

Image Analysis on Individual Identification of Face Mask Monitoring Using Convolutional Neural Network.

Vidullatha Pellakuri¹, Neha Kolipakula², Padarthi Sonika vana lakshmi³, Pothapragada Sai Pavan kumar⁴, Rohit Babu Pasumarthi⁵,

¹Associate Professor, Dept. of Computer Science and Engineering, KoneruLakshmaiah Education Foundation, AP, India.

^{2,3,4,5}IVth year B.Tech Student, Dept. of Computer Science and Engineering

¹latha22pellakuri@gmail.com, ²kolipakulaneha@gmail.com@gmail.com, ³sonikavanalakshmi2292@gmail.com,

⁴pavanpothapragada777@gmail.com, ⁵pasumarthirohith@gmail.com

Article History: Received: 10 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 20 April 2021

Abstract : Every person must put on a mask in this COVID-19 pandemic to protect himself. It came to practice that in the crowd of people wearing the mask in most public conventions such as Malls, Theatres, Parks. Whether or not a person with a mask is studying artificial intelligence. This study uses 7 deep learning algorithms that are highly used for real-time applications and the TensorFlow framework in the OpenCV library for model building through CNN in the Convolutionary neural network for face mask detection method. Through this model, every individual has emerged before they can join the public collecting the software 8 to search . To collect the data and evaluate the related features for the creation of a CNN prototype model to apply pre-processing concepts. To predict the outcomes of data using neural convolution networks and to visualize the results by building a dashboard in the Tableau open source visualization tool

Index Terms:convolutional neural network model,Deep learning, Face mask,Tableau, Tensor flow,Visualization.

I.Introduction

The world is battling with Covid19 widespread. There are so numerous basic equipment's required to battle against Crown infection. COVID-19 spreads primarily from individual to individual through respiratory beads. Respiratory beads travel into the discuss After you hack, wheeze, talk, yell, or sing, respiratory beads pass into the discuss. These droplets may at that point arrive within the mouths or noses of individuals around you, or these beads may be breathed in by them. Subsequently, the key security safety measure to be taken is wearing a confront cover in arrange not to be tainted by this hurtful infection. Restorative covers are portrayed as level or creased surgical or strategy veils, a few are shaped like glasses, they are affixed with straps to the head

The operation of convolution is an element-wise duplication operation of the lattice. Convolutionary layers take the three-dimensional input network we depicted prior and pass a channel over the picture (too known as the convolutionary bit), apply it at a time to a little pixel window (i.e. 3x3 pixels) and move this window until the total picture has been checked. Within the show channel window, the convolutionary operation gauges the dot product of the pixel values beside the weights indicated within the channel. This operation's yield is the ultimate convoluted picture. The nature of the CNN picture classification is that when the show trains what it truly does, it gets it.They are tried for adjusted tall filtration, legitimate breathability and discretionary resistance to liquid infiltration. The think about investigations a set of pictures to recognize individuals who are compliant with the government run the show of wearing therapeutic veils. This might offer assistance the government take seven fitting steps against non-compliant people. Since confront veils are required to anticipate the spread of the confront of the infection, it is exceptionally imperative and, in this widespread, it has ended up unused hone. It has been required for people to wear covers some time recently taking off their homes or going to open places for both created and immature nations around the world. In expansion to securing the ears, the government moreover empowers other prudent measures to guarantee wellbeing and cleanliness.In addition, because of the short supply of masks on the market, millions of individuals are learning to make their own face masks. Hundreds of individuals are learning to create

masks for their own faces. On the other hand, identifying faces with masks on any surveillance devices when retaining touchless control of access in buildings would be difficult.

First of all, face mask was not mandatory for everyone, but scientists and doctors have advised everyone to wear face mask as the time advance, since it acts as a physical barrier when you wear a face mask to shield you and others from viral and bacterial particles. Most individuals injure others unknowingly by going out and transmitting germs by coughing or contacting others. It is very difficult for the government to continue to check whether or not every person wears a 12-face mask. Covering faces with veils has postured a challenge for confront location calculations and execution. So, we came up with an arrangement where we will presently distinguish whether or not an individual is wearing a confront veil, utilizing the strategy of confront cover location. Location Confront Veil The stage employments Fake Arrange to get it whether or not an individual is wearing a cover. To recognize individuals with or without a cover, the application may be associated with any existing or modern IP cameras. Here, whether the person is wearing a mask or not, it'll be tried by employing a CNN show. Convolutional Neural Organize is the key classification to recognize pictures, classifying pictures. Where CNNs are broadly utilized to identify objects, faces are known, etc. At the beginning organize identifies faces and the another arrange employments a lightweight picture classifier by the CNN design to distinguish the faces have either '0' or '1' faces.

II. Related Work

Sandeep Kumar, Aman Balyan, Manvi Chawla, (2017) , "proposed that the time of forecasting, our model creates scores in a specific category for the object's presence. A Single Network Assessment makes predictions. Object detection here is an issue of regression to spatially separated bounding boxes and related probabilities of class [1]. Dr. Abhay E Wagh, Dr. Wankhede V. A creates the model scores in a specific category for the object's presence. A Single Network Assessment makes predictions. Object detection here is an issue of regression to spatially separated bounding boxes and related probabilities of class [2]. The major aim and objective of this study is to explore the possibility of the computerized detection of mask or spectacles kind of objects and implementing a convolutional neural network using supervised machine learning to reliably detect the presence of mask or spectacle in input images [3]. W. zoho, R. chellappa, P. J. Phillips, (2003), purposed that to make faces remembered by machines and to provide a detailed survey. Not only do they have them here recurrent recognition methods have been classified, but there are also detailed explanations of within each group, representative methods. Furthermore, related subjects, such as psychophysical research, device assessment, and illumination and pose variance problems are hidden [4]. Shashi Yadav, suggested that the real-time automatic monitoring approach focuses on an appropriate computer vision approach. Individuals in public places to recognize both safe social distances and face masks implementation of the raspberry pi4 model to track behavior and recognize violations by means of camera [5]. In 2017, Kartik Umesh Sharma and Nileshsingh V. Thakur In 2017, Kartik Umesh Sharma and Nileshsingh V. Thakur provides In pictures and photographs, various techniques are used to detect an object, locate an object, categorize an object, extract characteristics, descriptions of its appearance, and many others and more. [6]. Ashutosh Balakrishnan, Toshanal Meenpal 2018 A binary face classifier was developed which, regardless of its orientation, can detect any face present in the picture. We present a technique for producing accurate face segmentation masks from any arbitrary image input size [7]. Walid Hariri et al., proposed a dependable strategy based on dispose of conceal locale and profound learning-based highlights in arrange to address the issue of conceal confront acknowledgment prepare. The primary step is to dispose of the veiled confront locale. Following, we apply a pre-trained profound Convolutional neural organize [8]. S. in 2014, Gawali and R. R. Deshmukh used elastic shape analysis for comparing shapes of facial curves because elastic matching seems natural for facial deformation and is robust to challenges such as large facial expressions (especially those with open mouths), large pose variations, missing parts, and partial occlusions due to glasses, hair, and so on [9].

III. Proposed system

This section elaborates on different phases of proposed multimodal face mask detection such as image preprocessing, using convolutional neural network (CNN). Preprocessing is commonly used for extracting characteristics in face recognition, but it is easily influenced by changed light conditions and facial expression and other reasons. So, prior to extracting features, we can preprocess face images. To increase the identification rate of the face with the proposed algorithm, the images are checked, preprocessing is carried out, which is the first stage

of any method for face recognition. A new approach preprocessing has been proposed for uncontrolled and uncontrolled face recognition applications under difficult conditions for lighting. Here, the Facial Acknowledgment Framework preprocessing steps have been connected to all crude input pictures to turn them into clean adaptations, i.e., Picture Capture & input picture will be resized (256 x 256). In this facial location, facial points of interest permit us to naturally induce the position of facial structures, counting: eyes, eyebrows, nose, mouth, jawline..The channels will be applying by the color filtering (White & Grey) selection and image adjustment. The images will be center cropping with the pixel value of 224x224x3. In preprocessing, when facial organs are changed to the gray value for less than the facial skin, and postprocessing is applied to face recognition to highlight facial texture of images. Image Alignment: The images will be aligned for further processing. Finally, recognition process will be transformed to model selection procedures.

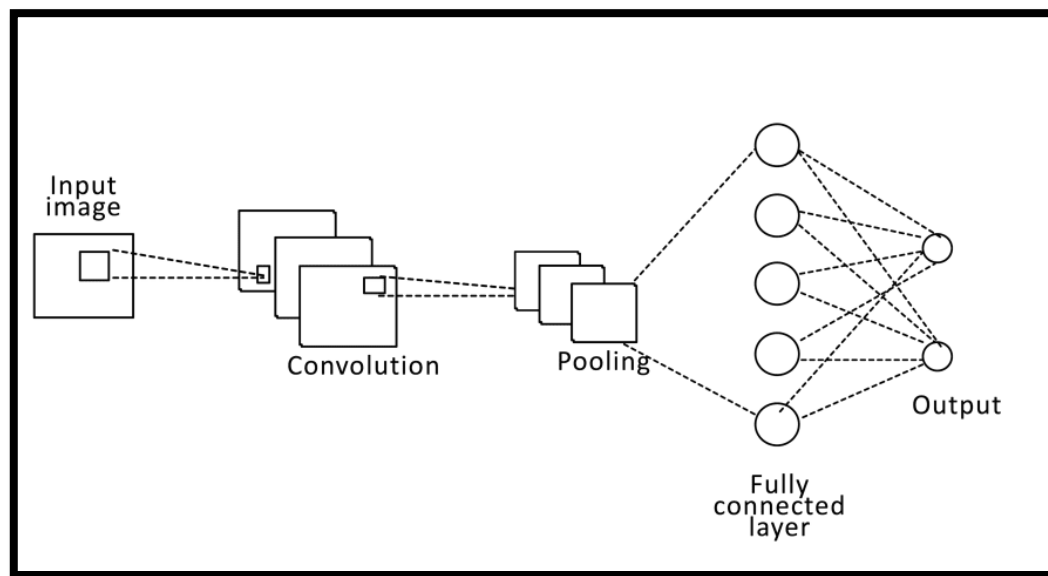


Fig-1:convolutional neural networkArchitecture

3.1 CNN Segmentation

Deep convolutional Neural Networks (CNN) are the most often used neural networks with image analysis. A CNN collects a 3D matrix from the image as an input. The first two components relate to the pixel image scope and height, because the third one correlates to the Pixel value within each element. The operation of convolution is an element-wise duplication operation of the lattice. Convolutionary layers take the three-dimensional input network we depicted prior and pass a channel over the picture (too known as the convolutionary bit), apply it at a time to a little pixel window (i.e. 3x3 pixels) and move this window until the total picture has been checked. Within the show channel window, the convolutionary operation gauges the dot product of the pixel values beside the weights indicated within the channel. This operation's yield is the ultimate convoluted picture. The nature of the CNN picture classification is that when the show trains what it truly does, it gets it. Values for filter matrices that allow important characteristics (shapes, textures...) to be extracted. Colored regions, etc) in the image. One new filter is added to the convoluted layer by each convolutional layer. An picture of the going before layer, which can extricate one more component. So, as we stack more channels, CNN will expel more highlights from an picture by stacking more channels. After each convolution operation, CNN applies to the output a Rectified Linear Unit (ReLU) function to the convoluted image. As you may remember from the Machine Learning 101 course in university, ReLU is very commonly used in machine learning applications because it introduces nonlinearity into the model. This

helps our model to generalize better and avoid overfitting. Pooling is the mechanism by which a transformed image of CNN specimens is used to decrease the feature numbers for map dimensions. This power was required by the machine and decreased the process time. During the most relevant knowledge about the feature is preserved through this process. Using several Approaches, pooling, and different methods can be carried out. Amongst the most common ones Max pooling and Average pooling are the others. When we use max pooling in our business, most of the time, it's the strongest model. The approach to convolution is truly close to max pooling. The window moves over the function map and draws tiles of the size specified. Max pooling takes advantage of most of the top value is added to each and every one. There is always more than one layers that are closely connected. After pooling, there is often more than one layer that is closely related. The categorization image is focused on layers which are completely linked by the convolution process described above. The last fully connected layer was the output layer to which the SoftMax function was applied. A previous layer that completely binds. And linked layers will return the likelihood of each class.

Tableau:

Visualization of information makes a difference tell stories by curating data in a way that's less demanding to get it, outlining designs and exceptions. A great visualization tells a story, disposes of the clamour from the data and highlights the useful data. Tableau may be a information visualization computer program that's utilized for information science and commerce insights. It comes with apparatuses that permit to bore down information and see the affect in a visual arrange that can be effectively caught on by any person. In real-time, Scene too comes with capabilities and cloud bolster for information analytics. The most advantage of scene is it encourages the representation of indeed expansive sums of information in an attractive, easy to read and in an organized way. This information is orchestrated in lines and columns. Typically among the foremost shapes of introduction of information since information tables are simple to develop and perused.



```

[ ] from keras.models import Sequential
    from keras.layers import Dense, Activation, Flatten, Dropout
    from keras.layers import Conv2D, MaxPooling2D
    from keras.callbacks import ModelCheckpoint

    model = Sequential()

    model.add(Conv2D(200, (3, 3), input_shape=data.shape[1:]))
    model.add(Activation('relu'))
    model.add(MaxPooling2D(pool_size=(2, 2)))

    model.add(Conv2D(100, (3, 3)))
    model.add(Activation('relu'))
    model.add(MaxPooling2D(pool_size=(2, 2)))

    model.add(Flatten())
    model.add(Dropout(0.5))

    model.add(Dense(50, activation='relu'))

    model.add(Dense(2, activation='softmax'))

    model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=['accuracy'])

[ ] model.summary()

```

Fig 2: CNN model build using Python KERAS.

IV. Result and Discussions:

The proposed confront cover location is actualized on working stage PYTHON. Experimentations are performed on openly accessible investigate information. Here, we have considered our claim dataset which it comprises of our possess pictures. For include extraction here we have utilized CNN calculation and came up with a great result within the shape of a chart which it is appeared within the scene whether a person is wearing a veil or not. Within the figure 3 appears the comes about of the categories That obtained when testing and training of the data with

different values and accuracy of the data fig 4 related to tableau visualization that showing up result on person wearing the mask and without wearing the mask .In fig 5, represents that tableau dashboard which is used to represent data on single sheet here are results obtain for accuracy of dataset with mask and without mask, these graphs shows that after testing and training the loss of validation and accuracy are shown in graphs.

Training Data	Testing Data	Accuracy %
60	40	89
70	30	92
80	20	94
90	10	96

Table 1:Accuracy results of testing and training of data.

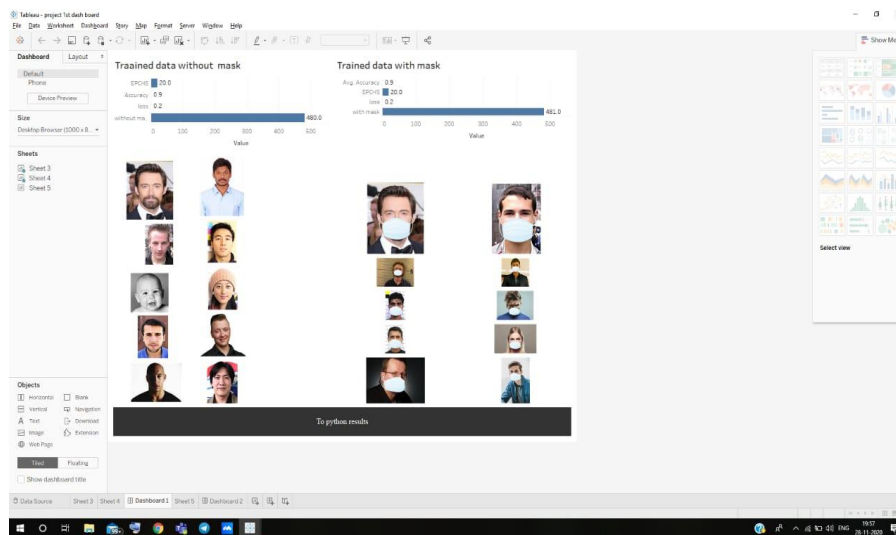
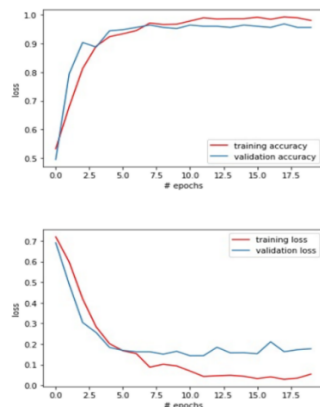


Fig-3:Tableau Results for trained data without mask and with mask

visualization obtained in python

These plots refers the Test & Train of data we got the results for loss and accuracy of the data .



To tableau

Download PDF

Fig-4: Visualization results obtained in python

V. Conclusion

Testing models are tested with mask images and without masks and obtained accuracy of the model of 98%. Generally training a neural network model takes more than a few epochs. In other words, we trained a neural network model for the grounding data for 20 epochs for different patterns. Here we achieved the result after model implementation with mask as '1' and without mask '0'. And we have come to conclusion that our model works, and our trained data identifies different objects of the face and identifies different fields. And visualization results we have developed in tableau that depicts the statistics of the project. The Tableau dashboard appear the accuracy and loss over all images and represented graphical results.

VI. References: -

- [1].Madhura Inamdar,"Real-time face mask identification using Facemask net deep learning network", Researchgate, March 2019
- [2].Sandeep Kumar, Aman Balyan, Manvi Chawla, "Object Detection and Recognition in Images", © 2017 IJEDR | Volume 5, Issue 4 | ISSN: 2321-99
- [3].Dr. Abhay E Wagh, Dr. Wankhede V.A, "FACE MASK DETECTION USING DEEP LEARNING BASED ON NEURAL NETWORK ANALYZER", International Journal of Advanced Research in Engineering and Technology (IJARET) Volume 11, Issue 8, August 2020, pp. 266-272, Article ID: IJARET_11_08_026
- [4].W. ZHAO, R. CHELLAPPA, P. J. PHILLIPS, "Face Recognition: A Literature Survey", ACM Computing Surveys, Vol. 35, No. 4, December 2003.
- [5].Shashi Yadav, "Deep Learning based Safe Social Distancing and Face Mask Detection", (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429 Volume 8 Issue VII July 2020- Available at www.ijraset.com
- [6].Kartik Umesh Sharma* and Nileshsingh V. Thakur, "A review and an approach for object detection in images", Int. J. Computational Vision and Robotics, Vol. 7, Nos. 1/2, 2017.
- [7].Ashutosh Balakrishnan, Toshnal Meenpal, "Facial Mask Detection using Semantic Segmentation", 2019 4th International Conference on Computing, Communications and Security (ICCCS)
- [8].Walid Hariri, "Efficient Masked Face Recognition Method during the COVID-19 Pandemic" <https://doi.org/10.21203/rs.3.rs-39289/v1>
- [9].S.Gawali and R. R. Deshmukh. "3d face recognition using geodesic facial curves to handle expression, occlusion and pose variations. "International journal of computer science and technology. 5(3):4284–4287, 2014.
- [10]. Shakir Fattah kak and Pedro Valente. "A Review of Person Recognition Based on Face Mode", January 2018.
- [11].Yichun Shi and Anil K. Jain Michigan State University, East Lansing, MI "Probabilistic Face Embeddings", august 2019.
- [12].Kavita and Ms. Manjeet Kaur. "A Survey paper for Face Recognition Technologies", July 2016.
- [13].Ashu Kumar and Amandeep Kaur, "Face detection techniques", august 2019.
- [14].Faizan Ahmad and Aaima Najam, "Image-based Face Detection and Recognition", 2013
- [15].Vidyullathapellakuri, "Image Retrieval Scheme Using Quantized Bins of Color Image Components and Adaptive Tetrolet Transform", June-2020