

# Face Mask and Social Distancing Detection System

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**Abstract:** *The spread of COVID-19 has been taken on pandemic magnitudes and has already spread over 200 countries in a few months. In this time of emergency of COVID-19, especially when there is still a need to follow the precautions and developed vaccines are not available to all the developing countries in the first phase of vaccine distribution, the virus is spreading rapidly through direct and indirect contacts. The World Health Organization (WHO) provides the standard recommendations on preventing the spread of COVID-19 and the importance of face masks for protection from the virus. The excessive use of manual disinfection systems has also become a source of infection. That is why this research aims to design and develop a low-cost, rapid, scalable, and effective virus spread control and screening system to minimize the chances and risk of spread of COVID-19. We proposed an IoT-based Smart Screening and Disinfection Walk-through Gate (SSDWG) for all public places entrance. The SSDWG is designed to do rapid screening, including temperature measuring using a contact-free sensor and storing the record of the suspected individual for further control and monitoring. Our proposed IoT-based screening system also implemented real-time deep learning models for face mask detection and classification. This module classified individuals who wear the face mask properly, improperly, and without a face mask using VGG-16, MobileNetV2, Inception v3, ResNet-50, and CNN using a transfer learning approach. We achieved the highest accuracy of 99.81% mask detection and classification module. We also implemented classification to classify the types of face masks worn by the individuals, either N-95 or surgical masks. We also compared the results of our proposed system with state-of-the-art methods, and we highly suggested that our system could be used to prevent the spread of local transmission.*

**Keywords:** Covid-19, Mask, No Mask, Social Distancing, Machine Learning Algorithm, Neural Network

## I. INTRODUCTION

Our project is to detect Unmask person and detect social distance or not. Our system is to see if person wearing mask or not, Person having social distance or not. The Pandemic situation day by day more critical. Some People cannot follow rules for covid-19 they are not wearing mask because of this issue corona spread more in our country. we discuss this issue and we motivate for implement system for Covid-19. To help prevention for covid-19 firstly we all have to take care of our safety and wear mask and sanitizes regularly. In Public place there is not wearing mask properly so covid is Spared so our system is detecting the unmask person.

## II. MOTIVATION

Wearing the mask on the face appears necessary to protect people and to limit the propagation of the disease. Currently, we are facing the 2019–2020 coronavirus pandemic. Coronavirus disease COVID-19 is an infectious disease with first symptoms similar to the flu. The symptom of COVID-19 was reported first in China and very quickly spreads to the rest of the world. The COVID-19 contagiousness is known to be high by comparison with the flu. In this paper, we propose a design To This system is people are moving safe to organization Ease of use, maintenance, and low-cost installation is the motivation behind the system design.

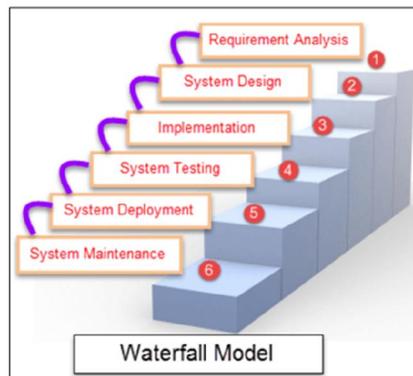
## III. PROBLEM DEFINITION

Now a days In mall there is manually but our device is check unmask person also check our system by using image processing. And also check the social distance or not. The COVID-19 contagiousness is known to be high by comparison with the flu. In this paper, we propose a design To This system is people are moving safe to organization.

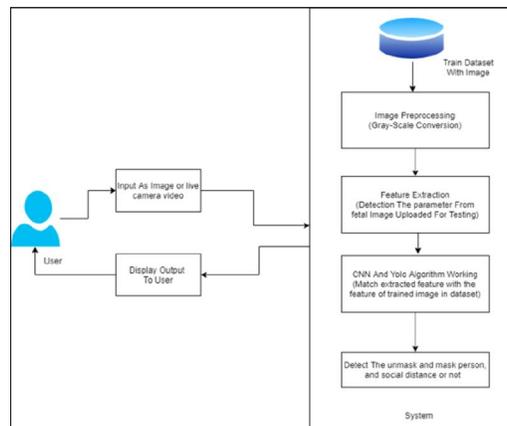
**IV. METHODOLOGY OF PROBLEM SOLVING**

We are using waterfall model for our project.

1. **Requirement Gathering and Analysis:** In this step of waterfall, we identify what are various requirements are need for our project such are software and hardware required, database, and interfaces.
2. **System Design:** In this system design phase we design the system which is easily understood for end user i.e. user friendly. We design some UML diagrams and data flow diagram to understand the system flow and system module and sequence of execution.
3. **Implementation:** In implementation phase of our project, we have implemented various module required of successfully getting expected outcome at the different module levels. With inputs from system design, the system is first developed in small programs called units, which are integrated in the next 10 phase. Each unit is developed and tested for its functionality which is referred to as Unit Testing.
4. **Testing:** The different test cases are performed to test whether the project module is giving expected outcome in assumed time. All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures.
5. **Deployment of System:** Once the functional and non-functional testing is done, the product is deployed in the customer environment or released into the market.
6. **Maintenance:** There are some issues which come up in the client environment. To fix those issues patches are released. Also, to enhance the product some better versions are released. Maintenance is done to deliver these changes in the customer environment. All these phases are cascaded to each other in which progress is seen as flowing steadily downwards like a waterfall through the phases. The next phase is started only after the defined set of goals are achieved for previous phase and it is signed off, so the name Waterfall Model. In this model phases do not overlap.



**V. PROPOSED SYSTEM**



**Figure:** System Architecture

- **Admin:** In this module, the admin has to log in by using valid user name and password. After login successful he can do some operations, such as View All Users and Authorize, View All E-Commerce Website and Authorize, View All Products and Reviews, View All Products Early Reviews, View All Keyword Search Details, View All Products Search Ratio, View All Keyword Search Results, View All Product Review Rank Results.
- **View and Authorize Users:** In this module, the admin can view the list of users who all registered. In this, the admin can view the user's details such as, user name, email, address and admin authorize the users.
- **View Charts Results:** View All Products Search Ratio, View All Keyword Search Results, View All Product Review Rank Results.
- **Ecommerce User:** In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will be stored to the database. After registration successful, he has to login by using authorized user name and password Once Login is successful user will do some operations like Add Products, View All Products with reviews, View All Early Product's reviews, View All Purchased Transactions.
- **End User:** In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will best or to the database. After registration successful, he has to login by using authorized user name and password. Once Login is successful user will do some operations like Manage Account, Search Products by keyword and Purchase, View Your Search Transactions, View.

## VI. MATHEMATICAL MODEL

1. Identify the Users,

$$U = \{u_1, u_2, u_3, \dots\}$$

Where 'U' is main set of Users like  $u_1, u_2, u_3, \dots$

2. D be the set of Data.

$$D = \{D_1, D_2, D_3, \dots\}$$

3. Entered Queries

$$Q = \{Q_1, Q_2, Q_3, \dots\}$$

Where 'Q' is main set of queries  $q_1, q_2, q_3, \dots$

4.  $SYS = \{DX, DF, AP, BG, HD, HV\}$

– DX = It Data Extractor which extract the data from the dataset.

– DF = Search query using DFS in database.

– AP = Filter the results of DFS using Apriori Algorithm.

– BG = It generate the Bipartite graph by considering query and url as a node.

– HD = Heat Diffusion find out H-D matrix for query and H-D with Random Jump matrix.

– HV = It is Heat Vector which suggest the final recommendation for the given query in particular order.

5. Identify the processes as P.

$$P = \{P_1, P_2, P_3, P_4\}$$

–  $P_1 = \{e_1, e_2\}$  where,

{  $e_1 = i \mid i$ , database designing from the dataset }

{  $e_2 = j \mid j$ , show all clicks through data from the database }

–  $P_2 = \{e_1, e_2, e_3, e_4\}$  where,

{  $e_1 = i \mid i$ , Take the Query from the user t }

{  $e_2 = i \mid i$ , Search query using DFS }

{  $e_3 = j \mid j$ , Filter the results of DFS using Apriori }

{  $e_4 = j \mid j$ , Generate the directed bipartite Graph }



Graph  $G = \{E, V\}$

where, \*  $V = \{v1, v2, v3, \dots\}$  be set of vertex

\*  $E = \{(v1, v2), (v2, v3)\}$  be set of edges

– P3 =  $\{e1, e2\}$  where,

{  $e1 = i \mid i$ , Find out the similarity information propagation on Web graphs }

{  $e2 = i \mid i$ , Find out H-D matrix for query and H-D with Random Jump matrix }

$Fi(t)$  = heat at node  $Vi$  at time  $t$ .

– P4 =  $\{e1, e2\}$  where,

{  $e1 = i \mid i$ , Find out the Heat Vector }

{  $e2 = i \mid i$ , Suggest final queries having top Heat values }

#### VII. LITERATURE REVIEW

This project aims to detect face masks and social distancing on a video feed using Machine Learning and Object Detection. TensorFlow and Keras were used to build a CNN model to detect face masks and it was trained on a dataset of 3800 images. YOLO Object detection was used to detect people in a frame and check for social distancing by calculating the Euclidean distance between the centroids of the detected boxes. Developed an Android app named “Stay Safe” where the user will be notified and can monitor the violations. For this purpose, Firebase was used as the backend service. If a violation is detected it will upload the image to a Firebase Cloud Storage with a notification, and the user will be able to view these images on their Android app along with the date and time. Firebase Cloud Messaging service was used to send notifications which will be handled in the android app. The app offers various features like viewing history, saving the image to the device, deleting the images from the cloud etc.

#### VIII. CONCLUSION

We will be building a model which will detect whether a person is wearing a mask or not and person having social distancing or not and will also determine if the person have low temperature or oxygen ratio to notify. Hence, we reduce Covid from spreading more.

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