. Therefore, it is very urgent to improve the recognition performance of the existing face recognition technology on the masked faces.[15]

M. Jogin, et al, 2018, Feature extraction using convolution neural networks (CNN) and deep learning. The Image classification is one of the preliminary processes, which humans learn as infants. The fundamentals of image classification lie in identifying basic shapes and geometry of objects around us. It is a process which involves the following tasks of pre-processing the image (normalization), image segmentation, extraction of key features and identification of the class.[7]

S.A. Hussain, et al, 2020- A real time face emotion classification and recognition using deep learning model. The facial recognition applications plays an important role in many areas such as security, camera surveillance, identity verification in modern electronic devices, criminal investigations, database management systems and smart card applications etc. This work presents deep learning algorithms used in facial recognition for accurate identification and detection.[11]

A. Çayir, et al, 2018, Feature extraction based on deep learning for some traditional machine learning methods. Deep learning is a subfield of machine learning and deep neural architectures can extract high level features automatically without handcraft feature engineering unlike traditional machine learning algorithms. In this method which combines feature extraction layers of a convolutional neural network with traditional machine learning algorithms, such as, support vector machine, gradient boosting machines.[1]

S. Albawi, TA Mohammed, et al, 2017, Understanding of a convolutional neural network. The term Deep Learning or Deep Neural Network refers to Artificial Neural Networks (ANN) with multi layers. It has been considered to be one of the most powerful tools, and it is able to handle a huge amount of data.[10]

A. Oumina, et al, 2020, Face mask detection using transfer learning. It is now involving in many areas of research in the use of new information technologies, particularly those related to artificial intelligence.[3]

S. Pooja, et al, 2021, Face mask detection using AI. Predictive and Preventive Measures for Covid-19. The most important tools is face mask detector. These systems work with existing surveillance systems along with innovative neural network algorithms to check whether a person has worn a face mask or not.[12]

S. Sharma, K. Shanmugasundaram, 2016, CNN based efficient face recognition technique using Dlib. Despite of advancement in face recognition, this field of research and it proposes an efficient technique for face recognition system based on Deep Learning using Convolutional Neural Network (CNN) with Dlib face alignment. It describes the process involved in the face recognition like face alignment and feature extraction. It also emphasizes the importance of the face alignment and accuracy.[13]

B Qin, D Li, 2020, Identifying facemask-wearing condition using image super-resolution with classification network to prevent COVID-19. Facemask wearing is valuable for infectious disease control, but the effectiveness of facemasks has been diminished, mostly due to improper wearing. However, there have not been any published reports on the automatic identification of facemask-wearing conditions. Develop a new facemask-wearing condition identification method by combining image super-resolution and classification networks.[4]

M. Razavi, et al, 2021, An automatic system to monitor the physical distance and face mask wearing of construction workers in covid-19. Face mask detection identifies whether a person is wearing a mask or not in a picture. Physical distance detection first recognizes people in a picture then identifies the real distance between them. Then, trained multiple Faster R-CNN object detection models to choose the most accurate model for face mask detection.[8]

O. M. Parkhi, et al, 2015, Deep Face Recognition.To end learning for the task using a convolutional neural network (CNN), and the availability of a large scale training datasets. To make two contributions: first, show how a very large scale dataset can be assembled by a combination of automation and human in the loop. The complexities of deep network training and face recognition to present methods and procedures to achieve comparable state.[9]

I.T. Jollie and J. Cadima, 2016,Principal component analysis: a review and recent developments. Large datasets are increasingly common and are often difficult to interpret. Principal component analysis (PCA) is a technique for reducing the dimensionality of such datasets, increasing interpretability but at the same time minimizing information loss.[5]

A. Krizhevsky, I. Sutskever, et al, 2012, ImageNet classification with deep convolutional neural networks. Deep convolutional neural network is capable of achieving record breaking results on a highly challenging dataset using purely supervised learning. It is notable that network's performance degrades if a single convolutional layer is removed.[2]

T. Ahonen, A. Hadid, et al, 2006, Face description with local binary patterns: Application to face recognition. It represents a novel and efficient facial image representation based on local binary pattern (LBP) texture features. The face image is divided into several regions from which the LBP feature distributions are extracted and concatenated into an enhanced feature vector to be used as a face descriptor. The performance of the proposed method is assessed in the face recognition problem under different challenges.[14]

IV.METHODOLOGY

PROPOSED SYSTEM

STEP1: Images are used in real time.

STEP2: It is moved to a dataset which collects the images of the person.

STEP3: The next phase is the training phase. This stage is initiated with the collection of the dataset**.** Train the system for to detect the face portion from images.

STEP4: After training, test the images which is in the position to identify whether the person is wearing mask or not.

STEP5: After detecting face from input image, then use PCA algorithm for feature extraction from image, which are used for training. This work also presents a statistical difference of accuracy between masked face recognition and non-masked face recognition using the algorithm of Principal component analysis.

STEP6: This feature extraction using pca algorithm will test and train images and will be recognized when the person is wearing mask or not.

WORK FLOW

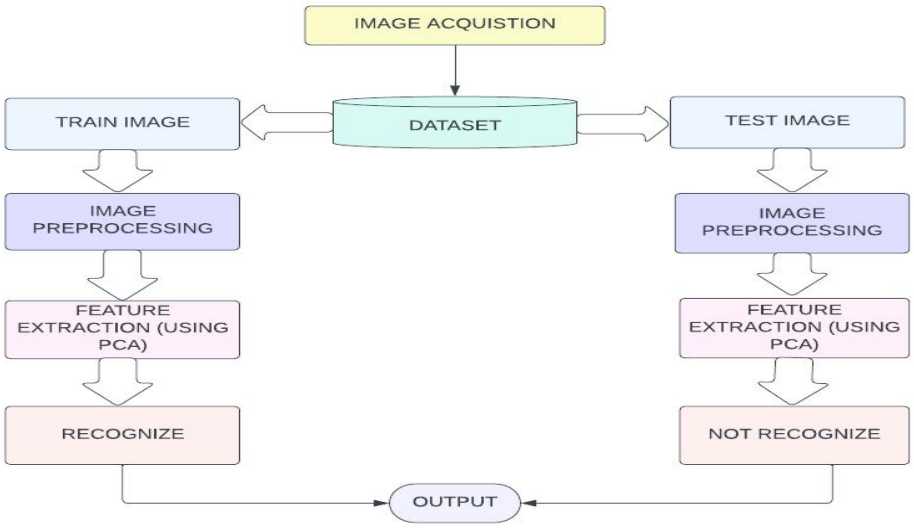

Fig 4.1

A. IMAGE PREPROCESSING:

- Image preprocessing are the means taken to design pictures before they are utilized by model preparation and deduction. This incorporates, however isn't restricted to, resizing, arranging, and variety remedies.
- The aim of preprocessing is an improvement of the image information that smothers undesired mutilations or upgrades some picture highlights pertinent for additional handling and examination task.
- The image is a mix of pixels in lines set in a steady progression to shape one single picture every pixel esteem addresses the force worth of the picture, so if there are multiple images it can form a matrix considering a row of pixels as a vector. It requires huge amounts of storage while working with many images, PCA is used to compress it and preserve the data as much as possible.

B. PRINCIPAL COMPONENT ANALYSIS:

- Principal component analysis is a measurable method that permits to sum up the data content in enormous information tables through a more modest arrangement of "Summary Indices" that can be more easily visualized and analysed.
- PCA is utilized to extricate the significant data from the information and to communicate the data as a "summary indices" called principal components.
- PCA Algorithm can be used in own or it can serve as a data cleaning or data preprocessing technique and it is also a flexible tool.
- Data causes regression-based algorithms, by using PCA it will lower the dimensions of the training dataset, prevent the predictive algorithms from overfitting.
- The PCA eventually lessens the quantity of viable factors utilized for order which are contrasted and some measurable technique. An examination is made to represent the significant of PCA in different sign handling based application like Texture characterization, Face acknowledgment, Biometrics and so forth.

V.CONCLUSION AND FUTURE WORK

This paper analyzed for face recognition and masked face recognition accuracy using Principal Component Analysis (PCA) to recognize a person. The principal component analysis algorithm was utilized to lessen the dimensions of the data we had images having a number of pixel values. It is demonstrated that it can perceive by PCA based face acknowledgment framework. But when a person is wearing mask, facial recognition gives with mask. when a person in not wearing mask then it shows in text format as no mask. The proposed system will be implemented in targeted areas such as schools, colleges, universities, superstores, and so on. Finally conclude that conventional measurable calculation Principal Component Analysis (PCA) is better for ordinary face acknowledgment.

REFERENCES

[1] A. Çayir, et al, 2018, Feature extraction based on deep learning for some traditional machine learning methods

[2] A. Krizhevsky, I. Sutskever, et al, 2012, ImageNet classification with deep convolutional neural networks.

[3] A. Oumina, et al, 2020, face mask detection using transfer learning. In IEEE international conference on electronics, control, optimization and computer science.

[4] B. Qin, D. Li, 2020, Identifying facemask-wearing condition using image super-resolution with classification network to prevent COVID-19.

[5] I. T. Jollie and J. Cadima, 2016,Principal component analysis: a review and recent developments.

[6] M.S. Ejaz, et al, 2019, Implementation of principal component analysis on masked and non-masked face recognition 2019 1st International Conference on Advances in Science, Engineering and Robotics Technology (ICASERT) (2019).

[7] M. Jogin, et al,2018, Feature Extraction using Convolution Neural Networks (CNN) and Deep learning, in: 2018 3rd IEEE International Conference on Recent Trends in Electronics, Information Communication Technology (RTEICT), May 2018.

[8] M. Razavi, et al,2021, An automatic system to monitor the physical distance and face mask wearing of construction workers in COVID-19 pandemic.

[9] O. M. Parkhi, A. Vedaldi, and A. Zisserman, 2015, Deep Face Recognition.

[10] S. Albawi , Mohammed TA, et al, 2017, Understanding of a convolutional neural network.

[11] S. A. Hussain, et al, 2020, A real time face emotion classification and recognition using deep learning model.

[12] S. Pooja, S. Preeti, et al, 2021, Face mask detection using AI and Algorithms for intelligent systems.

[13] S. Sharma , K. Shanmugasundaram , et al, 2016, CNN based efficient face recognition technique.

[14] T. Ahonen, A. Hadid, et al, 2006, Face description with local binary patterns: Application to face recognition.

[15] Z. Wang, et al., 2020, Masked face recognition dataset and application.