

PUNE VIDYARTHI GRIHA's
COLLEGE OF ENGINEERING & SSD IOM , NASHIK.
Department of Computer Engineering

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PROJECT SYNOPSIS

Title : Face Mask Detection System Using Artificial Intelligence

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Problem Definition :

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 detect if people are wearing masks or not. 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.

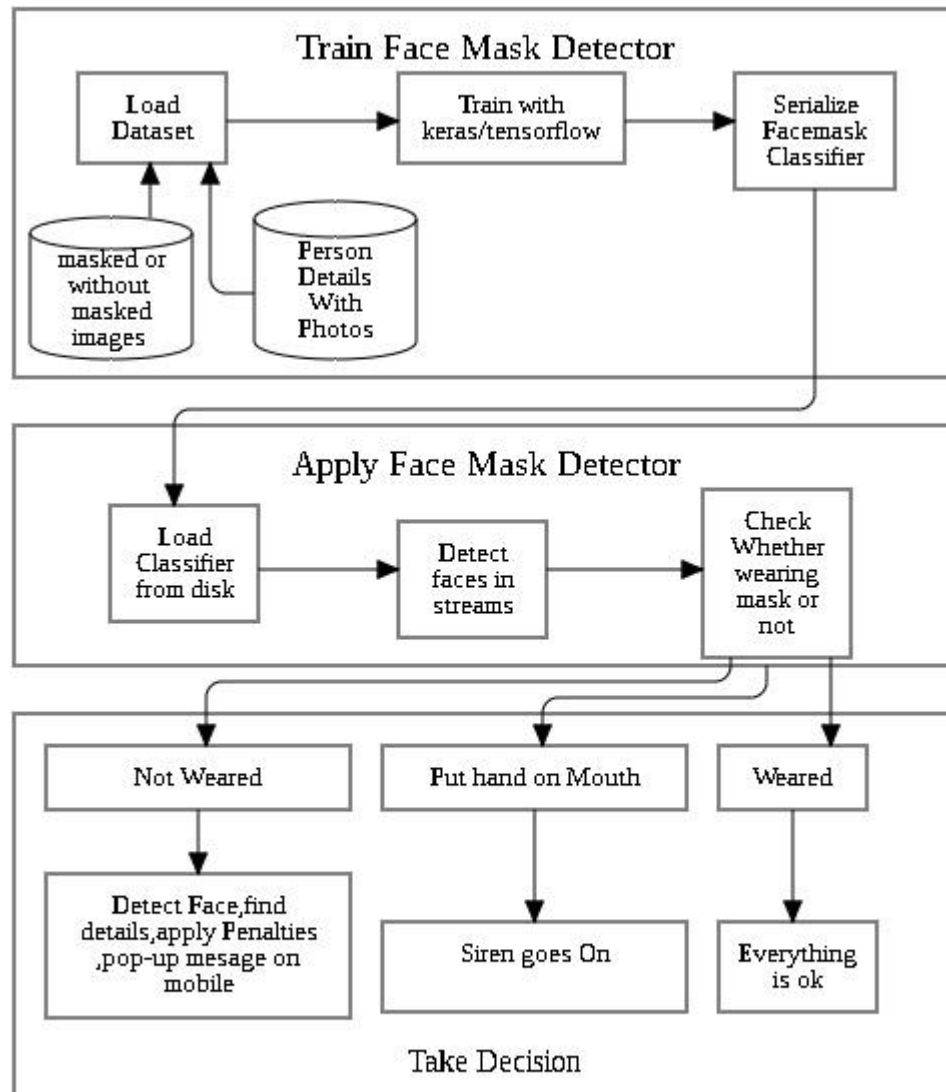
Objectives :

1. To enforce the mandate for wearing masks in public places following the covid-19 pandemic.
2. To effectively provide a working model for accurate mask detection.
3. To utilize image processing approaches to identify the presence of mask on face.
4. To develop an efficient computer vision based system focused on the real time automated monitoring of people to detect face mask in public places.

Relevant Theory (Existing system) :

There are several approaches are used for facial masks detection. For instance, used electromagnetic and radiometry techniques for facial masks detection. Employed deep neural networks (ANN) using machine learning techniques in Facial Masks detection. Also comparison was made between ELM ANN and BP ANN based on performance measurements. Neural Networks are used to extract information from ultrasound to classify the abnormal lesions. An island based model for classification of face mask and distinguishing between various classes of face feature detection using artificial neural network. That artificial neural network to detect the abnormality masks lesions based on edge. Ultrasound imaging system in order to reduce the dependency of the operator.

- Existing system uses ANN Algorithm to detect the face mask.
- This algorithm treats local pixels same as pixels far apart.
- It is sensitive to location of an object in an image.
- It needs lot more computation to predict the output.
- Existing process is more time consuming as well as having the less accuracy.

System Design : (Architecture of proposed system)**Fig.1 PROPOSED SYSTEM**

Implementation details modules:

1. Load Face mask dataset
2. Train face mask classifier with keras/tensor flow
3. Serialize the classifier to the disk
4. Load Face mask classifier from disk
5. Detect faces in images/videos streams
6. Kaggle Data set for person details
7. Extract each face ROI
8. Open CV libraries and python or Java language
9. Classify images as masked or unmasked
10. Show final Result

Working of Proposed System :

The main basic goal of our system is making risk-free surroundings will be priority of every person and avoid the third wave of covid-19. We will create face mask detection system using artificial intelligence and deep learning, we are using some machine learning algorithms and some dataset.

Firstly there are one camera use for capturing person image or video then preprocessing on that image then using some algorithm like CNN, SVM and Keras and use to some data set like kaggle & to check person wearing mask or not and check also person put hands on face. After check person wearing mask then application is terminate, if person is not wearing the mask then system to check details in organization and pop-up notification on that person cellphone and due. If person put hands on face then siren goes on.

- We detect face mask using CNN, It will solve the problem of more computations using feature extraction techniques and classification techniques.
- It will use three types of filters i.e. Head Line Filter, Vertical Filter, Diagonal Filter that's why CNN will not sensitive to location of an object in an image.
- We use Relu and pooling technique to reduce the computational size and time to make system more efficient.
- We uses data augmentation methods to generate new rotation/scale samples from existing training samples.
- We build a system which get the images from the CCTV and after capturing it will detect the face mask is present or not.

Algorithms:

1.CNN Algorithm

2.SVM Algorithm

1.CNN Algorithm

A convolutional neural network (CNN) is a type of artificial neural network used in image recognition and processing that is specifically designed to process pixel data. A CNN uses a system much like a multilayer perceptron that has been designed for reduced processing requirements.

- Convolution Operation-Convolution has the nice property of being translational invariant.
- ReLU Layer-ReLU is an activation function.
- Pooling- In this layer we shrink the image stack into a smaller size.
- Flattening.
- Full Connection.

2.SVM Algorithm:

A support vector machine (SVM) is machine learning algorithm that analyzes data for classification and regression analysis. SVM is a supervised learning method that looks at data and sorts it into one of two categories.

- Import the dataset.
- Explore the data to figure out what they look like.
- Pre-process the data.
- Split the data into attributes and labels.
- Divide the data into training and testing sets.
- Train the SVM algorithm.
- Make some predictions

Minimum Requirements:**1) Software:**

- Operating System : Windows 7 and above
- Android operating system : Version 7.0 and above
- IDE : Android Studio, Visual Studio Code, Jupyter Notebook, Pycharm
- Programming Language : Java or Python

2) Hardware :

- Camera
- Speaker
- Ram : 4 GB and above for Fast Processing
- CPU : Intel Core i3 and above
- Internal Storage : 20 GB minimum(Android), 250 GB minimum(windows)

Applications :

- School/Colleges
- Company
- Bank
- Bus Station
- Railway Station
- Airport

Conclusion:

With the help of this proposed system, we are able to contribute in public healthcare and welfare. Using basic ML tools and simplified techniques the method has achieved reasonably high accuracy.

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- 10) N. Mehendale B-412, K. J. Somaiya College of Engineering, Mumbai, India Tel.: +91- 9820805405 E-mail: ninad@somaiya.edu

Sr. No.	Group Members	Date	Sign
1	Tejas Dnyaneswhar Bansode		
2	Abhijit Ramesh Shermale		
3	Darshan Daulat Shinde		
4	Suraj Shankar Pawar		

Project Guide

(Prof. A. N. Gharu)

Project Co-ordinator

(Prof. A. N. Gharu)

H.O.D

(Prof. J. Y. Kapadnis)