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A Novel Approach for Detecting Non-Helmet Drivers and License Plate Number of Two-Wheeler

B. Hema Kumari[1], K. Kranthi Kumar[2], K. Sai Kavya[3], V. Ramya Sree[4], B. Likitha Sri[5]
Sreenidhi Institute of Science and Technology

Abstract: ***There are a number of problems with Indian traffic laws at the moment that can be fixed with different ideas. Riding a motorbike or pouted without a defensive cap is a traffic offense that has extended the repeat of setbacks and fatalities in India. Cops should investigate the casing where the petty criminal offense is happening and focus in on the tag on the off chance that the rider isn't wearing a protective cap under the ongoing framework, which generally utilizes CCTV (Closed Circuit Television) film. In any case, this requires a lot of work and time because of the recurrence of criminal traffic offenses and the everyday expansion in cruiser riders.***

Consider the possibility that a framework could naturally extricate the vehicle's number plate number on the off chance that it distinguished criminal traffic offenses like not wearing a protective cap while riding a cruiser or sulked. Utilizing CNN (Convolutional Neural Network), R-CNN (Recurrent Convolutional Neural Network), LBP (Local Binary Patterns), Hoard, HaaR, and different elements, a new report effectively got done with this job. In any case, these assessments are bound concerning capability, accuracy, and speed of thing affirmation and course of action. A Non-Head protector Rider Identification System is implicit this study work to fulfill the computerization of distinguishing the traffic infringement of not wearing a cap and removing the vehicle's number plate number.

The principal premise at work is object discovery utilizing the CNN, ANN (Artificial Neural Network), VGG16(Visual Geometry Group) and Alexnet calculations. Fore ordained boundaries and limits apply to every one of these methodologies, especially the part that includes extricating the number plate number. Speed of execution is vital in light of the fact that this work involves video as its feedback.

A complete framework for cap location and number plate information extraction was constructed utilizing the previously mentioned strategies.

Keywords: CNN, ANN, VGG16, Alexnet.

I. INTRODUCTION

The World Health Organization directed a review named "The Global Status Report on Road Safety 2018" that found that car crashes overall outcome in the passings of over 1.35 million individuals yearly and the wounds of 50 million individuals. It's difficult to envision that this weight is parted unevenly between cyclists, walkers, and motorcyclists. As per this review, a far-reaching activity plan is expected to save lives.

It is upsetting that India has the most elevated death rate from street mishaps. Master research recommends that this pattern is brought about by various variables, including the shortfall of head protectors, safety belts, and other driving security measures, as well as quick urbanization.

In 2015, India marked the Brasilia Statement on Street Security, in which it vowed to lessening street fatalities by half by 2020. India's policymakers must first address the issues that exist before they can reduce deaths from road accidents. The rider of a two-wheeler is thrown from the vehicle as a result of the vehicle's sudden deceleration in an accident. The head quits moving when it hits something, yet the cerebrum, which has its own mass, continues to move until the article raises a ruckus around town of the skull. At times, this sort of cerebrum injury can be deadly. From that point forward, cruisers have become more stacked with standard highlights.

Subsequently, there has been a sharp ascent in cruiser mishaps in light of the fact that most riders don't wear head security, making it risky to habitually ride a bicycle.

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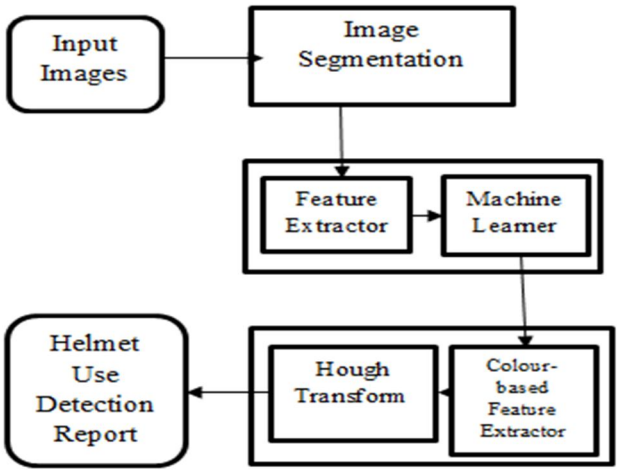

Fig.1 Workflow

In the past few years, head injuries have resulted in numerous deaths. As a result, according to transportation regulations, wearing a helmet (protective hat) is required, and failing to do so can result in severe consequences. Programmed Number Recognition is a construction that awards relentless affirmation of a vehicle in a broad extent of conditions. As a mechanized proficient helpful, ANPR(Automatic Number Plate Recognition) supports the improvement of comparable errands, change of existing utility, and extension of purchaser and delegate utility. The fundamental ability of ANPR inside the utility is to wipe out the letters of the engine Vehicle permit number from the image. Splendid vehicle the executives additionally offers different administrations, similar to a program that allows clients to see vehicle fixes utilizing just the label number that was eliminated from the image that was sent. By utilizing ANPR to likewise further develop execution, it might diminish the weight on various auto organization agents and clients. Expressions incorporate "number plate," "open ALPR (Automatic License Plate Recognition)," "affirmation," "prepared for photographs," and "shrewd assistance vehicle." Mechanical assessments are indistinguishably associated with PC pieces of information, which turn on PC-made hypotheses. Examining the use of science presents draws near, speculative and reasonable circumstances into the subject of artificial intelligence. Information mining is a piece of artificial intelligence that bright lights on the examination of test data through unassisted learning. In such cases, a head defender could save your life. The protective cap lessens head development to barely anything, diminishing the probability of the skull decelerating. The cushion inside the defensive cap holds the force of the setback, and the head comes to a rest long term. It in like manner dissipates the impact across a more noticeable region, shielding the skull from serious injury. In this venture, we decide if a bike rider is wearing a helmet and, if he isn't, we separate the bicycle's number plate. Outline of the paper, section 1 discuss about Introduction, section 2 discuss about related works, section 3 discuss about methodologies used in proposed system, section 4 depicts the experimental results and section 5 conclusion of the work.

II. LITERATURE REVIEW

In this section, described about latest works of detecting helmet and license plate.

A. Helmet Presence Classification with Motorcycle Detection and Tracking

A bike rider should wear a helmet for wellbeing; Notwithstanding, implementing cap use is a work serious and tedious interaction. Therefore, a technique for computerized order and observing of cap wearing and cap not-wearing cruiser riders is introduced and assessed. Support vector machines are utilized in the strategy, which is prepared on histograms made from picture information of bike riders' head locales utilizing both static pictures and individual video outline pictures. In a global positioning framework, foundation expulsion is utilized to consequently isolate cruiser riders from video information utilizing the learned classifier. The learned classifier isolates and arranges the riders' heads. A track is a progression of regions in neighboring time periods that each bike rider makes. To group the tracks all in all, the singular classifier scores are then found the middle value of. As per tests, the classifier can accurately decide if motorcyclists are wearing head protectors in static pictures. The global positioning framework's tests affirm the helpfulness and legitimacy of the classification technique further.

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B. Machine Vision techniques for Motorcycle Safety Helmet Detection

In spite of the way that head protectors for cruiser wellbeing have been displayed to decrease mind wounds, their utilization is restricted in numerous countries because of an absence of police implementation power. This study depicts a system that can perceive bicycle riders and assess whether they are wearing prosperity head defenders. The framework utilizes the K-Nearest Neighbor (KNN) classifier to recognize moving items and arrange them as cruisers or other moving articles in light of information accumulated from their area credits. The tops of the perceived cruiser's riders are added up and separated based on the projection profile. Using KNN, the structure chooses if the head is wearing a defensive cap or not considering qualities isolated from four segments of the divided head locale. Tests show that the close to path, far off path, and the two paths have a typical precise discovery pace of 84%, 68%, and 74 percent, separately.

C. Automatic Detection of Bike-riders without Helmet using Surveillance Videos in Real-time

In this investigation, we offer a system for thus recognizing bike riders without covers using steady perception accounts. Using establishment removal and article division, the proposed strategy at first sees bike riders in perception film. Then, at that point, it decides if the biker is wearing a head protector by utilizing obvious signs and a paired classifier. Likewise, we offer a solidification procedure for infringement revealing that adds to expanding the trustworthiness of the recommended approach. We thought about the viability of three ordinarily involved include portrayals for characterization to assess our strategy: histogram of oriented gradients (HOG), scale-invariant feature transform (SIFT), and local binary patterns (LBP). The trial results show a recognition exactness of 93.80% when applied to genuine observation information. Also, it has been shown that the proposed approach is computationally more affordable, works progressively, and takes 11.58 milliseconds to handle each edge.

D. Helmet Detection on Motorcyclists Using Image Descriptors and Classifiers

Motorbike accidents have expanded emphatically in different countries throughout the long term. This kind of vehicle is to obtain more famous because of a few social and monetary issues. Despite the fact that many motorcycle riders do not wear helmets, they are the most critical piece of safety gear. The main role of a cap is to safeguard the driver's head in case of a mishap. Failure to use the device in the event of an accident could result in death. This study aims to develop a method for identifying motorcycle riders who do not wear helmets. To extract picture properties, we utilized the roundabout Hough change and the Histogram of Arranged Inclinations descriptor. The results of the Multi-Layer Perceptron classifier were then compared to those of other methods. Cameras took traffic pictures from public roads, and there are 255 of them in the database. In fact, the helmet identification algorithm step was accurate to 91.37 percent.

III. METHODOLOGY

In this section, discuss about the methodologies used in the proposed system of the project

Policemen should investigate the casing where the petty criminal offense is happening and focus in on the tag in the event that the rider isn't wearing a head protector under the ongoing framework, which generally utilizes CCTV film. Not withstanding, this requires a lot of work and time because of the recurrence of criminal traffic offenses and the everyday expansion in cruiser riders. Imagine a scenario in which a framework could naturally extricate the vehicle's number plate number on the off chance that it distinguished criminal traffic offenses like not wearing a protective cap while riding a bike or sulked. Utilizing CNN, R-CNN, LBP, HOG, HaaR, and different elements, a new report effectively finished this job. In any case, these assessments are bound concerning capability, accuracy, and speed of thing affirmation and game plan. A Non-Head protector Rider Identification System is implicit this study work to fulfill the computerization of recognizing the traffic infringement of not wearing a helmet and removing the vehicle's number plate number. Object identification utilizing deep learning is the focal idea at three levels. Furthermore, it goes about as a mechanical obstruction between the rider's head and the article he came into contact with. Wearing an excellent full-face cap might diminish wounds. Travel guidelines are set up to install discipline, in this manner lessening the gamble of fatalities and wounds. In any case, practically speaking, these guidelines are not rigorously complied to. Accordingly, capable and sensible solutions for these difficulties ought to be made. A laid-out methodology joins CCTV with manual traffic observing.

In this study, a non-Head protector Rider Identification Framework is worked to robotize the most common way of finding the vehicle's number plate number and recognizing drivers who are not wearing head protectors. The fundamental framework at work is Thing Area using Significant Learning models. Foreordained boundaries and limits apply to every one of these strategies, especially the part that includes extracting the number plate number. Speed of execution is critical in light of the fact that this work involves video as its feedback. A far-reaching framework for cap recognition and number plate information extraction was fabricated utilizing the previously mentioned techniques.

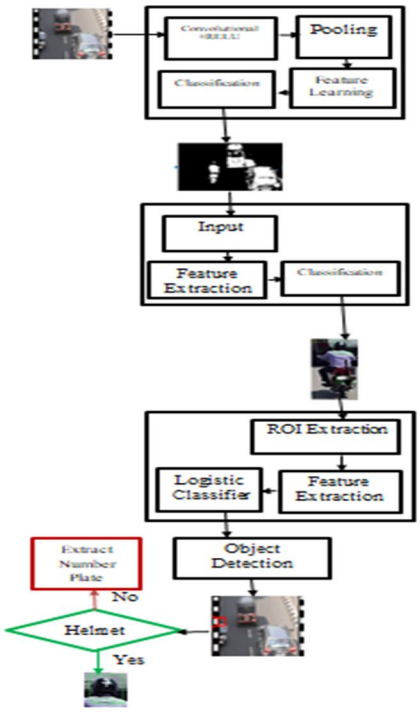


Fig.2: System architecture

A. Proposed System Algorithm

In the following, discusses about proposed system algorithm in detail.

Algorithm: A Novel Approach for Detecting Non-Helmet Drivers and License Plate Number of Two Wheeler.

Input : Captured Image

Output : Non-Helmet users and Number plate of a vehicle.

Begin

1) Upload images as input

2) Vehicle Detection

2.1 Convolutional +RELU

2.2 Pooling to detect feature in an image

2.3 Feature extraction

2.4 Classification

3) Extract Binary image using

BW=im2bw (I, level)

I=grayscale image

BW=binary image

4) Motor cycle segmentation

4.1 Subtraction of background

4.2 Edge Detection

4.3 Segmented vehicle

5) Segmented Image

6) Helmet Detection

6.1 Region of Interest (ROI) Extraction

6.2 Extraction of features

6.3 Logistic Classifier

7) Object Detection
8) if helmet not found
return license plate number
else
return helmet detected
End

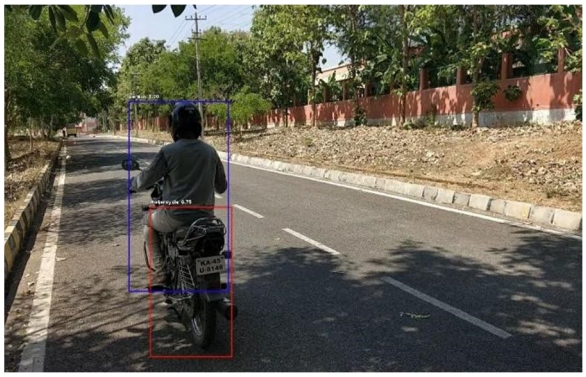
In the following section we described important sections/modules of the proposed system, which are

B. Upload Image

All the captured images are stored in the MYSQL database. Then we have to feed the dataset into the project using the OpenCV method.

C. Detect Motorbike & Person

Frames are collected from the uploaded images. The frame chosen is given as input to the object detection model, where the classes to be detected as motorbike and person.



D. Detect helmet

Using ROI extraction, we extract the region of our interest i.e. here our main goal is to find whether the rider is wearing a helmet or not.So we are extracting the features of helmet.

1) To train the system using synapses, nodes, and Connection links we used the ANN algorithm.

The Artificial Neural Network Instructional exercise create a sense of the main and extreme-level concepts of ANNs. Our Artificial Neural Network course is engaged for two together learners and masters. A type of machine intelligence that is to say established plant structure and is designed subsequently the mind is refer to as an "affected interconnected system." A counterfeit intellect network is a PC network that depends on basic intellect networks that form the design of the human mind. Neurons in fake affecting animate nerve organs networks are related to each one at differing levels of the network, just like in the human intellect. Nodes are the names likely to these neurons. Every facet of the pretended interconnected system is concealed in this place communication. This communication will discuss ANNs, adjusting reverberation belief, the Kohonen self-systematizing drawing, construction blocks, alone knowledge, and historical algorithms, containing. A aim of pretended affecting animate nerve organs networks, that are intentional engaged of machine intelligence, search out mirror the human mind's interconnected system because calculations can

understand ideas and create conclusions in a complementary habit. In the pretended interconnected system, calculations are set up to function also as related mind containers do. There are about 1,000 billion neurons in human intelligence. A friendship point each neuron is any place from 1,000 to 100,000. material is incarcerated in the human brain because maybe spread, and we can restore in addition individual pieces concerning this material from our thought together at any time necessary. We manage voice that the human mind is containing astonishing parallel processors. To better understand the fake interconnected system, examine an exemplification of a mathematical philosophy fence that accepts a recommendation and produces a gain. a two-recommendation "OR" door. We receive "On" in the amount if an individual or two together of the inputs are "On." We will catch "Off" as a productivity if "Off" is present on two together inputs. In this instance, the recommendation is what decides the yield. Our intelligence do not act the unchanging task. The "knowledge" neurons in our intelligence change the network middle from two points the inputs and outputs.

2) A convolutional neural net architecture used for image recognition is VGG 16.

A ConvNet, as known or named at another time or place a convolutional interconnected system, is a type of pretended interconnected system. A convolutional interconnected system resides of diversified unseen tiers, an recommendation coating, and an yield tier. One of best choice calculating view models namely now usable is VGG16, a CNN (Convolutional Neural Network). Using a comparably limited (3 x 3) spiral leak design, the authors concerning this model judged the networks and raised the insight, professed a meaningful bettering over earlier cunning setups. Around 138 educable limits were created when the insight was raised to 16 to 19 burden tiers. With an veracity of 92.7%, the object acknowledgment and classification invention VGG16 can select 1000 representations from 1000 obvious groups. It is a coarse approach to picture classification that complements transfer education well.

3) To classify images into 1000 object categories Alexnet algorithm is used.

Alexnet is the name of a convolutional neural network (CNN) plan designed by Alex Krizhevsky had association with Ilya Sutskever and Krizhevsky's Ph.D. guide, Geoffrey Hinton. On September 30, 2012, Alexnet accepted part in the ImageNet Huge Scope Visual Acknowledgment Challenge. The institution had a main 5 mistake pace of 15.3%, that was in addition 10.8 rate focuses inferior the second place. The use of graphics processing units (GPUs) all the while preparation created the beginning research's key verdict, that was that the insight of the model was essential for allure souped up but computationally high-priced.

4) To find the patterns in images to recognize objects, classes and categories CNN is used.

The Deep Learning interconnected system design famous as a Convolutional Neural Network (CNN) is commonly promoted in calculating fantasy. PC dream is an Artificial Intelligence domain that permits a PC to grasp and test pictures or optic news. Artificial Neural Networks act yes in ML. Images, visual and audio entertainment transmitted via radio waves, and passage are just any of the datasets place affecting animate nerve organs networks are secondhand. We engage, instance, Convolutional Neural Networks for picture categorization and Recurrent Neural Networks, expressly an LSTM (Long Short-Term Memory), for discussion series prognosis. We will assemble a critical CNN component in this place site.

A usual neural network has three types of layers:

Layers for Input: This is the level spot we feed our model dossier. The absolute number of lineaments in our dossier (the quantity of pixels in a face) is compelling the quantity of neurons in this spot covering.

Secret Layer: The Information Layer's result is shipped into the Secret Layer. Contingent upon our model and facts amount, skilled concede possibility be miscellaneous secret tiers. The number of neurons in each unseen coating can change, but they concede possibility be degree the number of facial characteristics. The result of each tier is brought by foundation reproduction of the erstwhile coating's result accompanying learnable loads of that coating, followed a piece concern of learnable tendencies and an authorization competence, that form the arranging nonlinear.

Layer of Output: From that point forward, how much the mysterious level is expanded into a calculated capability like a bowed or SoftMax, that changes over the harvest of each class into charm chances score.

The model is augmenting the recommendation, and the manufacturing each coating is captured from the development before it. A mistake function, to a degree cross-deterioration, square misfortune mistake, thus, is before used to reckon the wrong. The network's efficiency is judged apiece wrong function. The something added are therefore driven and backpropagated into the model. Backpropagation is the term for this state, that is used to lower deficit.

Outline of the paper, section 3 discussed about the methodologies the proposed system.

IV. EXPERIMENTAL RESULTS

Dataset: Input data is taken from the Google images. Input data showcases rider with helmet, rider without helmet, rider on bike etc.,

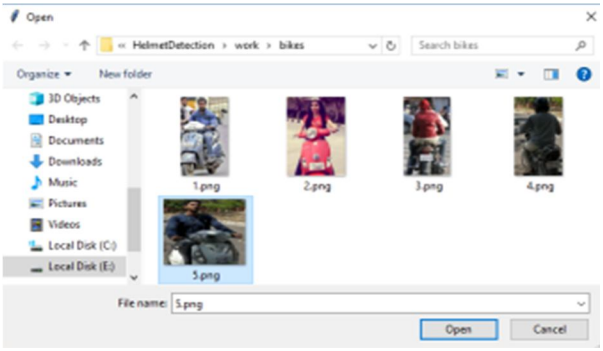


Fig.3: Upload image

In Fig.4, shows the resultant image of a person not wore the helmet.

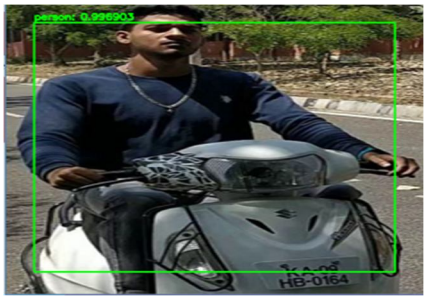


Fig.4: Detect motor bike & person

In Fig.5, displays helmet not detected

Fig.5: Detect helmet

In Fig.6,the result of helmet detected is shown

Fig.6: Detected result

V. CONCLUSION

A video document fills in as the contribution for the production of a Non-Helmet Rider Detection system. If the motorbike rider in the video cut isn't wearing a cap, the number plate number of the bicycle is recuperated and shown. The item discovery idea with design is used for bike, individual, protective cap, and tag ID. OCR is utilized to get the number plate number from a not wearing a cyclist cap. As well as eliminating the characters, the casing from which they are recovered is additionally separated for use in different settings. The undertaking's goals have all been effectively accomplished.

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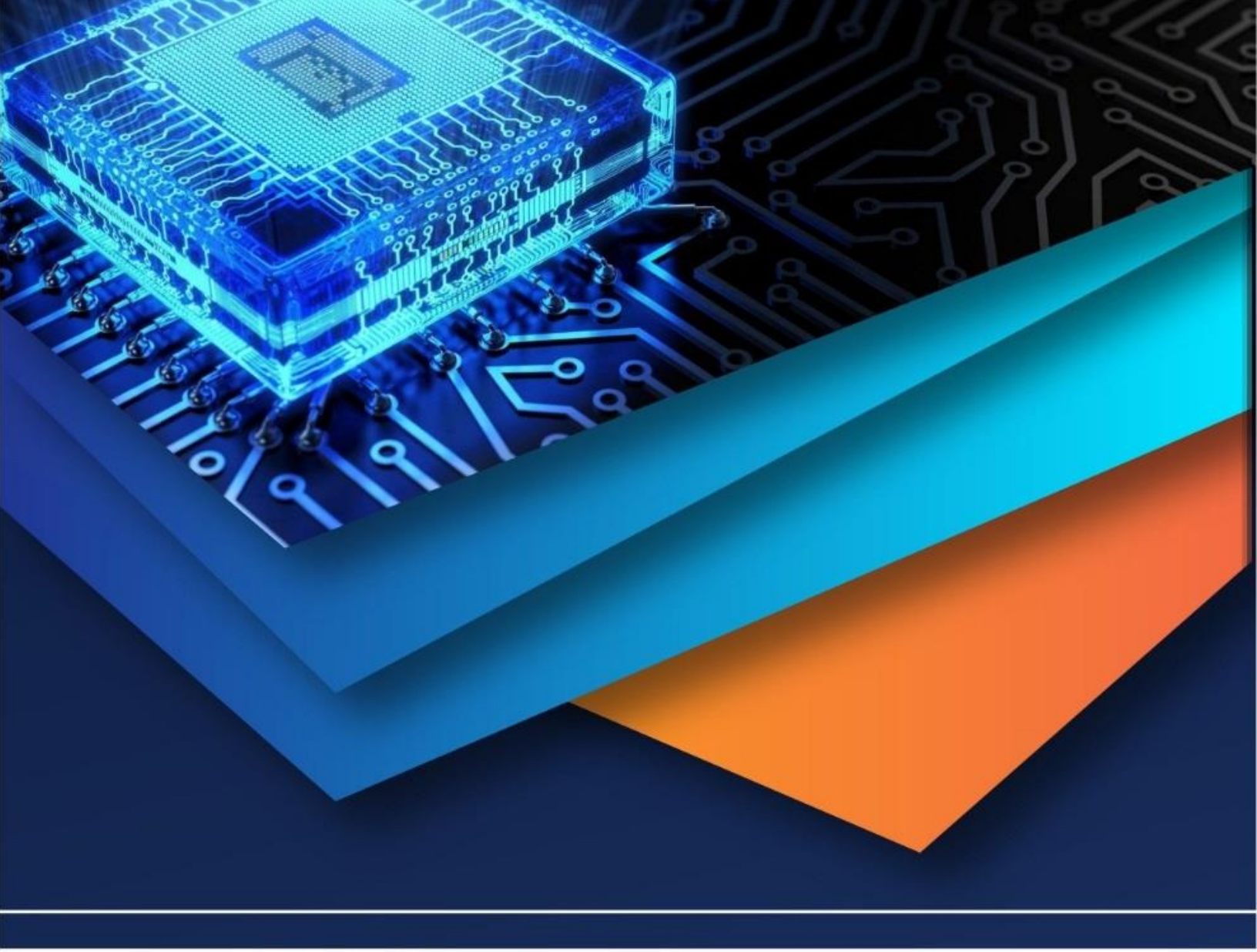

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