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Helmet and License Plate Detection

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Abstract: ***Traffic accidents are one of the leading causes of death today. Motorcycle accidents lead to serious injuries. A helmet is important for every motorcyclist. However, many do not adhere to helmet laws. This is the software CNN uses to find motorcyclists without helmets. The structure consists of motorcycle detection, helmetless classification, and motorcycle licence plate recognition. The motorcycle is scanned with the feature vector HOG. Once the motorcycle is recognised by CNN, do motorcyclists wear helmets? Motorcycle licence plate if it is determined that the motorcyclist is not wearing a helmet. Motorcycles are recognised by Tesseract OCR.***

I. INTRODUCTION

About 1.35 million people are killed in road accidents and 50 million are injured each year, according to a report published by the World Bank entitled Global Status Revision Manuscript. Received December 5, 2019. It is unlikely that this load is shared equally by motorcyclists, cyclists, and pedestrians. The report makes clear that comprehensive action plans must be developed to save lives. Motorcycles are a very popular mode of transportation in almost every country. However, the lower the level of protection, the higher the risk. When a two-wheeler collides, the rider is thrown out of the vehicle due to sudden deceleration. When the head hits an object, the head movement is zero, but the brain, due to its own mass, continues to move until the object hits the inside of the skull. Sometimes this type of head injury can be fatal. At such times, the helmet is his lifesaver. The helmet reduces the chances of his skull slowing down, making his head movement nearly zero. The cushion inside the helmet absorbs the impact, and the head remains still over time. It also spreads the impact over a wider area and protects the head from serious injuries. More importantly, it acts as a mechanical barrier between the rider's head and the object it contacts. A quality full-face helmet can help minimise injuries. Traffic rules should convey a sense of discipline so that the risk of casualties can be significantly reduced. However, strict compliance with these laws is lacking. Therefore, efficient and workable techniques must be created to overcome these problems. It is highly desirable that cyclists wear helmets to reduce the associated risks. Worryingly, India tops the list in terms of road fatalities. Rapid urbanisation, the avoidance of helmets and seatbelts while driving, and other safety measures are some of the reasons behind this trend, according to expert analysis. In 2015, India signed the Brasilia Declaration on Road Safety, with India pledging to reduce road fatalities by 50% by 2020. Recognising the utility of helmets, governments criminalised driving without helmets and implemented manual strategies to catch offenders. However, existing methods based on video surveillance are passive and require significant human assistance. In general, such systems are not viable due to the involvement of people who become less efficient over time. Automating this process is highly desirable for reliable and robust monitoring of these violations and also greatly reduces human resources. Recent educational programmes have successfully done this work based on CNN, Yolov5, Pytorch features, etc. However, this work is limited in terms of the efficiency, accuracy, or speed with which object detection and classification are performed.

II. LITERATURE SURVEY

In many areas there is a need to recognize and effectively track target objects while dealing with occlusion and other involved complexities. Many researchers (Almeida and Guting 2004, Hsiao-Ping Tsai 2011, Nicolas Papadakis and Aure Lie Bugeau 2010) have tried different approaches in object tracking. The nature of the technique is highly dependent on the application domain. Here are some of the studies that have evolved into proposed research in the field of object tracking Until recently, most methods of object detection and object classification extract features using methods such as Haar, HOG, Local Binary Patterns (LBP), Scale Invariant Feature Transformation (SIFT), Speeded Up Robust Features (SURF), etc. and supported Vector Machines (SVM).) , a random forest of classifiers or AdaBoost .

Silva et al. [1] Perform feature extraction using methods such as histogram of oriented gradients (HOG), LBP, and wavelet transform (WT) to classify motorcyclists with and without helmets. Using multiple combinations of basic functions like HOG+LBP+WT, we get 7 possible sets of functions. In [5], K. Dahiya et al. I came up with helmet detection from surveillance videos and used her SVM classifier for classification.

Another her SVM classifier classifying between motorcyclists and non-motorcyclists, and between helmets and no helmets. For both classifiers, we implemented three of his widely used features (HOG, SIFT and LBP) and compared the performance of each with the other two of his features. They concluded that the HOG descriptor helped them achieve the best performance.

[6] C. Vishnu et al. proposed an approach that uses convolutional neural networks (CNNs) for classification. In recent years, CNNs that perform both automatic feature extraction and classification outperform previously dominant methods in many problems. Recently, advances in graphical processing units (GPUs) and the availability of more training data for neural networks to learn have led to unprecedented advances in computer vision, natural language processing, and speech recognition. Precision is now possible. Currently, all state-of-the-art methods for object classification, object recognition, character classification, and object segmentation are based on CNN. For example, see the method used in the ImageNet Large Scale Visual Recognition Challenge [2].

Li and Shen [3] use deep convolutional neural networks and long short-term memory (LSTM) to perform the license plate recognition and character extraction process. They use her two methods of segmentation and detection. [4] shows that using CNNs for text recognition and cognition offers significant improvements over existing methods.

The YOLOv3 algorithm is able to perform accurate object detection (road users) with near real-time performance (around 25 fps for HD images) under different driving conditions (bright cloudy sky, snow on the road, night driving).

The YOLO v3 algorithm consists entirely of a CNN [7] and a post-processing algorithm for neural network outputs. A CNN is a special architecture of neural networks suitable for processing lattice-like data topologies. An important feature of CNNs in object detection is parameter sharing. Unlike his feedforward neural network where each weight parameter is used once, in CNN architecture each member of the kernel is used at each position of the input. Have learned. YOLOv3 AP shows a trade-off between speed and accuracy when using YOLO and RetinaNet, as RetinaNet training time is longer than his YOLOv3. Object detection accuracy using YOLOv3 can be matched on larger datasets than when using RetinaNet, making it an ideal option for models that can be trained on large datasets. Examples of this are common

Detection models such as traffic detection. A large amount of data is available for model training due to the abundance of images of different vehicles. YOLOv3 may not be suitable for use in niche models where large data sets are difficult to obtain.

III. SCOPE OF THE PROPOSED WORK

In this project, we will detect if the motorcycle driver is wearing a helmet when he is not. Next, extract the licence plate of this motorcycle. For extracting licence plates, we have Yolo CNN. Model some training and test photos. If you want to add more photos, please send us these photos. These images can be annotated and inserted into the YOLO model to extract licence plates for these new images.

IV. METHODOLOGY

In this research, we will build a notification system for drivers who do not wear helmets and try to cope with the automation of traffic detection. Violation of wearing a helmet and removing the vehicle licence plate. Key Concepts of Objects His detection in three steps by deep learning In the first stage of YOLOv4, detection targets are people, motorcycles, The second step in YOLOv5 is helmet recognition, and the last step in YOLOv5q is licence plate recognition. The licence plate numbers are then extracted with OCR (optical character recognition). All of these techniques apply to the agreement of terms and limitations, especially the extraction part of the licence plate. To make sure this work continues using video as input, execution speed is very important. I built both overall systems using the above process. Extraction of helmets and licence plates

A. Data Set

All classification studies in the training and testing phases require suitable large data sets. Upload After uploading the dataset, the dataset named "dataset.txt".

B. Proposed System

A Proposed Feature Extraction Method Using LBP-Based Hybrid Descriptors, HOG and Hough Transform explanation. A grayscale co-occurrence matrix is absorbed together with LBP for feature extraction. YOLOv2 and COCO You can edit the dataset to recognize different types of objects and classify them accordingly. The target object is a motorcycle. Motorcycles, pedestrians, workers. The difference between the color of the helmet and the color of the tires motorcycle. An introduction to using microcontrollers and accelerometers to identify motorcycle accidents. Largely Pedestrian safety is extremely important as pedestrians are the real victims of traffic accidents.

Introduction of pedestrian classification method Using SVM based histograms of directional gradient features (HOG). The final step involves helmet detection. Colour A circle-based Hough transform is used for helmet disclosure, and the HOG descriptor can also be used for helmet detection. Another option is color feature detection. Use color space conversion and color property distinction Recognize your helmet. We use the GLCM statistical function and a backpropagation artificial neural network to better detect helmets. An effective helmet detection system includes the following steps

Dataset group, motion detection, background subtraction, object classification by neural, etc. Network and license plate derivation when the motorist is not wearing a helmet. Using reattached varanusast etc. ANN classifier for extracting and classifying moving objects. Here the head is categorized as helmeted and uncovered Various features derived from segmented headers can be used to detect moving objects using adaptive backgrounds Subtract. You can also apply the ViBe background modeling algorithm to detect moving objects. canny edge detection The algorithm is used to obtain segmented moving objects.

V. IMPLEMENTATION

A. *Architecture*

For helmet recognition and license plate recognition it have the process to recognize the helmet . First we insert the photo of the motorcyclist and the next step is to process the video to remove the background. Of The other step is motorcycle segmentation. In the next step, the system recognizes people without helmets. Lastly Steps Recognize license plates and display license plate numbers from images.

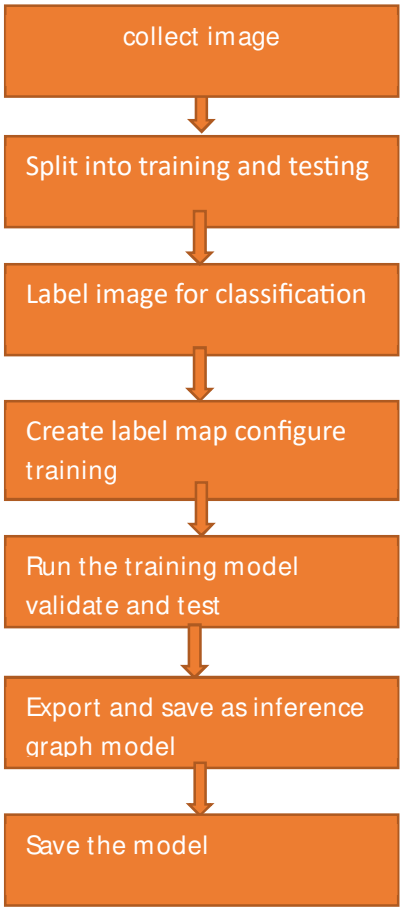


Fig 1 detection of helmet

B. *Introduction to UML*

A unified modeling language enables software engineers to express inspection models using: A model symbol that follows a set of semantic, descriptive, and practical rules. UML system It consists of five different views that describe the system from different angles. UML is special It is built by two separate domains: UML analytical modeling focuses on user models and structural model views of systems.

UML design modeling. observable modeling, implementation modeling, and Environment model view. In software development, the class diagram of the Integrated Modeling Language (UML) is a kind of stable structure diagram that describes the structure of a system by showing the structure of the system. Classes, their associations, operations (or methods), and relationships between classes. explain which Classes contain information.

C. Use Case Diagram

The superior necessary feature of the design is dynamic behavior capture. Static behavior alone is not enough to model a system, dynamic behavior is more important than static behavior. There are five diagrams you can use in UML to plan your dynamic nature and the use case diagram is one of them. Since we have to talk about the use case diagram being of a larger nature, there must be some internal or external factors to make the connection. A use case diagram consists of actors, use cases, and their connections. A individual adoption case diagram captures the specific performance of the system. Therefore, a set of use case diagrams is used to model the entire system.

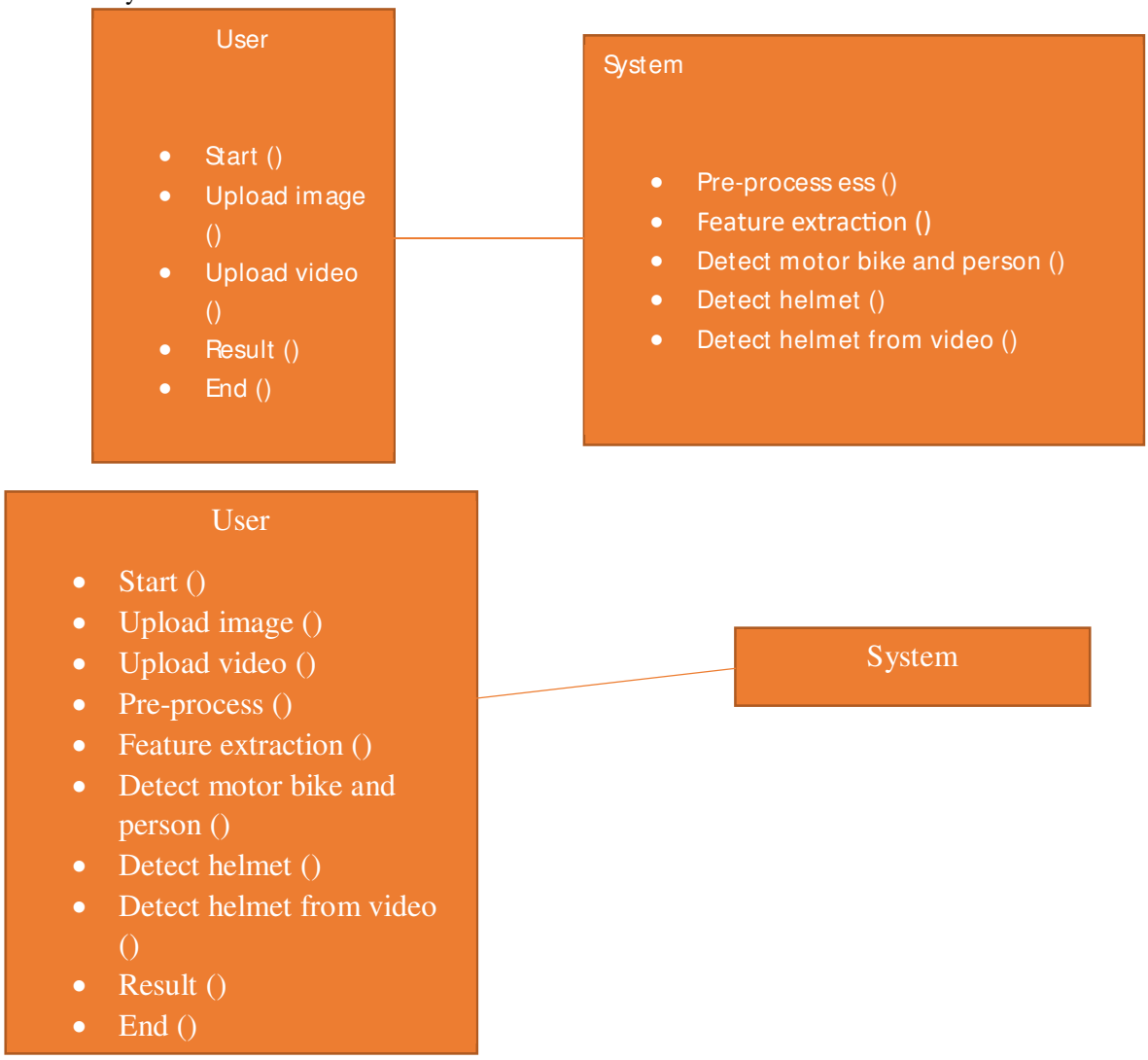


Fig 2 case diagram

VI. MODULES DESCRIPTION

A. Tensor Flow

Tensor Flow is a free opensource software library for various data flow and other programming function. This is an iconographic math library, also used for machine learning such as neural networks. Already used Released under the Apache 2.0 opensource license, both in research and production at Google. November 9, 2015.

B. NUM Py

Numpy is a general purpose array processing package. provides a very efficient multi-dimensional array of Objects and tools used in these arrays.Basic package for scientific computing in Python. Contains various characters including these important characters thing:

1) Powerful N-dimensional array object Advanced (broadcast) features
2) Tools for integrating C/C++ and Fortran code
3) Useful linear algebra, Fourier transforms, random potentials

In addition to its obvious scientific uses, NumPy can also be used as an efficient multidimensional container for generics data. You can define arbitrary data types using NumPy. This allows NumPy to complete itself and integrate with data types out of the box various databases.

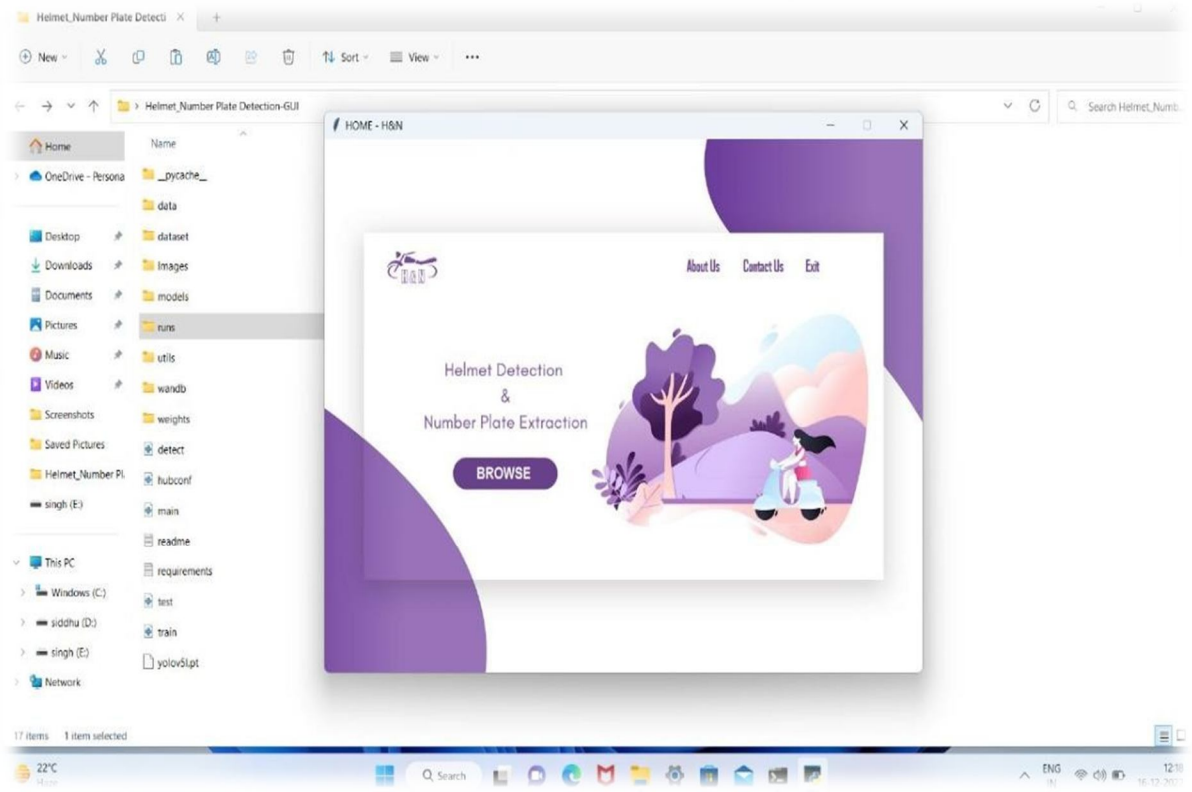
C. PANDAS

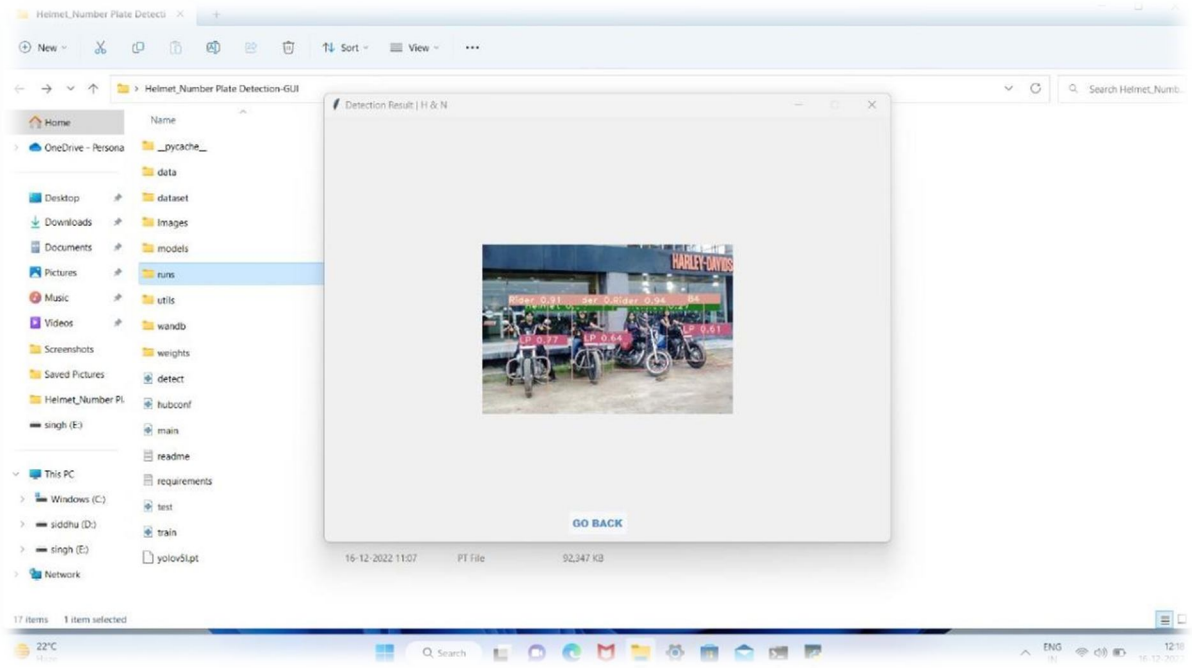
Pandas is an open source Python library that uses its powerful data to provide effective data manipulation and analysis tools structure. Python was primarily used for data decryption and preparation. Contributions to data analysis were negligible. Panda This issue has been resolved. Pandas allows us to follow five classic steps when manipulating and analyzing data. Load, prepare, manipulate, model, and analyze your data sources. Python with pandas is used in many areas including: Education and business sectors including finance, economics, statistics, analytics and more.

D. YOLOV5

YOLOv5 is a flawless in the You Only Look Once (YOLO) family of computer vision models. YOLOv5 is widely used for object recognition. YOLOv5 has four main versions. Small (s), medium (m), large (l), and extra large (x), each providing progressively higher accuracy rates. Different variants require different training times

VII. RESULT





VIII. CONCLUSION

A non-helmet driver detection system has been developed that uses a video file as input. a motorcyclist The video footage shows someone not wearing a helmet when riding a motorcycle. I will upload the photo here. Extract the licence plate of this motorcycle from the image and display it. Object detection principle Detect motorcycles, people, helmets, and licence plates using Yolo architecture. OCR is used for licence plate number extraction if the driver is not wearing a helmet. Extract not only characters but also frames. It is extracted for other purposes. All project goals were met. Satisfied

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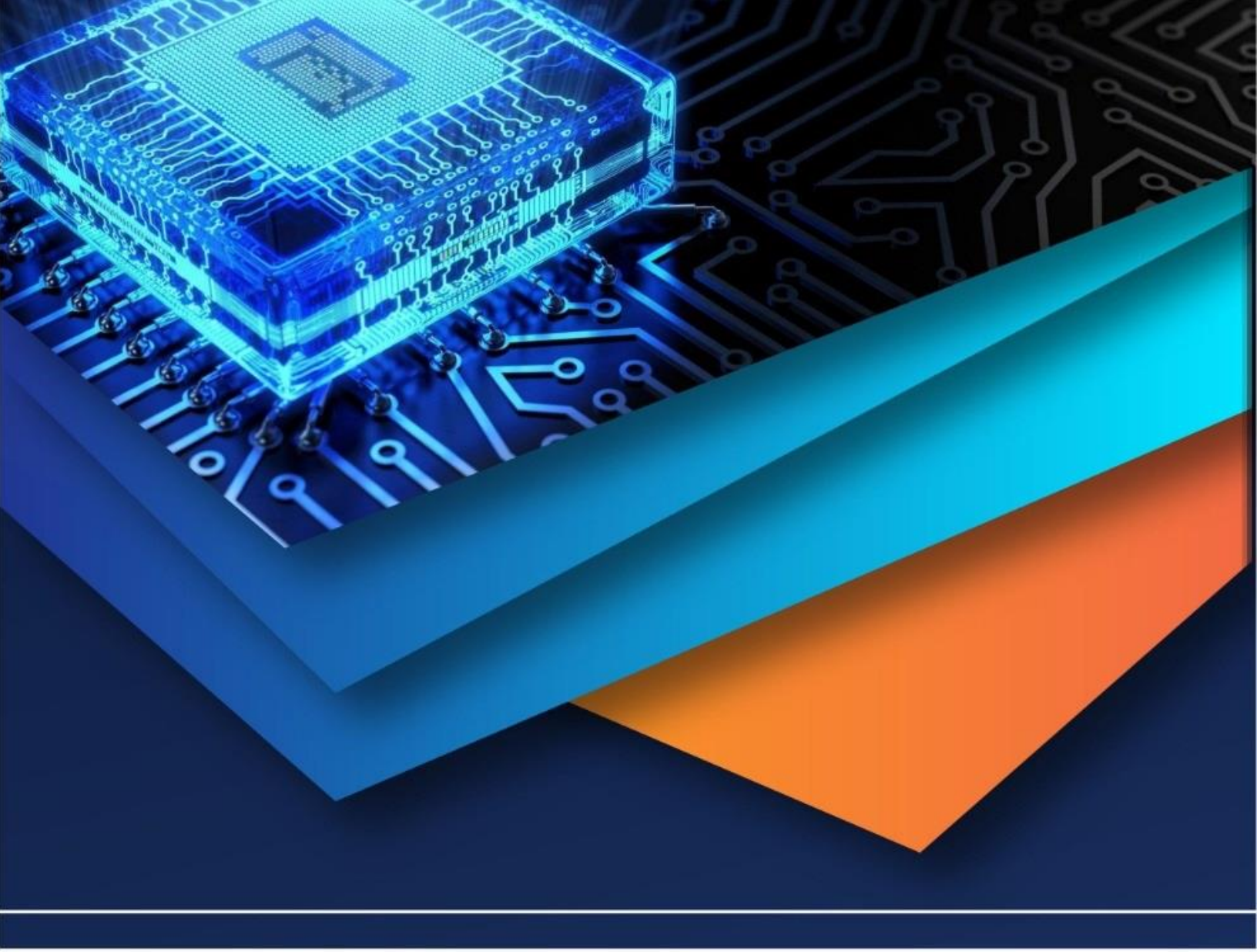

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