``**Project Report** on

House Price Prediction (An End-to-End ML Project)

Submitted in partial fulfillment of the requirement

for the award of the degree of

B. tech

GALGOTIAS UNIVERSITY

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

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SCHOOL OF COMPUTING SCIENCE AND ENGINEERING GALGOTIAS UNIVERSITY, GREATER NOIDA

CANDIDATE'S DECLARATION

I/We hereby certify that the work which is being presented in the project, entitled **"FACE MASK DETECTION"** in partial fulfillment of the requirements for the award of the B.Tech submitted in the School of Computing Science and Engineering of Galgotias University, Greater Noida, is an original work carried out during the period of month, Year to Month and Year, under the supervision of Mr. G.Nagarajan Assistant Professor, Department of Computer Science and Engineering, of School of Computing Science and Engineering , Galgotias University, Greater Noida

The matter presented in the project has not been submitted by us for the award of any other degree of this or any other places.

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This is to certify that the above statement made by the candidates is correct to the best of my knowledge.

Mr.G. Nagarajan
Professor

CERTIFICATE

The Final Thesis/Project/ Dissertation Viva-Voce examination of Priyanshu Chaudhary 19SCSE1010184 Raman Garg 19SCSE1010749 has been held on _____ and his/her work is recommended for the award of B.Tech.

Signature of Examiner(s) **Signature of Supervisor(s)**

Signature of Project Coordinator **Signature of Dean**

Date: December,2021
Place: Greater Noida

Acknowledgement

It is with a great pleasure our venture in real life application of project finder in the form of project work. We acknowledge our sincere gratitude to all those who helped me to make this project a success. It is great sense of satisfaction and matter of privilege to thank the faculty of Computer Science Engineering (CSE) Department and in charge Mr .G. Nagarajan who tuned our knowledge in the field of computer science. We thank them for their cooperation and guidance throughout the course. Our heartfelt to All teachers of CSE Department for helping in the project with words of encouragement and has shown full confidence in my abilities. The project would not be success without the constant the valuable guidance of Mr .G. Nagarajan my guide for the project who is rendering all sorts of help as and when required.

It is our pleasures to thanks those people help us directly or indirectly during our project.

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ABSTRACT

The Large-scale losses That have been noticed across the world due to the covid-19 pandemic have been highly shocking and lead to a lot of loss of property and life. The pandemic was sudden and the people and governments could not prepare themselves effectively before head to mitigate the effects of this epidemic. The virus is highly deadly and has caused multiple causalities effective prevention and further spread of the virus which can be the main ingredient for stopping the infection in their path.

- To ensure that the mask rule is been followed there needs to be an automatic technique that can provide highly accurate intelligent system for mask detection detection through image processing
- Wearing a mask in public settings is an effective way to keep the communities safe. As a response to the COVID-19 pandemic, we open-sourced a face mask detection application created by Neutral that uses AI to detect if people are wearing masks or not. We focused on making our face mask detector ready for real-world applications, such as CCTV cameras, where faces are small, blurry, and far from the camera.
- In future we can implement it in mobile application as if a person is not wearing mask it will start giving alert message.
- It will help in maintaining alert status.
- The system is easy to operate and it can be used in crowded areas.it also ensure the compliance for wearing mask and the system provides accurate assessment of the individual in public areas weather the person is wearing a mask or not.

Scope of the Project

This project can be developed even more by adding the database to the model such that, it can be used in academic institutions on a large scale. Airports, traffic signals, and secured open places can be installed with such a working model. Since these systems are not introduced in India and also most of the work in industries are at stake, they can customize this basic and simply built model according to the requirements by deploying the software model using Raspberry. To summarize,

- Different position capturing of the face.
- Cognitive face expressions.

CHAPTER 1

INTRODUCTION

The year 2020 has shown mankind some mind-boggling series of events amongst which the COVID-19 pandemic is the most life-changing event which has startled the world since the year began. Affecting the health and lives of masses, COVID-19 has called for strict measures to be followed in order to prevent the spread of disease. From the very basic hygiene standards to the treatments in the hospitals, people are doing all they can for their own and the society's safety; face masks are one of the personal protective equipment. People wear face masks once they step out of their homes and authorities strictly ensure that people are wearing face masks while they are in groups and public places .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 In this project, we will be developing a face mask detector that is able to distinguish between faces with masks and faces with no masks. In this report, we have proposed a detector which employs SSD for face detection and a neural network to detect presence of a face mask. The implementation of the algorithm is on images, videos and live video streams

.The rest of the report is organized as follows. In Section 2, we will go through the literature review and related work. In Section 3, the methodology of our proposed solution is discussed in detail. In Section 4, the model is evaluated, and results discussed. Section 5 and Section 6 discuss limitations and future work and finally with Section 7, the report is concluded

FACE DETECTION:

Face detection involves separating image windows into two classes; one containing faces (tarning the background (clutter). It is difficult because although commonalities exist between faces, they can vary considerably in terms of age, skin colour and facial expression. The problem is further complicated by differing lighting conditions, image qualities and geometries, as well as the possibility of partial occlusion and disguise. An ideal face detector would therefore be able to detect the presence of any face under any set of lighting conditions, upon any background. The face

detection task can be broken down into two steps. The first step is a classification task that takes some arbitrary image as input and outputs a binary value of yes or no, indicating whether there are any faces present in the image. The second step is the face localization task that aims to take an image as input and output the location of any face or faces within that image as some bounding box with (x, y, width, height).

The face detection system can be divided into the following steps:-

1. Pre-Processing: To reduce the variability in the faces, the images are processed before they are fed into the network. All positive examples that is the face images are obtained by cropping Department of ECE Page 3 images with frontal faces to include only the front view. All the cropped images are then corrected for lighting through standard algorithms.

2. Classification: Neural networks are implemented to classify the images as faces or nonfaces by training on these examples. We use both our implementation of the neural network and the Matlab neural network toolbox for this task. Different network configurations are experimented with to optimize the results.

3. Localization: The trained neural network is then used to search for faces in an image and if present localize them in a bounding box. Various Feature of Face on which the work has done on:- Position Scale Orientation Illumination

CHAPTER 2

LITERATURE SURVEY

- Study of Face Mask detection Approach in Video Analytics

The paper outlines the principle used in each of these steps and the use of commonly available algorithms of improvement in the people detection and face detection performance of the This unique approach for the problem technique. has created a method simpler in complexity thereby making real time implementation feasible. Analysis of the algorithm's performance on test video sequences gives useful insights to further improvements in the masked face detection performance.

- A cascade Framework for masked Face detection

the proposes a new cnn based cascaded framework which consists of three carefully design convolutional neural networks to detect mask face . beside because of the shortage of masked face training sample a new data set call “MASKED FACE dataset “ to finetune our CNN model the evaluation propose mask face detection algorithm on the mask face testing set and it achieve satisfactory performance

- utilising skin mask and face organs detection for improving the Violance face detection method

Approach to detect eyes and nose makes possible face detecting only with two eyes or one eye and nose in addition to decrease false deduction rate rather than violation approach. implementing of this approach shows the present algorithm could reduce false negative from 10 % to 2.4 and reduced false-positive from 4.4 to present 2.4

Deformable Templates:

Deformable templates were then introduced by Yuille et al. to take into account the a priori of facial features and to better the performance of snakes. Locating a facial feature boundary is not an easy task because the local evidence of facial edges is difficult to organize into a sensible global entity using generic contours. The low brightness contrast around some of these features also makes the edge detection process.Yuille et al. took the concept of snakes a step further by incorporating global information of the eye to improve the reliability of the extraction process. Department of ECE Page 6 Deformable templates approaches are developed to solve this problem. Deformation is based on local valley, edge, peak, and brightness .Other than face boundary, salient feature (eyes, nose, mouth and eyebrows) extraction is a great challenge of face recognition.E = Ev + Ee + Ep + Ei + Einternal ; where Ev , Ee , Ep , Ei , Einternal are external energy due to valley, edges, peak and image brightness and internal energy

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PDM (Point Distribution Model):

Independently of computerized image analysis, and before ASMs were developed, researchersdeveloped statistical models of shape . The idea is that once you represent shapes asvectors, you can apply standard statistical methods to them just like any other multivariateobject. These models learn allowable constellations of shape points from training examplesand use principal components to build what is called a Point Distribution Model. These havebeen used in diverse ways, for example for categorizing Iron Age broaches.Ideal Point Distribution Models can only deform in ways that are characteristic of the object. Cootes and his colleagues were seeking models which do exactly that so if a beard, say, covers the chin, the shape model can \override the image" to approximate the position of the chin under the beard. It was therefore natural (but perhaps only in retrospect) to adopt Point Distribution Models. This synthesis of ideas from image processing and statistical shape modelling led to the Active Shape Model.The first parametric statistical shape model for image analysis based on principal components of inter-landmark distances was presented by Cootes and Taylor in. On this approach, Cootes, Taylor, and their colleagues, then released a series of papers that cumulated in what we call the classical Active Shape Model.

LOW LEVEL ANALYSIS:

Based on low level visual features like color, intensity, edges, motion etc.Skin Color BaseColor is avital feature of human faces. Using skin-color as a feature for tracking a face has several advantages. Color processing is much faster than processing other facial features. Under certain lighting conditions, color is orientation invariant. This property makes motion estimation much easier because only a translation model is needed for motion estimation.Tracking human faces using color as a feature has several problems like the color representation of a face obtained by a camera is influenced by many factors (ambient light, object movement, etc

WORKING

This project makes the use of OpenCV,Caffe-based face detector, Keras, TensorFlow and MobileNetV2 for the detection of face mask on humans. The dataset which is being used contains 3835 images out of which 1916 images have people with masks in them and 1919 people without masks in them.

First a base model is generated. This is done my using Keras and MobileNetV2. First a base model is generated and a head model is generated on top of that. The head model consists of a network with 128 layers, an activation function of “Relu” and a dropout of 0.5 followed by another network with 2 layers and an activation function “softmax”. All these three layers combined, will give out model which will be trained.

The generated model is then trained with the labeled dataset by splitting it into two portions. One portion contains 75 percent images and it is used for training. The remaining portion contains the remaining 25 percent of images and is used for testing the model accuracy. After the model is trained, it can be used for detection of facemask on human faces.

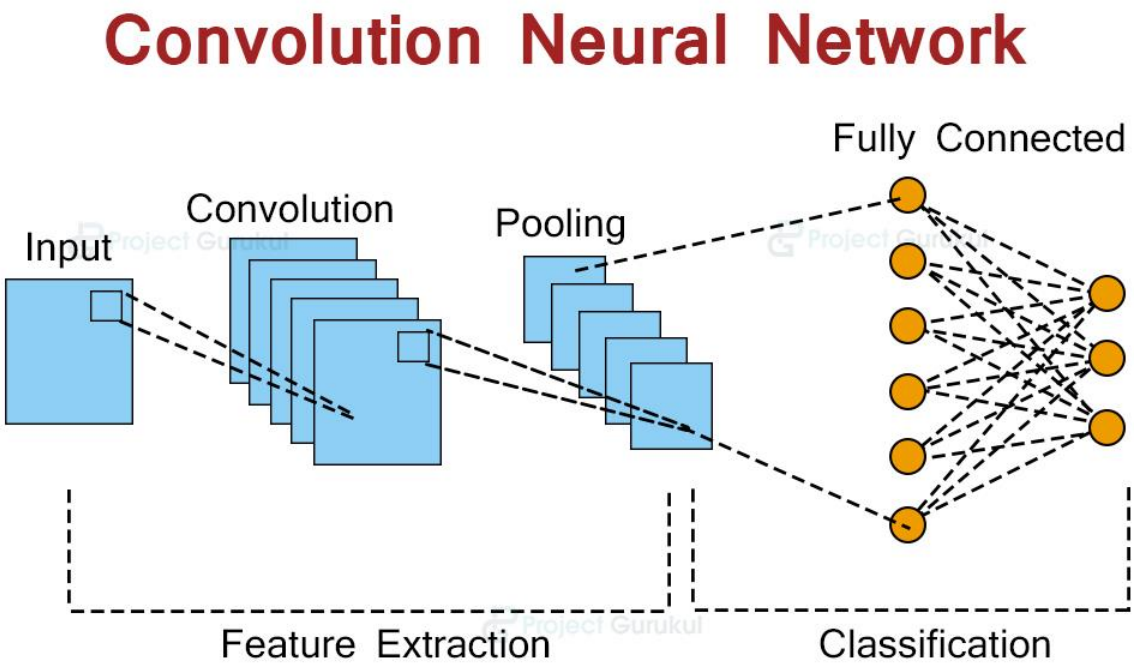
The trained model is loaded and image which contains human faces with or without masks or a continuous video stream with humans is given as input. The image or a frame of the video, in case the input is a video stream, is first sent to the default face detector module for the detection of human faces. This is done by resizing the image or the video frame first, followed by detecting the blob in it. This detected blob is sent to the face detector model which outputs only the cropped face of a person without the background. This face is given as the input to the model which we trained earlier. This outputs weather there is a mask or not.

Another model is trained with the faces of humans. The images used for the training of the model are provided with the name and email address of that person as the labels of those images. This is done by using Open CV. When an input image is given to the CV model, it detects the face of a person and asks the user to provide the name and email address of that person which will be stored in the database. The output of the first model is given as the input to this model. This face will be compared with the persons present in the database. And if his face matches, then a bounding box will be drawn over his face with his name on it and an email and Sms will be sent to him that he is not wearing a mask. Else, only the words “Mask” will be present below the bounding box if the person is wearing a mask and “No Mask” if the person is not wearing one

Project Design

Convolution neural network

a convolutional neural network or CNN is a type of neural network that is commonly used for image processing tasks. It is specifically designed to process images. CNN takes some input arrays, then applies some filters, and gives an output array. The filters help to extract features from the images.



We'll do this project in three parts.

1. Data Collection
2. Model training
3. Model Testing

What is face mask detection?

Face mask detection means finding faces with mask in a digital image and localizing them. Generally, a bounding box is placed around the faces to determine where the face locates in that image.

Methods of face mask detection: -

Feature-based face mask detection- Every object has its unique features and our face has it too when we wear mask. By extracting those unique features from an image, we can detect different objects and their location. Our face has two eyes, two eyebrows above each eye, a nose under the eyes, and person will be wearing a mask etc. using these features we can determine whether person is wearing it or not.

Machine learning-based face detection: - In this method, some Face images are required to train a machine learning model to detect faces in an image. This method requires lots of data and pre-processing to build a face detector but it gives better results than a feature-based face detector.

In this face mask detection project, we'll use a deep learning approach to detect faces. We'll use the media Pipe framework to detect a face.

What is Media Pipe?

Media Pipe is a machine learning solution framework that has several pre-trained models inbuilt. It is a very fast and lightweight multi-platform framework. Media Pipe is developed by Google's brain team

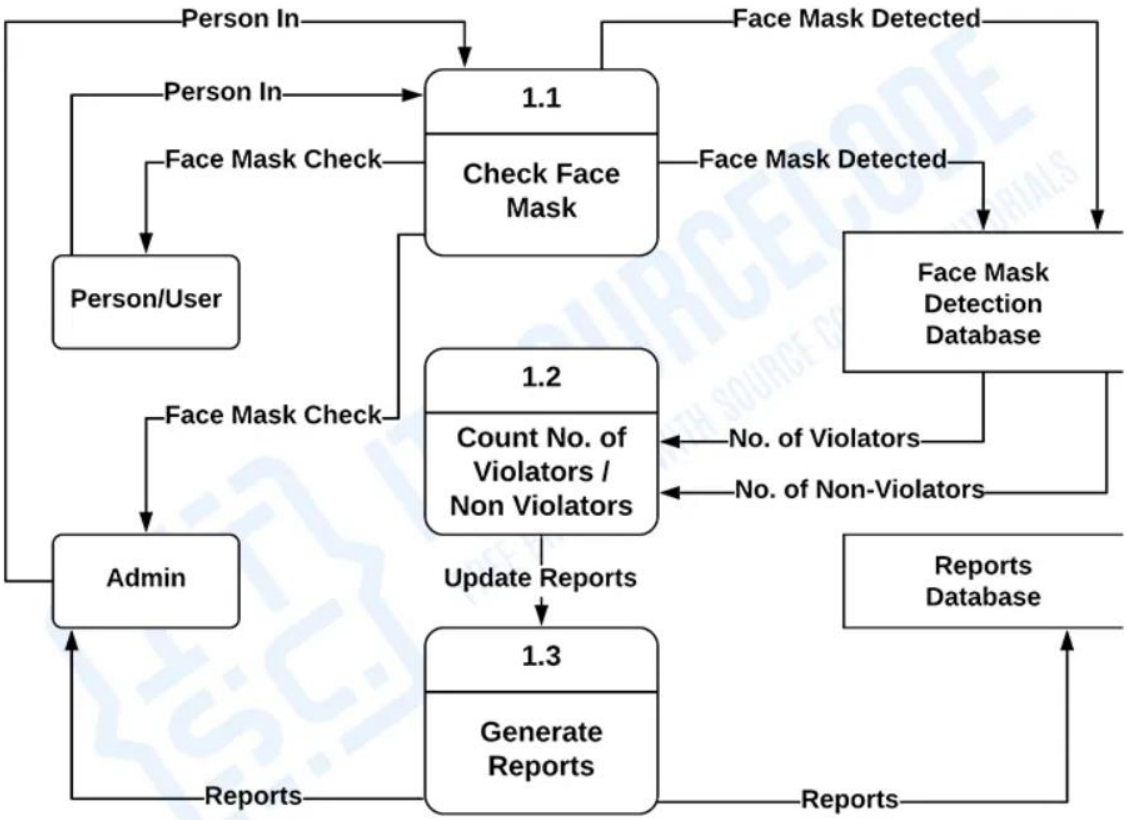
Steps:

- Import necessary packages.
- Create the Face detector function.
- Data collection.

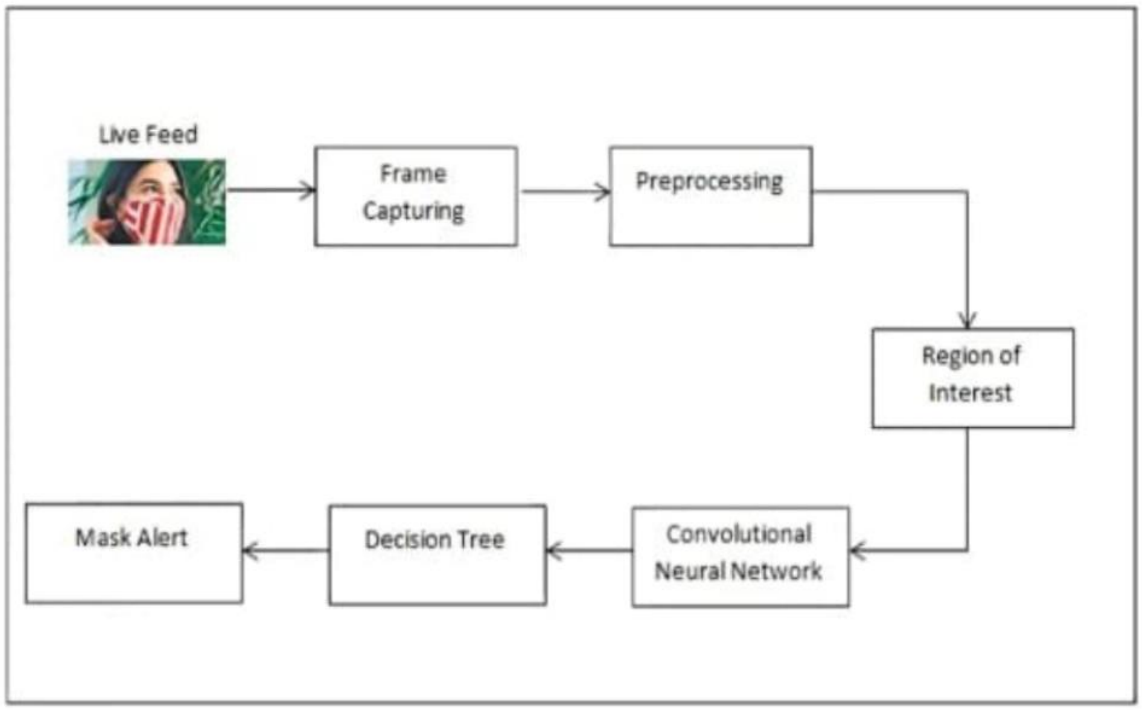
DATA FLOW DIAGRAM

DFD level 2 lets you know the ideas on where does the data inputs goes and inputs comes within the Face Mask Detection System. Considering the dataflow levels mentioned above, you can determine well the importance of breaking the processes into more specific manner.

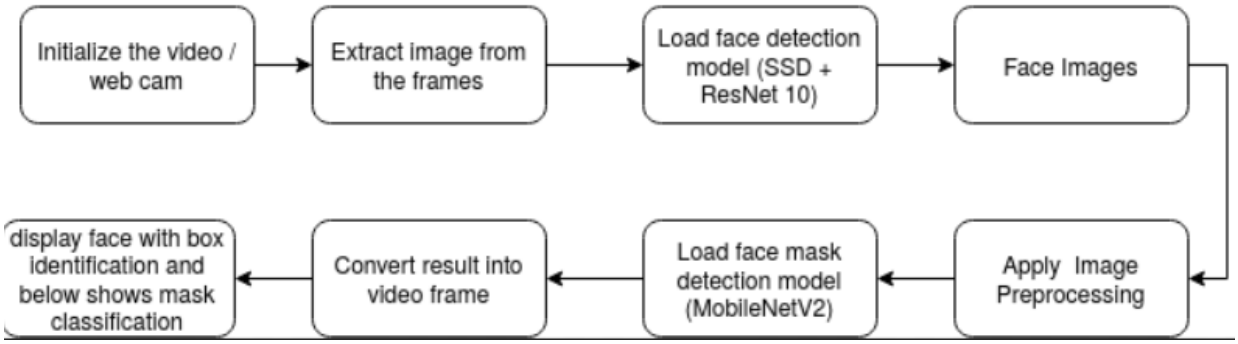
The presented level not only shows you the detailed processes of system, but also gives you precise destination of the data that flows in the system.



ARCHITECTUAL DIADGRAM



FLOW CHART



Conclusion

The goal of the project is to ensure that the working of a few industries and professions progress well without any economic loss. Since man-power is mandatory and safety should be ensured in these pandemic COVID-19 conditions, it is important and would be efficient to install such models at workplaces. Apart from this, public transportation like airports can also be made available with these systems for safety and sanity

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