Face Mask and Social Distancing Detection Using Image Processing

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***Abstract*: After the breakout of the worldwide pandemic COVID-19, there arises a severe need of protection mechanisms, face mask being the primary one. The basic aim of the project is to detect the presence of a face mask on human faces on live streaming video as well as on images. We have used deep learning to develop our face detector model. The architecture used for the object detection purpose is Single Shot Detector (SSD) because of its good performance accuracy and high speed. Alongside this, we have used basic concepts of transfer learning in neural networks to finally output presence or absence of a face mask in an image or a video stream. Experimental results show that our model performs well on the test data with 100 percent and 99 percent precision and recall, respectively. We are making a savvy framework which will identify the whether the specific user has wear the mask or not and furthermore observing the social distancing of two user. Our framework will be python and AI based which will be the safe and quick for delivering the yields. At the point when the client is recognize without mask or dodging social distancing framework offers caution to control room, Control room in control make a declaration of wearing mask or follow social distancing , in the event that still user maintain a strategic distance from it , at that point the specific user will face police.**

***Keywords*: centralized system, Data, Transparency, access control mask Detection, Social Distancing**

INTRODUCTION

This chapter describes the term Block Chain and introduces the concept of Block chain Framework. It also gives the overview of the Block Chain Framework which describes the deliverable of the project. 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. 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

MOTIVATION

This project to implement a application using machine learning aims at monitoring mask and social distance in peoples, who have lost the mask and have crossed the distance limit. so we are creating a system to easily identify the without mask peoples, and social distance in peoples.

LITRATURE SURVEY

• An Efficient Moving Object Detection Algorithm Using Multi-mask, Chunlian Yao; Wei Li; Yi Chen; Lihua Gao, 2009

Is a author of this paper, this paper published in 2009. Advantage of his project is, Motion object detection is the basis of video surveillance, and background subtraction is commonly used to detect motion object, but how to build and maintain background model is very critical, and what'smore, one background model can't solve all complex background problems. This paper present the Mask Motion Object Detection (MMOD) algorithm, which synthesize the thoughts of background subtraction and frame difference, frame difference mask and background difference mask are generated and utilized to detect motion object. Morphological post processing method is introduced to reduce noise and improve detection precision. It is proved by testing with standard sequence provided by MPEG organization and outdoor/indoor sequence captured by us that MMOD algorithm achieves good detection result[1].

Block-based masking region relocation and detection method for image privacy masking is paper of Sohee Park; Geonwoo Kim, 2020

The widespread use of CCTV and various image devices has become a primary cause of privacy invasion, because these are possible to record, share and leak privacy images without owners' consent. The image privacy masking is one of technology for privacy prevention, and its necessity has been increased owing to need of personal information protection and social safety in these days [1]. In this paper, we propose a block-based masking region relocation and detection method to overcome the shortage of the

meta-data typed privacy region information sharing method of restorable image masking service. This method is based on the histogram difference between the original image and the masked image. It analyzes the histogram feature of images, and relocates the masking region information from the coordinate system to the block system. Therefore, it set and detect the masking region without additional information such as meta-data and the original image. For demonstration the feasibility of our approach, we used the real-world database and the experimental results show the applicability of the real privacy masking service[2].

Color quotient based mask detection, Ioan Buciu,2020 in this paper described The paper deals with mask detection in the age of COVID - 19, by proposing a simple and efficient method to detect people not wearing mask. The approach includes a feature extraction step followed by a supervised learning model built with support vector machines. The features are formed of color information by considering red, green and blue channels for an RGB color image. Ratio of color channels is taken into account to discriminate between mask and non-mask images. The approach has been tested on a set of 1211 facial images extracted from group of people wearing or not wearing a mask, by considering a 2 - class problem, where the mask class represents the positive examples, where the non-masked faces are negative examples. Part of the image data set is used to train the support vector machines for learning discriminant features for each class, followed by a prediction for each test sample. The image set for the mask class ranges from simple and common one-colored surgical masks to complex and challenging patterned masks. Cross-validation approach is adopted to test the approach, leading to 97.25 percent as recognition rate[3].

Study of masked face detection approach in video analytics Gayatri Deore; Ramakrishna Bodhula; Vishwas Udpikar, 2019

Security being of utmost importance, video surveillance has become an active research topic. Video analytics enhance video surveillance systems by performing tasks of real time event detection and post event analysis. This can save human resources, cost and increase the effectiveness of the surveillance system operation. One of the common requirements of Video Analytics for security is to detect presence of a masked person automatically. In this paper, we propose a technique for masked face detection using four different steps of estimating distance from camera, eye line detection, facial part detection and eye detection. The paper outlines the principles used in each of these steps and the use of commonly available algorithms of people detection and face detection. This unique approach for the problem 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[4].

LIMITATION OF EXISTING SYSTEM

• Costing: The Existing system is high cost and this is main reason most of the system is failed.

• Technology Complexity: Most of system is the complex to understand, Not user friendly as compare to our proposed system

• Time Consuming Feature: In existing system, the performance is low and most of the time system gets hanged due to load.

• Not Easy to Understand: Systems are complex to understand and they were not user friendly

EXPERIMENTAL SETUP

This section describes the various features of the system and also describes the implementation methods. Following are some of the features explained with their implementation details:

• Pattern Recognition: Pattern recognition is the automated recognition of patterns and regularities in data. It has applications in statistical data analysis, signal processing, image analysis, information retrieval, bio informatics, data compression, computer graphics and machine learning.

• Authentication: Authentication is the act of proving an assertion, such as the identity of a computer system user. In contrast with identification, the act of indicating a person or thing's identity, authentication is the process of verifying that identity.

Hardware and Software Requirements

Hardware Requirements

• AMD/Intel Processor

• 2GB RAM for application development

• Min. 80 GB Hard Disk

• Android Emulator for testing

Software Requirement

• Python

- Action Script
- Java
- MySQL

Python PyCharm is an integrated development environment (IDE) used in computer programming, specifically for the Python language. It is developed by the Czech company JetBrains.[6] It provides code analysis, a graphical debugger, an integrated unit tester, integration with version control systems (VCSes), and supports web development with Django as well as Data Science with Anaconda. MySQL 5.1 MySQL provides our small, medium and large enterprise customers with affordable, open access to their web data warehouses.

MySQL allows us to offer our System Administrator low cost, low maintenance database solution for applications without sacrificing power, performance or scalability. Benefits of MySQL are as follows:

• Easy to maintain & upgrade, does not have a slew of administrative tasks to put up.

• Its table format does not vary between releases

• It has cleanly separated table handler modules and can mix access to different type of tables.

• It seems to be developed iteratively, and the features are very stable when they ship them.

• It is a relational database. Over the past several years, this relational database management systems have become the most widely accepted way to manage data.

• It offers benefits such as:

• Easy to access data • Flexibility in data modeling

• Reduced data storage and redundancy

• Independence of physical storage and logical data design

• A high level data manipulation language

SCOPE:

The corona virus COVID-19 pandemic is causing a global health crisis so the effective protection methods is wearing a face mask in public areas according to the World Health Organization (WHO). The COVID-19 pandemic forced governments across the world to impose lockdowns to prevent virus transmissions. Reports indicate that wearing facemasks while at work clearly reduces the risk of transmission. An efficient and economic approach of using AI to create a safe environment in a manufacturing setup

PROBLEM STATEMENT:

We are making an application identification veil and social removing. Facial covering location include utilizes apparent stream from the camera joined with AI strategies to recognize and create a caution for individuals not wearing facial coverings. An easy to understand interface permits checking and audit of cautions produced by the framework. Social removing is a strategy used to control the spread of infectious illnesses. social removing infers that individuals ought to actually separate themselves from each other, diminishing close contact, and subsequently decreasing the spread of an infectious illness, (for example, Covid).

SYSTEM ARCHITECTURE

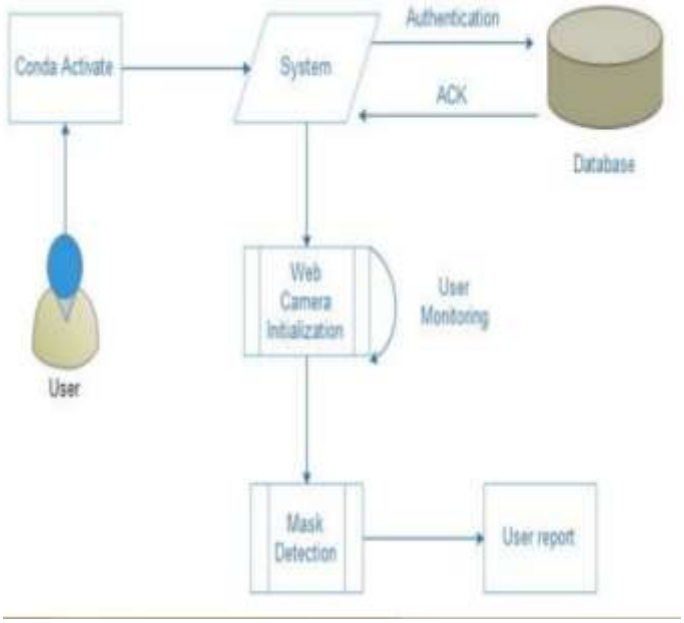

Fig -1: System Architecture Diagram

We are making a savvy framework which will identify the whether the specific user has wear the mask or not and furthermore observing the social distancing of two user. At the point when the client is recognize without mask or dodging social distancing framework offers caution to control room, Control room in control make a declaration of wearing mask or follow social distancing , in the event that still user maintain a strategic distance from it , at that point the specific user will face police

ADVANTAGES

1. Easy to use
2. High Performance
3. Scalable

METHODOLOGY

The single problem can be solved by different solutions. This considers the performance parameters for each approach. Thus considers the efficiency issues.

- Problem Solving Methods are concerned with efficient realization of functionality. This is an important characteristics of Problem Solving Methods and should be deal with it explicitly.

- Problem Solving Methods achieve this efficiency by making assumptions about resources provided by their context (such as domain knowledge) and by assumptions about the precise definition of the task. It is important to make these assumptions explicit as it give the reason about Problem Solving Methods.

- The process of constructing Problem Solving Methods is assumption based. During this process assumptions are added that facilitate efficient operationalization of the desired functionality

CONCLUSION

To mitigate the spread of COVID-19 pandemic, measures must be taken. We have modeled a face mask detector using SSD architecture and transfer learning methods in neural networks. To train, validate and test the model, we used the dataset that consisted of 1916 masked faces images and1919 unmasked faces images. These images were taken from various resources like Kaggle and RMFD datasets. The model was inferred on images and live video streams. To select a base model, we evaluated the metrics like accuracy, precision and recall and selected Mobile Net V2 architecture with the best performance having 100 precision and 99 recall. It is also computationally efficient using Mobile Net V2 which makes it easier to install the model to embedded systems. This face mask detector can be deployed in many areas like shopping malls, airports and other heavy traffic places to monitor the public and to avoid the spread of the disease by checking who is following basic rules and who is not.

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