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Face Mask Detection with Raspberry Pi

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Abstract— In the wake of the COVID-19 epidemic, institutions such as the academy are suffering the most from global closure if the current situation haven't rectified. COVID-19 also known as Serious Acute Respiratory Syndrome Corona virus-2 is an infectious disease that is transmitted to an infected person who talks, sneezes or coughs through respiratory droplets. This spreads quickly through close contact with anyone with the disease, or by touching objects or the infected area. By wearing a face mask under the jaws covering at crowded places or by frequently hygiene at your palms and by using at the minimum of 70% sanitizers which are based on alcohol is the best method for the against of the COVID-19. In this project we have used it ML, OpenCV and TensorFlow face recognition. This the model can be used for security purposes because of course an app that works well for use. In this way MobilenetV2 using a BN-based layout too lightweight and embedded this model with Raspberry pi to make real-time mask discovery, when, SSD (Single Shot Detector) format is used and the spinal network is light. As technology advances, Deep Learning has demonstrated its effectiveness in recognition and classification through image processing. The study uses in-depth reading techniques to distinguish facial recognition and to determine whether a person is wearing a facemask or not. The collected data contains 25,000 images using 224x224 pixel resolution and obtained 96% accuracy with the performance of a trained model. The system enhances the Raspberry Pi-based real-time recognition made by alarms and takes a facial image when the person found is not wearing a facemask. This study is beneficial in combating the spread of the virus and in avoiding contact with it.

Keywords— ML (Machine Learning), OpenCV (Open-Source Computer Vision Library), COVID-19 (Corona Virus Disease), Raspberry Pi, Web Camera.

I. INTRODUCTION

Each and every one is infected due to the cause of COVID-19 epidemic worldwide. It has crippled global economic growth. Coronavirus termed as COVID-19 is a chronic breathing illness triggered at lungs infection called 2 nd Coronavirus or advance stage of COVID-19. In the month of May 7, 2020, it has shaken out almost 7.9 million defiled sufferers including 3.45 million expired of this flu. In order to counter against this flu, further compulsory agreements imposed through World Health Organization (WHO) such as mandatory facial wear, monitoring public fitness at crowded areas by hand hygiene at regular cleanser with decontaminant liquids thoroughly.

There are studies being done that installing a facemask is a key to block the contaminated flu. Testing departments previews the success of N95 at operative masks in checking infection development of 92% and 69% approximately. By covering with these masks will beneficially mess up airborne pathogens at such that diseases don't contain the lungs of the human that are a cheap way to reduce mortality and breathing contamination. However, the effectiveness of facial expressions in preventing the transmission of disease to the society is being reduced due to poor facial cover. This is important to improve the automatic detection of face wear that results in isolated shielding that protect against specific epidemics.

As COVID-19 spreads across the planet, more people saw how important facial masks are. While face masks can cause minor discomfort, in particular during the summer, these tissues are the only ones a barrier between us and therefore the deadly SARS-CoV-2 (coronavirus). Health officials from the health planet Organization (WHO), Centers for Disease Control and Prevention (CDC), as well as indigenous institutions from around the world the world is urging people to wear masks, as it were which is the only way to prevent the transmission of the virus as it is not wearing a face 2 mask can increase the rash coronavirus.in tworld. The main page of this paper is to improve the acquisition of a working face to keep the rules during these difficult times of the Covid-19 outbreak and relief people protect themselves from the virus.



Fig. 1 Real Time Face Mask Detection

The development of in-depth learning and integration of computer vision provides advances in the construction of many technological areas. According to Deep neural networks (DNNs) is an integral part at in-depth learning mechanism occupies a lot they offer with visual perception and picture allocation and figure designation. Convolutional neural networks (CNNs) are particular main DNN frameworks that are widely used in computer monitoring activities. After modeling, CNN used for recognizing and categorizing someone's picture at in small variations in providing facility to extract powerful feature and sculpture figure factors.

According to this survey, in-depth study strategies will used to create a distinction which assembles the figures of an individual either tiring a facemask at front of the mush or not that distinguish among those categories at whether tiring a mush shield or untiring. The neural implant network eventually proves to create a powerful mechanism by extracting a factor through natural features. Even though this concept introduces the ConvNet by mitigating a mush shield thinker so that it produces result in a convolutional neural layer number with predictable accuracy. The project is being implemented with Raspberry Pi with OpenCV TensorFlow and Python programming language.

The Raspberry Pi (RPi) is categorized by a fragmentset-up in which improving laps known by disk drive, parallel processing, inputs, outputs which are mounted through unique plug-in. GPIO anchors contributes through an important feature by rescuing RPi access hardware systems that control electrical fragments at featured performance in an internal/external appliance. Install the induction coil, typewriter, mousey and monitoring function in the Raspberry Pi at conjunction along with audio/video interface connector. Upgraded mock-ups are accessible for Wi-Fi connection at the hyperspace. RPi can be run using the Raspbian app. Contains pre-installed Python programming language.

Here we condense the foremost subscriptions which are mentioned below.

A. Generate an identity verification program using CNN.
B. Use in-depth study methods to identify facial wear conditions.

II. LITERATURE SURVEY

We have used a unique approach to correlating our IEEE surveys. The first thing is that, we have divided them into multiple avenues of survey research. With an approach such as above, we aim to clearly demarcate the Hardware and Software ingenuity we aim to develop with our project. Using this method, one can easily attribute various survey ideas into their project, by keeping in mind their usage and the problem solving implementation. Various surveys have been used by us, and these surveys have been divided into hardware and software respectively. This signifies that, there is a separate usage for each side of our development and research. Keeping this in mind, we have taken use of the following papers- "Face Mask Detection using Keras, OpenCV & TensorFlow". A. Das, W. Ansari (IEEE). This is a modification that implements the use of face detection on a personal computer or laptop. "Face Mask Detection System using Raspberry Pi". M. Shinde, T. Sukhadare (IEEE)23 • This is a modification that implements the use of face detection on a Raspberry Pi respectively After choosing the following papers mentioned above, we discussed on how these aspects of papers can be utilized as per the convenience of our project and the prototype respectively. Based on that research and discussion we formed a basic idea of out project that is to be worked on respectively. Based on the above composition of discussion and research, we have performed exhaustive analysis and preform a to achieve good degree of uniquity in our project that aims to be a prototype and also a product as well. Above literature survey is done in accordance with the college library and also the IEEE Xplore Digital Catalogue Library with proper citations and references.

III. PROPOSED SYSTEM

This paper describes an operating system called "The face mask awareness system with Pi model called raspberry pi" which it finds out whether the person was3 wearing a face mask or not. Proposed structure for the acquisition of a face mask as well the alert system performs the following functions-

A. Face detection (using web camera insertion).
B. Acquisition of Mask (if a person is wearing a face mask or not).
C. Email alert with vibrating message and screenshot as evidence (if mask policy is violated).
D. Capturing of screenshots of all "no mask" shapes are placed within the device storage which is used.

We perform face detection using CNN example SSD architecture (Single Shot Detector) and another model called MobileNetV2 to get people in a video frame this is a face mask application for Raspberry Pi 4 the proposed algorithm for the face mask detection system contains: processing, training CNN, face mask adoption. The database we use also contains diagrams various sizes, colors and directions.

Therefore, the first step is to convert all images into gray because we would like to be sure of this color it shouldn't be a problem getting masks. After that, we need to have all the images in the same size before to apply it to the neural network. CNN training where SSD format used. Mine spinal network lite.

The full model has only 1.01M parameters. Input size of the model is 260x260 with spinal network (BN Network) has only eight layers. The perfect model it has only 24 layers with space and partition layers are calculated and we use another CNN properties called MobileNetV2.

We are connecting the Backbone network to Conv layers to speed up the average speed. The last step is to see if the person is wearing it mask or not using a trained model.

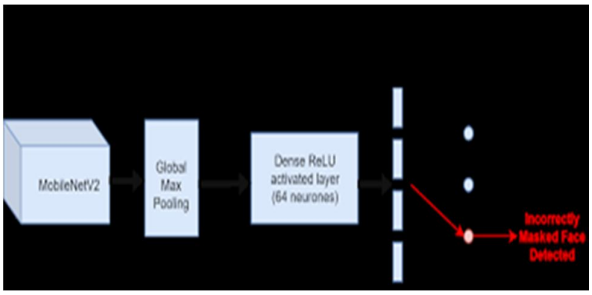


Fig. 2 Face Mask Detection with MibileNetV2

IV. RELATED WORK

Decision-making networks are also undoubtedly used to carry out the work of segregation. Standard formats such as AlexNet and VGGNet are packaged or contain a contortion load. AlexNet champion in the ImageNet major in-depth training combines five sheets of contortion and three sheets that are totally integrated behind VGGNet is a development of AlexNet, continuing to share and share large letters with several 3x3 characters. New structures such as ResNet use a fast link with training accuracy that allows for more indepth crisscross by neglecting over-blowing. Many structures will may used across frames to see the actual images of the feature release. The suggestion methods apply at VGG-16 construction trademarks as a basic facial recognition network and a totally contortion segmentation meshwork. The VGG-16 crisscross has great power to decipher features and costs less than computer names. However, many successive classification structures depend on figure reduction at deployment totally contortion meshwork are a clever and clear way to classify segments.

A huge amount of neural networks are placed inside the advanced learning in that basics are used with the help of card processor that occupies display card to adjust a segmented webworks divided as a knob at each neuron. In-depth training is applied at many programs since by the means of demand mainly in the region of treatment and cultivation. It may use to apply the spotting, noting, and conceding in all human, animal, and plant-connected diseases the discovery that placement of fruit images robotic photographic images such as visual identification at a travel set-up.

In case of the involution method begins with a drawn-out load figures and its qualities are helpful in 3x3 strainer at the 1st row as defined by involution. At which result explains and introduces the scheme inserted with the scalar product in the previous Inv sheet. Every inserted scheme maintains the exact factors of the reflection to set up the load so that lowers at sample in the form of ReLU to other solid rates and reduce false rates into null rates. The additional process of sampling succeeding every Inv called apex-fusing reduces at rates to ½ to their actual rate in ease of choosing the apex rates at most by kernel-based source. Presenting key leads in recognizing a particular scheme management image is a function of the combination film. Combined elements are dispensed and compress into totally attached parts (PC layers) will translate in formation shape a single value or null. Subsequently, the soft apex-triggered outcome presents opportunities for using its neural networks to separate input data.

V. METHODOLOGY

CNN process identifies and separates figures that are readable trademarks. This is useful at various line construction where the required features of graphic 4 images are detected and examined. The circumference at the preferred medium by identifying facemasks. Describes at proposed system that was fully developed for image acquisition. The background proof involves whether a person tiring a facemask or untiring a facemask thus CNN's art editing on the image.

Exaggerated semantic nets reproduces at performance into the brainpower including statistics also architecture through connected webs. Here ANN esteem will have trained at manage teaching method. Here CNN could be the success in standard exaggerated semantic nets, usually depends on utilization at repeated leaning at various domains like picture rather image recognition. A basic feature of ANN minimizes the computer-based architecture required in contrast with normal assuming semantic nets through process make a placement.

A Convolutional Neural Network was the systematic advanced teaching method which performs creative think at the difference in software focused and technology based on visual. Fields where CNN is used extensively for face recognition, object recognition, image classification etc. The elements of the CNN model to the use of such elements varies according to the network.

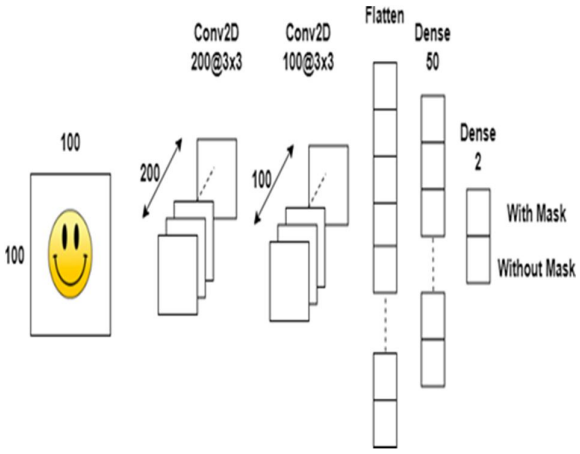


Fig. 3 Face Mask Detection using CNN

VI. SOFTWARE AND HARDWARE SPECIFICATIONS

A. Software Used

S / W Tool- TensorFlow (for machine learning) and OpenCV (for image processing).

Application- Raspbian as an OS.

Programming language- Python.

B. Hardware Requirements

H / W Tool- Raspberry Pi and Web Camera.

1) *Raspberry Pi:* The Raspberry Pi is a small, low-cost computer which can be connected to a monitor or TV, and use standard keyboard and mouse. It is a small device that allows people computer testing, and editing in languages such as Scratch and Python.



Fig. 4 Raspberry Pi

2) *Web Camera:* The web camera module is a simple weight camera that can connected to Raspberry Pi and portable. Connecting with Raspberry Pi using the MIPI camera interface the rule of thumb. It is often used for image processing,

study equipment or in surveillance activities. It is very commonly used on surveillance drones since camera loading too small.



Fig. 5 Web Camera

VII BLOCK DIAGRAM

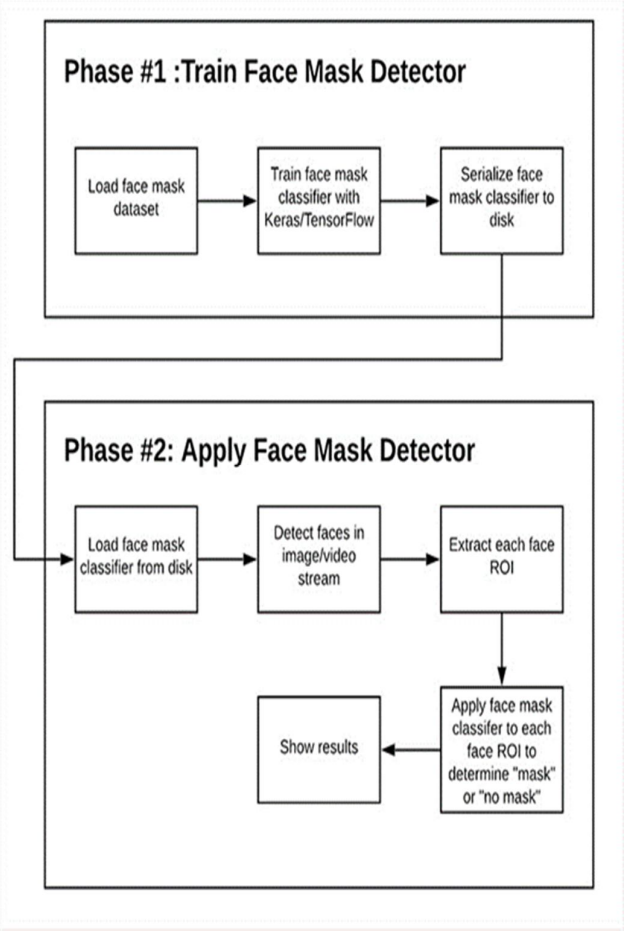


Fig. 6 Block Diagram of Face Mask Detection

VII. WORKING

The working consists of the following steps.

A. Picture Investment

Begin with the process in our daily life face realization program with picture detection. Person with perfect figures like either tiring a facemask or not glasses will available with spectrohelioscope motion-picture.

B. Defined Database Cluster

The Database is depending on the appropriate labeling of photographs with different category.

C. Picture Vulcanization

By capturing figures this process is involved in the forwarding move are specially developed while refining the figure traits. Here separation method splits figures within specific parts that is used to remove the combined areas of the face on a person's back face.

D. Feature-Extract

This section incorporates flexible layers that acquire image elements in image sizes and compile after each ReLU merger. The high and standard collection of feature extensions reduce the size. Finally, both contortion and fusing sheets imitates classifiers that produce particular elements of the picture.

E. Separation

The ending step is to separate the pictures to teach in advanced learning representation and stamped pictures that will identify to demonstrate figures at picture ocular viewing. Here developers have performed non-proprietary software with TensorFlow and OpenCV with Python by involving VGG-16 at CNN type.

Here developers used in moderated reading model teaching through assessment stations splits into 78% instructional through 18% documentation. Here four examples are allocated to calculated type strategy- tempo, teaching delay, focusing and debugging. This continuation with experiment, 224 loaded frameworks are controlled evenly according to the loaded pictures height by the frame dimension at working was fix at 62 pictures with 97 repetitions were fix at infinite times.

An ADAM user with a reading estimate of 0.001 was fix to use. This topic uses 11,900 pictures per group with this proof is sufficient by verifying an in-depth teaching type. As a result, of proof enhancement process is used to consolidate picture evidence by easy rotating, extracting, bankroll and zoom processes.

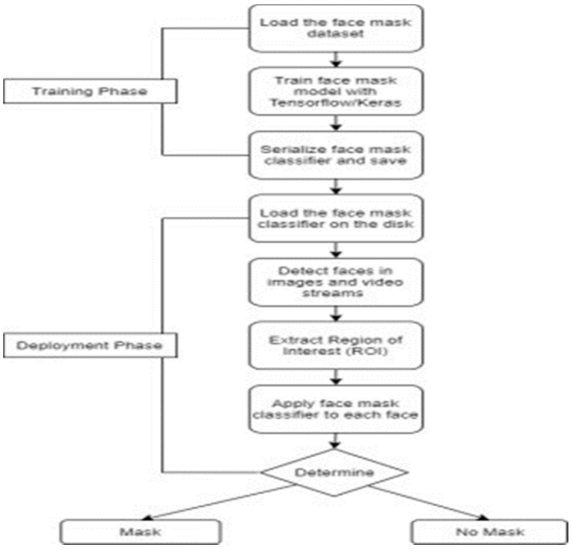
At 1 redemption. 233 a stop account is fix to 60% so the similar data addition specifications are used. This tends the repetition of every element of picture of a parallel invert adjacent space type 0.4 bolt feature 0.3 rotation breadth, vertical at serial objects with 30 tilt width. These experiments conducted by developers will used by an architecture of computer with specific processor at 2.30 GHz standard accuracy display adaptor NVIDIA GeForce GTX 1070 4 GB, RAM memory size is 8GB Kingston DDR4 2677 MHz, and the main card is SD 255 GB.

Thus CNN-advanced type has been redesigned to the Raspberry Pi to verify its effectiveness in finding whether people are tiring facemask or not. Final testing, a trained type and other installation system were transferred to the Raspberry-pi outlet system. Raspberry-pi executes in this application s/w.

VIII. FLOWCHART

To verify the color RGB pigments are applied in rectangular binding. Give us green and red Rectangular bounded "mask" and "missing" respectively. Inside the endless loop, we will insert the input Frame by frame from a Pi camera and convert each input frame from pi camera to gray then get a face. And the process will 6 continue by using each face loop extracted from frame and region of interest will be available.

Use it a lot an effective model for obtaining the best possible result. There are two possible outcomes i.e., "Mask" or "no mask" will be displayed as green or red box respectively during display of the result.



IX. RESULT AND DISCUSSION

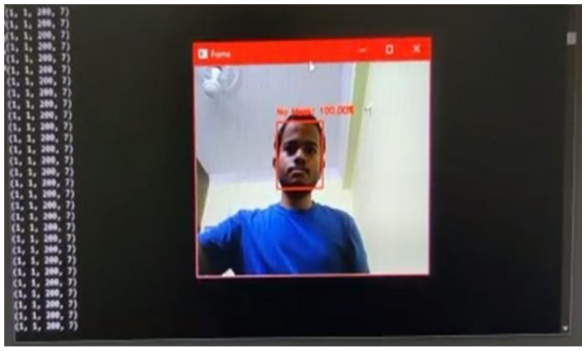


Fig. 7 Output shows Without Mask

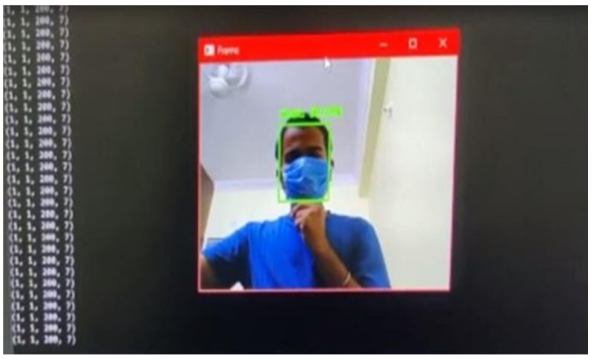


Fig. 8 Output shows With Mask

96% verification accuracy was achieved during CNN type training. At this level coming through batches of group dimension fix at 62 and 102 times the performance test results from accurate and error detection. Different results of model performance testing on finding whether they tiring facemask or not. The picture on the left is the result of a 53.69% nude face detection and in the right picture it shows 91.22% nude jewelry. By this device will operate an indication. In the fig.10.1 the output shows without mask at 1.23% accuracy and in fig. 10.2 with mask 97.33% accuracy.

X. CONCLUSION

This paper represents a view of daily life face mask through the captured technology using in-depth reading techniques in the form of Convolutional Neural Networks. Since working provides direct and immediate outputs for facemask recognition. Here final evaluation output shows an accuracy measure in identifying people whether they tiring facemask or not. Hence modified type will use its job useful in VGG-16 CNN type to get 98% results with quality tempo. In addition, research reveals a helpful kit combating the spread of COVID-19 virus by finding someone wearing a facemask or not and when a person is not tiring a facemask by fixing a light. As technology grows exponentially epidemic. So, we created a novel face mask a detector that can contribute to public health care department. Face mask detection is trained in CNN model and we used OpenCV, Tensor Flow and python to find out if someone is wearing mask or not. The model was tested in real time video and photos with promising accuracy is achieved and optimization of the model is not an ongoing process. In this project, the MobileNetV2 model and the SSD architecture was used to create an effective face recognition system. We have marked this method on known datasets. Our method tested on those data sets shows better levels of recognition. So, MobileNetV2 / SSD architecture model trained in hidden and invisible images provides better 7 accuracy of simple hidden faces recognition.

XI. FUTURE SCOPE

Future activities involve proportion of outside fiction, where the photographic telescope will capture whether a person is tiring a facemask or not also looks at the distance between each person and gives the result where body's vision is blurry. The combination of several CNN models is suggested and compares every type with the quick quality tempo during training to enhance checking in identifying and verifying people tiring facials. Also, developers announce the different optimizer, improved parameter settings, better optimization, and the use of flexible transfer learning models.

XII. ACKNOWLEDGEMENT

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REFERENCES

[1] Ejjaz, M. S., and Islem, M. R., Face Based Mask Identification. The Network based on Neural Convolution is being used. *Foreign Sustainable Technology Conference of Industry 4.0 (STI)*, 2019.

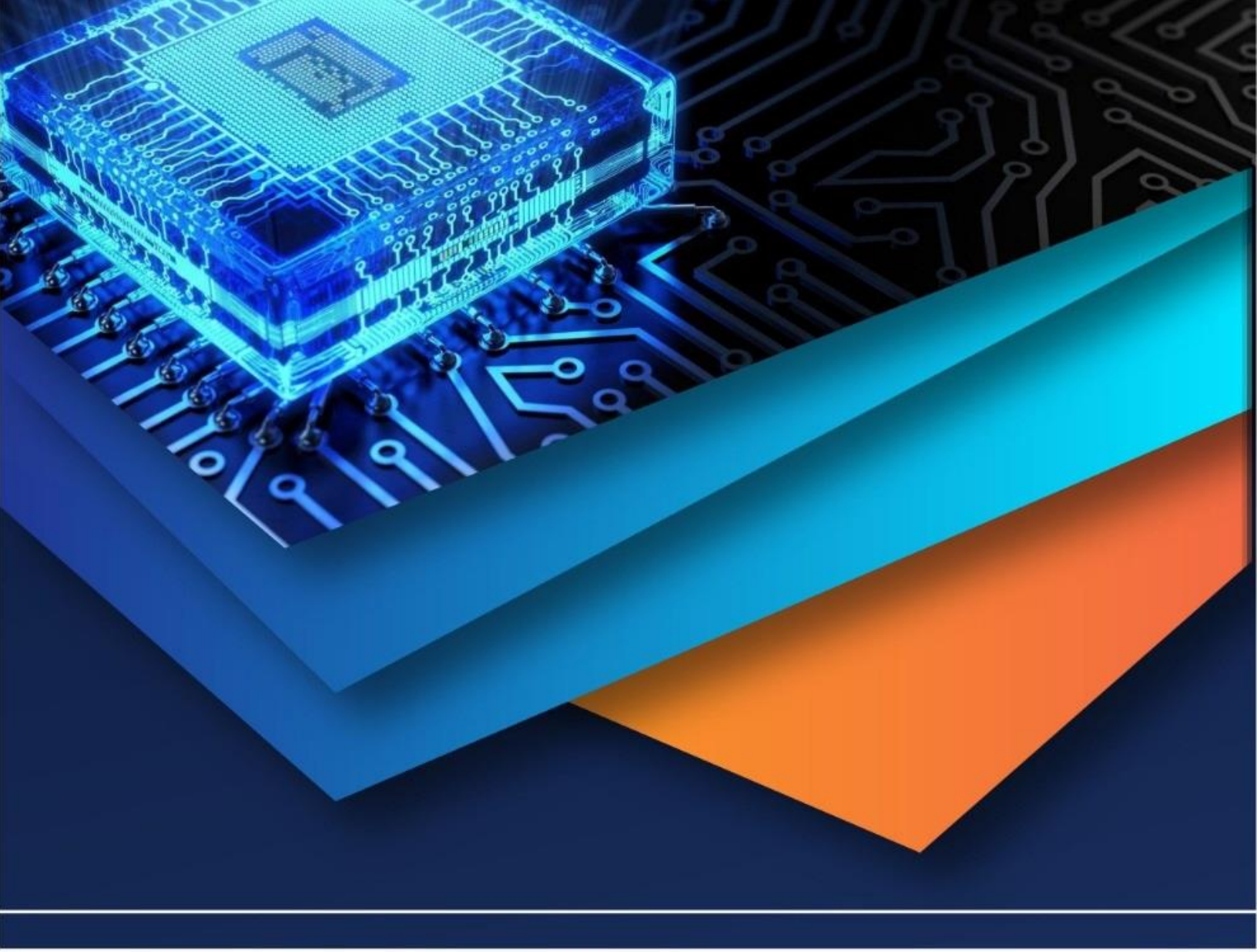
[2] Rahman, M. M, Manek, M. M. H., Islam, M. M., Mahmud, S., & Kim, J.-H, Automatic Program to Limit COVID-19 Using Face Massage Discovery on Smart City Network, *IEEE International IoT, Electronics and Mechatronics Conference (IEMTRONICS)*, 2020.

[3] W. Bu, J. Xiao, C. Zhou, M. Yeng laS. Leng, "A face mask detection in cascaded," *IEEE International Conference on Cybernetics and Intelligent Systems (CIS) and IEEE Conference on Robots, Automation and Mechatronics (RAM)*, Ningbo, 2017.

[4] K. Yen, S. Hueng, Y. Song, W. Teu and K. Fan, "Face recognition based on neural convolution network," *at the 36th Chinese Conference on Governance (CCC)*, Dalian, pages 40774081,2017.

[5] Shiming Ge, Jia Li, Qiting Ye, Zhao Luo, "Finding Wild Hidden Face with LLE- CNNs," in *IEEE Conference on Computer Vision and Pattern Welcome*, China, pages 2682—2690, 2017.

[6] H. Li, Z. Lin, X. Shun, L. Brendot, naG. Hua, "u-A convolutional neural network cascade of the face to find," in *IEEE CVPR*, pages 5325-5334,2015.



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