Face Mask Detection Using CNN Techniques and Machine Learning

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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 Detector (SSD) because of its good performance accuracy and high speed. Alongside this, we have used Shot 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**

LIMITATION OF EXISTING SYSTEM

To participate in mobile Data Privacy one must have a tablet or mobile devices with android as its base operating system,these can have high ranges of cost, due to this reason it cannot be affordable by everybody in todays world. Another aspect to be considered is the size of the device, this is only a challenge if one incorrectly plans mobile Data Privacy content to be nothing more than compressed eLearning. If your users are already using their mobile device that you plan to push Data Privacy to, your strategy should be what content do they need in the context of using the device. Add to that, the greatly improved displays, such as the OLED display on the DROID Incredible, and size isn't a detriment any more, but an advantage.

EXPERIMENTAL SETUP

Android Studio is the official [7] integrated development environment (IDE) for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development.[8] It is available for download on Windows, macOS and Linux based operating systems or as a subscription-based service in 2020.[9][10] It is a replacement for the Eclipse Android Development Tools (E-ADT) as the primary IDE for native Android application development. Android Studio was announced on May 16, 2013, at the Google I/O conference. It was in early

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

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 stream access preview stage starting from version 0.1 in May 2013, then entered beta stage starting from version 0.8 which was released in June 2014.[11] The first stable build was released in December 2014, starting from version 1.0

LITERATURE SURVEY: This chapter contains the existing and established theory and research in this report range. This will give a context for work which is to be done. This will explain the depth of the system. Review of literature gives a clearness and better understanding of the exploration/venture. A literature survey represents a study of previously existing material on the topic of the report. This literature survey will logically explain this system.

An Efficient Moving Object Detection Algorithm Using Multi-masknChunlian Yao; Wei Li; Yi Chen; Lihua Gao 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 pre- vention, 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 blockbased 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 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, 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 postevent 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].

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

COMPARITIVE ANALYSIS:

- This is the first phase in the systems development process. It identifies whether or not there is the need for a new system to achieve a business"s strategic objectives. This is a preliminary plan (or a feasibility study) for a company"s business initiative to acquire the resources to build on an infrastructure to modify or improve a service. The company might be trying to meet or exceed expectations for their employees, customers and stakeholders too. The purpose of this step is to find out the scope of the problem and determine solutions. Resources, costs, time, benefits and other items should be considered at this stage

SYSTEMS ANALYSIS AND REQUIREMENTS:

The second phase is where businesses will work on the source of their problem or the need for a change. In the event of a problem, possible solutions are submitted and analyzed to identify the best fit for the ultimate goal(s) of the project. This is where teams consider the functional requirements of the project or solution. It is also where system analysis takes place—or analyzing the needs of the end users to ensure the new system can meet their expectations. Systems analysis is vital in determining what a business"s needs are, as well as how they can be met, who will be responsible for individual pieces of the project, and what sort of timeline should be expected.

3 Systems Design: - The third phase describes, in detail, the necessary specifications, features and operations that will satisfy the functional requirements of the proposed system which will be in place. This is the step for end users to discuss and determine their specific business information needs for the proposed system. It"s during this phase that they will consider the essential components (hardware and/or software) structure (networking capabilities), processing and procedures for the system to accomplish its objectives.

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4 Development:-The fourth phase is when the real work begins—in particular, when a programmer, network engineer and/or database developer are brought on to do the major work on the project. This work includes using a flow chart to ensure that the process of the system is properly organized. The development phase marks the end of the initial section of the process. Additionally, this phase signifies the start of production. The development stage is also characterized by instillation and change. Focusing on training can be a huge benefit during this phase.

5 Integration and testing: - The fifth phase involves systems integration and system testing (of programs and procedures)—normally carried out by a Quality Assurance (QA) professional-to determine if the proposed design meets the initial set of business goals. Testing may be repeated, specifically to check for errors, bugs and interoperability. This testing will be performed until the end user finds it acceptable. Another part of this phase is verification and validation, both of which will help ensure the program"s successful completion.

SCOPE:

The majority of the code for the program is written. Additionally, this phase involves the actual installation of the newly-developed system. This step puts the project into production by moving the data and components from the old system and placing them in the new system via a direct cutover. While this can be a risky (and complicated) move, the cutover typically happens during off-peak hours, thus minimizing the risk. Both system analysts and end-users should now see the realization of the project that has

implemented changes.

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).
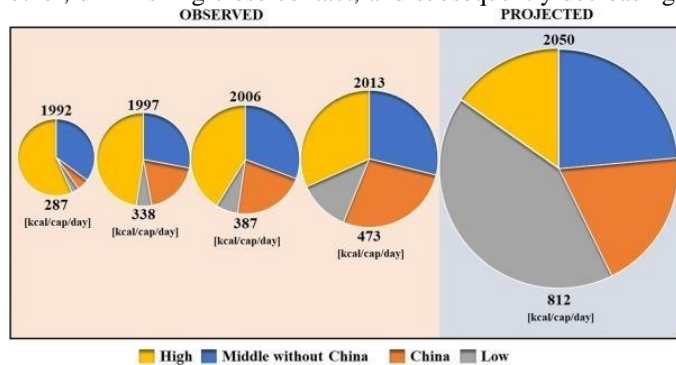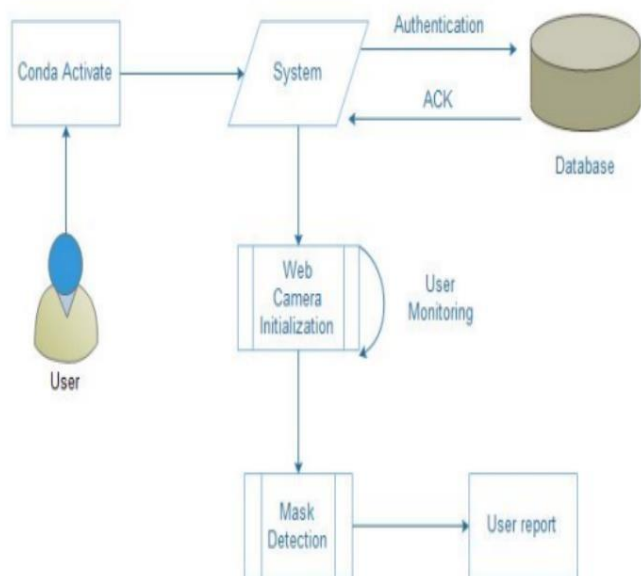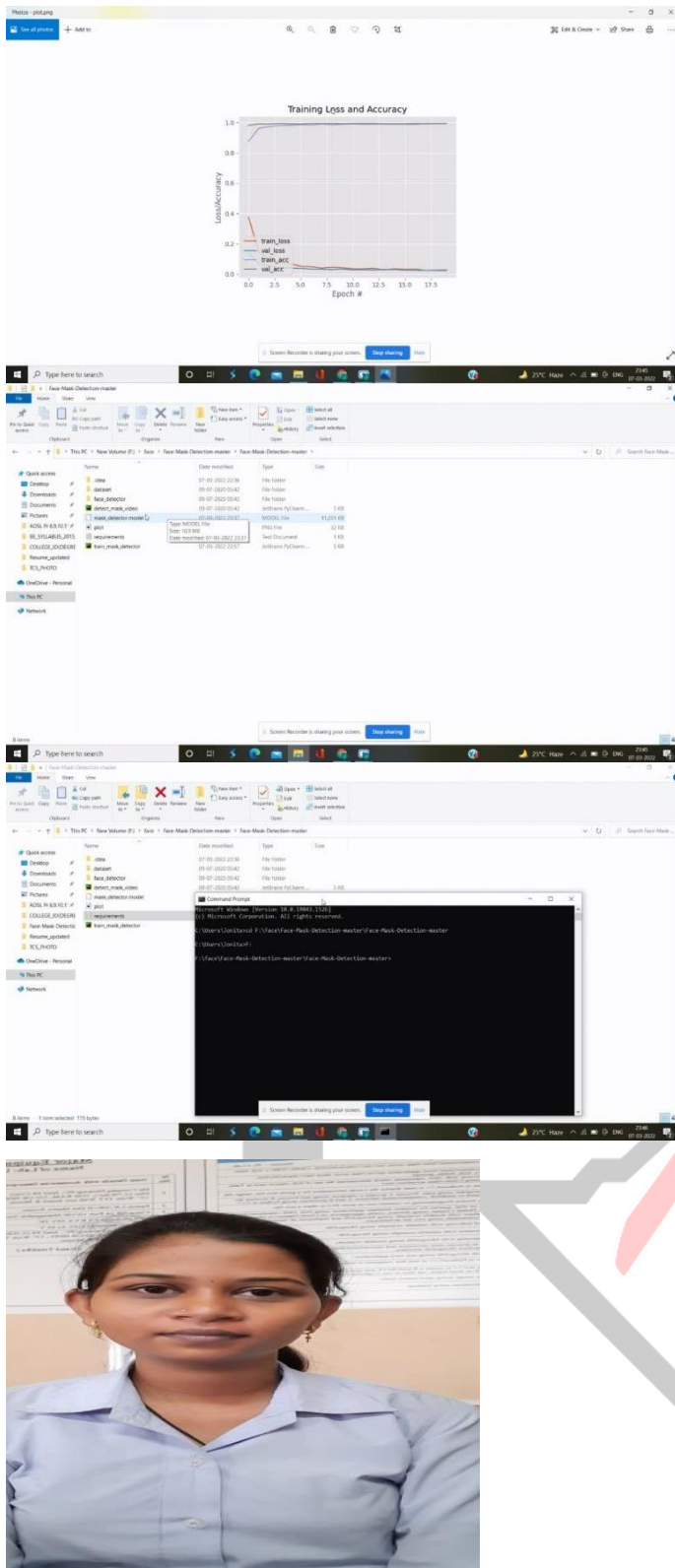

SYSTEM ARCHITECTURE

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

• Secure: Data Privacy at the point of need.

• Ability to access Data Privacy (almost) everywhere: This means down time can be leveraged for learning.

• Potential to be secure more data: Video, powerpoint, podcasts, and quizes are all potential outputs to devices. This provides a great deal of flexibility for mobile development.

• Potential for location based learning: This means the phone can alert the person when they are near a potential Data Privacy experience based in the context in which the Data Privacy will be used–which potentially can help retention and return on

investment.

APPLICATION:

• Easy to use

•Monitoring controlling user distance and mask detection.

METHODOLOGY

The algorithm in which every operation is uniquely defined is called deterministic algorithms. The algorithm in which every operation may not have unique result, rather there can be specified set of possibilities for every operation, such algorithms are called Non deterministic algorithms. Non deterministic means no particular rule is followed to make guess.

1. P Class: This group consists of all algorithms whose computing times are polynomial time that is there computing time is bounded by polynomials of small degree. Eg. insertion sort, merge sort, quick sort have polynomial computing time.

2. NP Class: This group consists of all algorithms whose computing time are non- deterministic polynomial time. Eg. Traveling salesman problem. The NP class problem can be classified into two groups:

(a) NP Hard Problems: Normally optimization problems are NP-Hard problems. All NP complete problems are NP hard but some NP hard are not NP complete. A problem is NP hard if and only if its at least as hard as NP complete problem.

(b) NP complete problems: Normally decision problems are NP-Complete problems. Non deterministic polynomial time complete problems. Decision Problems: Any problem having the answer either zero or one is called decision problem

SNAPSHOTS

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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