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Improvised Mask Detection System using Machine Learning

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Abstract: Coronavirus disease (COVID-19) has seriously affected the world. By theend of November 2020, the global number of new coronavirus cases had already exceeded 60 million according to information from the World Health Organization (WHO). To stop the spread of disease, face-mask is mandatory in public places. So face mask cover the mouth and nose fully as result virus not going to in our body, So we developed mask detection system. These research monitor the humans are wearing the mask or not.

I. INTRODUCTION

This corona virus gets spread in crowded and overcrowded places. It is difficult to manually figure out in such areas. In this paper, MobileNet CNN architecture is proposed for identifying the people who are not wearing mask. This proposed model is built not to only detect mask but to identify nose and lips using Dlib machine learning library. Dlib does sentiment analysis on faces as result it will achieve an accuracy of 99%.

The main aim of work is to develop machine learning model which will help todetect if person wearing mask or not in real time. This proposed model uses the MobileNet (CNN) Convolution neural network architecture. CNN are primarily used for image classification and reorganization because of its high accuracy. We trained model through various layers and finally gives out fully-connected layer.

II. OBJECTIVES AND SCOPE

To detect Faces or images in real world.

To check whether they are wearing mask or not.

To highlight Red/Green square on faces who are not wearing/wearing maskrespective

III. SYSTEM DESIGN

Below diagram shows working of proposed model. First input will be fed to the system.Dataset is input and this dataset contains thousands of pictures categories into two groups with mask and without mask respectively. This dataset is used to train and test the model.

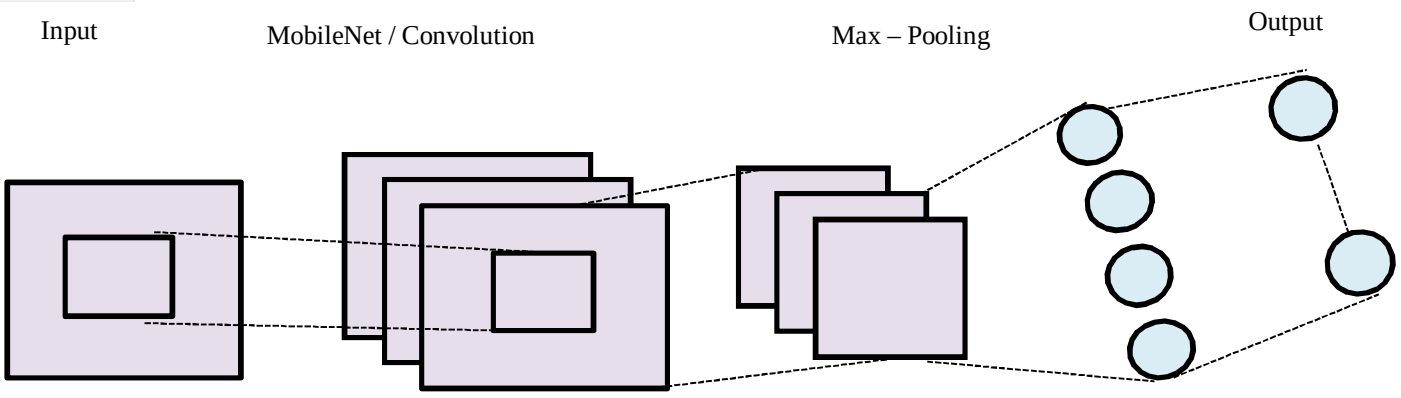
The model we are using to train the data is MobileNet-v2 is a 53 layers deep convolutional neural network You can load a pretrained version of the network trained on more than a million images from the ImageNet database.

MobileNet is a CNN architecture model for Image Classification and MobileVision. There are other models as well but what makes MobileNet special that it very less computation power to run or apply transfer learning to. This makes it a perfect fit for Mobile devices, embedded systems and computers without GPU or low computational efficiency with compromising significantly with the accuracy ofthe results. It is also best suited for web browsers as browsers have limitation over computation, graphic processing and storage.

In Max pooling we choose the maximum value within a matrix. The size of the matrix could be 2 X 2 or 3 X 3 also. Here is an image showing the max pooling of the reference image of 3. It is basically used to reduce the size of the image because the larger number of pixels contribute to more parameters which can involve large chunks of data. Thus, we need less parameters such that a CNN can still identify the image. With max pooling size of the resultant image gets reduced and also retaining the image information.

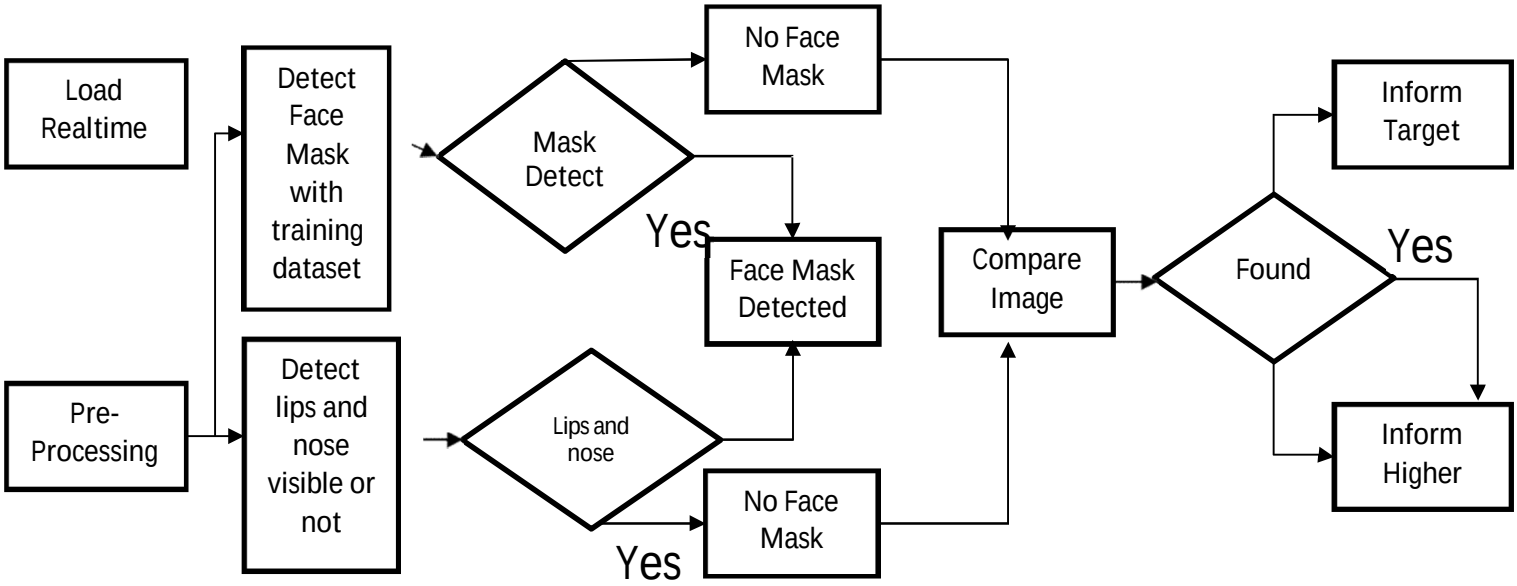
Fully Connected layers in a neural network are those layers where all the inputs from one layer are connected to every activation unit of the next layer. In most popular machine learning models, the last few layers are full connected layers which compiles the data extracted by previous layers to form the final output.

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IV. WORKING OF SYSTEM

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A. Implementation

First Dataset will be loaded and training of the model is done here. After the pre- processing it will first check that mask is detected or not.

Then it will detect nose and lips. If mask is detected and nose and lips are not detected means person is wearing mask. And if mask not detected but nose and lips are visible means mask is not wear properly. Those results will be compared to images in dataset and according to that information will be given to higher authorities. Using Facial landmark detection, we are detecting nose and lips of person. If it's not visible then person is wearing mask in right way, if it is visible then mask is not wear properly. Comparing initial output to the final output. Results are completely accurate infinal output. Mask is not worn properly and showing red square on face.

B. Conclusion

Many research studies have proved that wearing a mask in public places will reduce the transmission rate of the virus. Therefore, the governments of various countries have made it mandatory to wear masks in public places and crowded areas. It is very difficult to monitor crowds at these places. Proposed model is accurately able to detect face mask. Most of developed models are able to detect mask is present or not in images but only detection of mask is not our objective.We wanted to detect people who are not wearing mask properly. We are successfully able to implement facial land mark detection which is detecting nose and lips and giving us final output.

V. IMPLEMENTATION

First Dataset will be loaded and training of the model is done here. After the pre- processing it will first check that mask is detected or not. Then it will detect nose and lips. If mask is detected and nose and lips are detected means person is wearing mask. And if mask detected but nose and lips are visible means mask isnot worn properly. If there is no mask that means nose and lips are visible means person is not wearing mask at all. Those results will be compared to images in dataset and according to that information will be given to higher authorities.

Here it is still showing that person is wearing mask even if he hasn't worn it in right way. This error has occurred because we have trained model by passing only with mask and without mask images. So, we are over coming this problem by using the concept called facial landmark. Which detects nose and lips to check whether the person is wearing mask in right way or not.

Using Facial landmark detection, we are detecting nose and lips of person. If it's not visible then person is wearing mask in right way, if it is visible then mask isnot properly worn.

Comparing initial output to the final output. Results are completely accurate infinal output. Mask is not worn properly and showing red square on face.

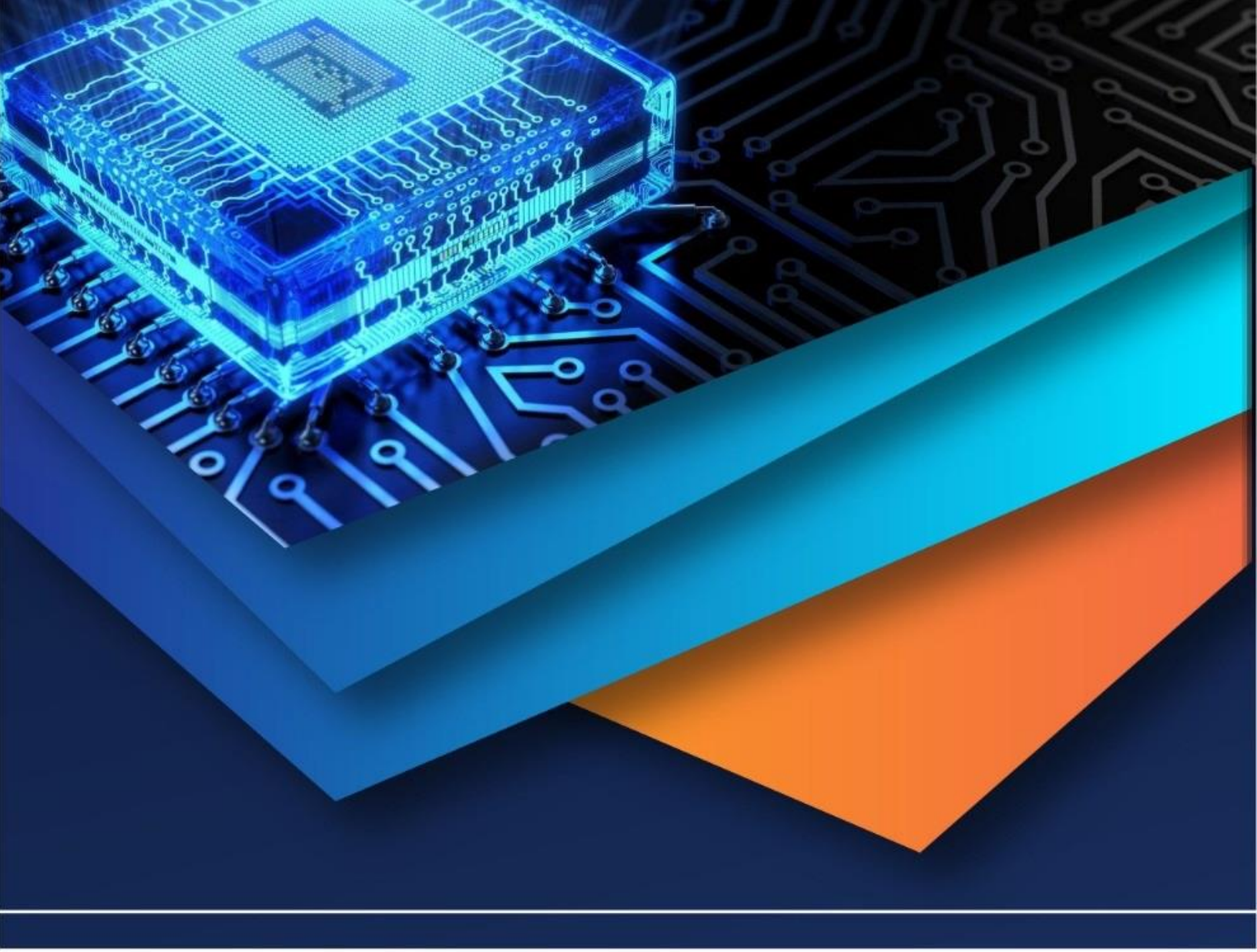
VI. CONCLUSION

Many research studies have proved that wearing a mask in public places will reduce the transmission rate of the virus. Therefore, the governments of various countries have made it mandatory to wear masks in public places and crowded areas. It is very difficult to monitor crowds at these places. Proposed model is accurately able to detect face mask. Most of developed models are able to detect mask is present or not in images but only detection of mask is not our objective.We wanted to detect people who are not wearing mask properly. We are successfully able to implement facial land mark detection which is detecting nose and lips and giving us final output.

VII. FUTURE SCOPE

Today we definitely need this model to fight with this pandemic. In future we will be able to detect person's body (If he is carrying a weapon, not wearing ID card, etc.). This model we will be able to implement in public places like mall, theaters, bus stands, railway stations, parks, hotels, etc. to detect unusual activities that happens.

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