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Face Mask Detection

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ABSTRACT: - COVID-19 pandemic has rapidly affected our day-to-day life disrupting the world trade and movements. Wearing a protective face mask has become a new normal. In the near future, many public service providers will ask the customers to wear masks correctly to avail of their services. Therefore, face mask detection has become a crucial task to help global society. This paper presents a simplified approach to achieve this purpose using some basic Machine Learning packages like TensorFlow, Keras, OpenCV and Scikit-Learn. The proposed method detects the face from the image correctly and then identifies if it has a mask on it or not. As a surveillance task performer, it can also detect a face along with a mask in motion. The method attains accuracy up to 95.77% and 94.58% respectively on two different datasets. We explore optimized values of parameters using the Sequential Convolutional Neural Network model to detect the presence of masks correctly without causing over-fitting.

Keywords: - COVID-19, Face mask detection, Object detection, Classification.

I. INTRODUCTION

The spread of Coronavirus disease 2019, commonly known as COVID-19, is a significant concern for everyone worldwide. It is a contagious disease that has affected human life globally. The health specialists suggest that the virus might transmit by direct or indirect contact with the infected person, hence measures like compulsory wearing of face masks have been strictly put into effect by medical bodies. Numerous studies advise putting face masks on even if a person is not feeling sick. It is not the first time, during COVID-19, that wearing face masks has been stressed to combat the transmission. It is a practice that can be dated back to the 1910–11 Manchurian epidemic in China. Various pandemics of history have been survived by wearing face masks. Besides, it is well proven by various studies that not just wearing face masks instead wearing them properly limits the transmission of the virus to quite an extent. The observation that greater the proportion of population wearing face masks in a country, the lesser the cases of COVID-19 in the nation has Created the need for an automated face mask detector.

II. PROBLEM FORMULATION

With time, the surge in COVID-19 cases urged people to be cautious, alert, and take all safety measures possible. In situations such as this, where a mere sneeze could be harmful to many people, safety remains the priority. To ensure the well-being of all humans, a system that could itself monitor if a face mask is on or not is necessitated. It would not only secure a being rather fellows in the vicinity as well. Having access to the ultra-modern technological methods, implementing such a system could be a boon to society. After analyzing the problem statement, numerous studies performed on the same were scrutinized to commence the research. Then, the content relevant to the issue was filtered, and a depth understanding of the topic was attained. Further, several existing datasets were explored, along with the techniques available. The literature survey of the available methods was conducted, followed by a comparison of the different algorithms. Further, the software was explored and thereby applications.

III. LITERATURE REVIEW

The Covid-19 commonly known as serious acute respiratory disorder, is a disease that causes serious respiratory problems. This disease is an infectious illness spread by respiratory droplets from

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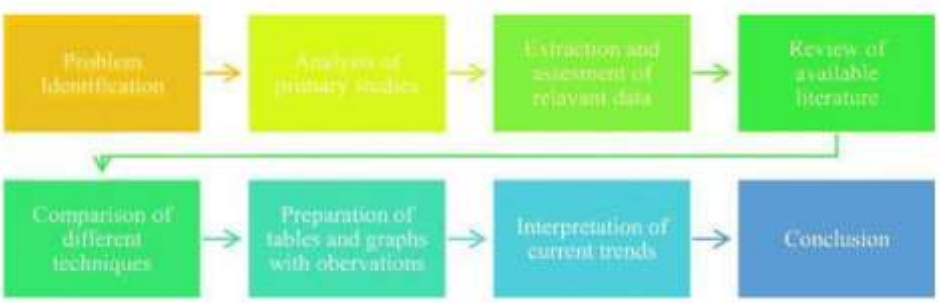
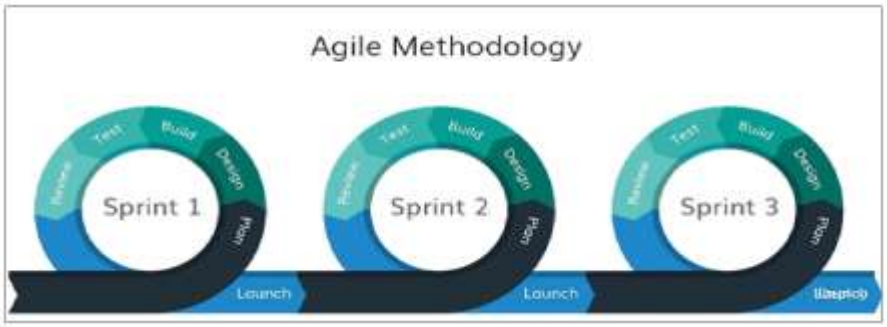
an infected unwell person who talks, sneezes and coughs. This spreads fast all the way through close contact with infected people or by touching contaminated goods or surfaces. There is presently no vaccination available to defend against Covid-19; therefore avoiding infection appears to be the merely way to guard ourselves. In public, exhausting a facemask conceals the nose and mouth. As technology has evolved, deep learning has proven its usefulness in image processing detection and classification. Deep learning approaches for facial recognition and determining whether or not a person is putting a facemask. The dataset gathered has a 96% accuracy rate when it comes to the trained model's performance. If the individual spotted is not wearing a facemask, the system creates a raspberry Pi-related real-time facemask identification system which alerts and records facial image.

IV. METHODOLOGY

The proposed method consists of a cascade classifier and a pre-trained CNN which contains two 2D convolution layers connected to layers of dense neurons.





The various phases of the agile model are as follows:

- Requirements
- Design
- Development and Coding
- Integration and Testing
- Implementation and Deployment
- Review

The algorithm for face mask detection is as follows:

Algorithm 1: Face Mask Detection

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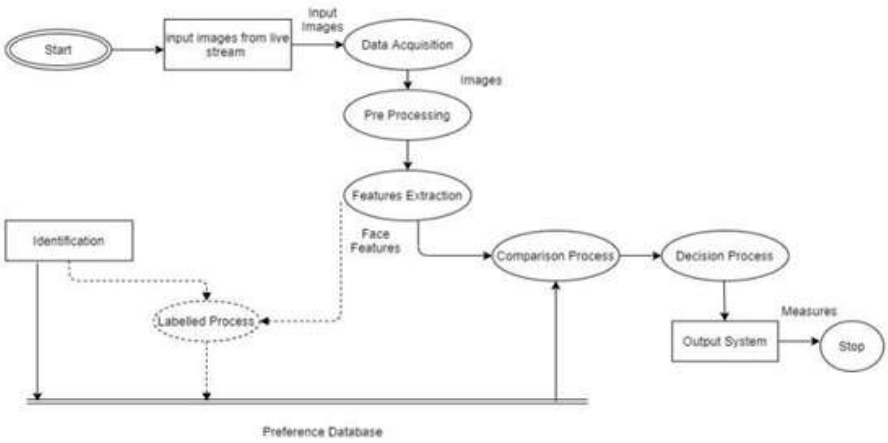
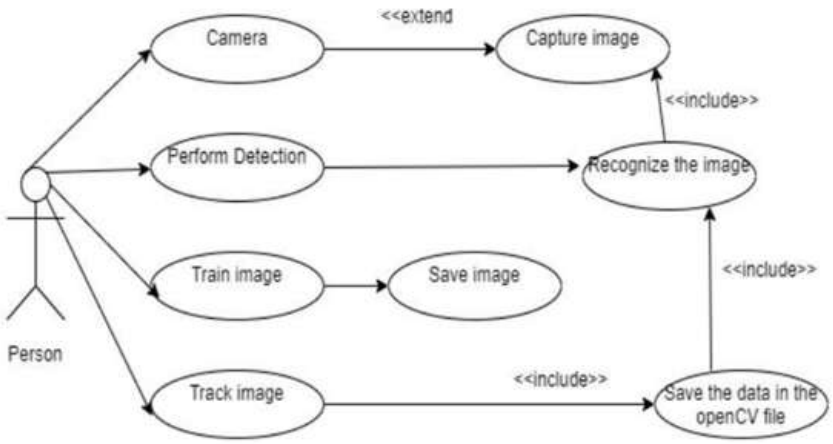
Input: Dataset including faces with and without masks
Output: Categorized image depicting the presence of face mask
for *each image in the dataset* **do**
  Visualize the image in two categories and label them
  Convert the RGB image to Gray-scale image
  Resize the gray-scale image into 100 x 100
  Normalize the image and convert it into 4 dimensional array
end
for *building the CNN model* **do**
  Add a Convolution layer of 200 filters
  Add the second Convolution layer of 100 filters
  Insert a Flatten layer to the network classifier
  Add a Dense layer of 64 neurons
  Add the final Dense layer with 2 outputs for 2 categories
end
Split the data and train the model

Data Flow Diagram



Use Case Diagram



Flow Diagram

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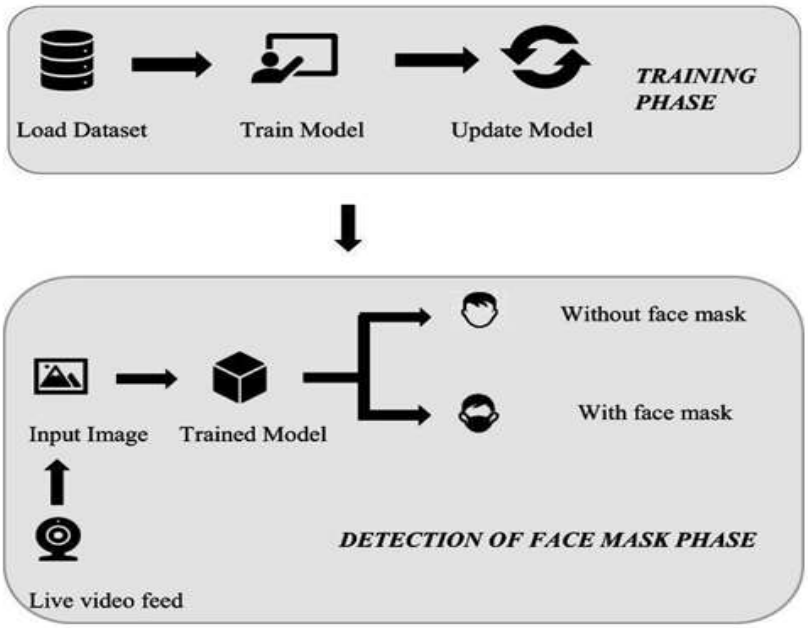

V. CONCLUSION

This project comes under the category of image processing and QR generation. It is useful to get easy entry to monuments/museums by skipping the ticket buying and standing in the long queue process altogether. It is used for easy tracking and managing of people and resources at the said monuments/museums. In future modifications this project can be further modified to directly see upcoming events and auctions at the said museums as well as monuments. The data can be used to collect the high time for the monuments/museums as well as gathering general feedback from people about the places and how the experience can be improved.

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