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Predicting Relationship Between Traffic Accidents with Related Injuries

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Abstract: ***Traffic collisions are one of the world's 14 most crucial issues right now since they cause countless fatalities, severe injuries, and financial losses every year. The difficulty of creating accurate forecasting models, Traffic accident severity is important for transportation networks. This study creates models to choose a number of important features and build a model for classifying injury severity. These models are produced utilizing various Machine Learning techniques. The data on traffic accidents, trained and methods for unsupervised machine learning are also used. The primary aim is to draw a connection between the many kinds of injuries and traffic accident types. The study's conclusions imply that unsupervised learning methods may be effective in predicting the severity of harm from traffic accidents.***

I. INTRODUCTION

Highway traffic collisions routinely cause fatalities, severe injuries, and property damage, which have a detrimental effect on society and the economy. World Health Organization (WHO)[1] estimates that more than 1.5 million different highway users died in traffic collisions in 2017, with collisions being the primary cause of half of those deaths. In addition, it is predicted that, if there is no sustained traffic, road accidents will beyond all other justifications for deaths by 2030.

Along with the increase in automobiles on the road and in traffic, particularly at rush hours, Likewise, the desire for automobiles. As a result, among the main global causes of injury and death is traffic accidents. According to the Michigan Traffic Crash Decade-At-A-Glance report [2], over 314,921 traffic accidents cost US citizens over $230 billion in 2017. Over 1,028 individuals they passed away, while over 78,394 others suffered injuries. Classification algorithms are among the most often used strategies in mining traffic events in order to develop accident prediction classifiers. The training sets of data used to create these classifiers that 34 include details on incident reasons.

Thus, the use of analytical and predictive techniques like machine learning algorithms is necessary for rational decision-making that prevents needless incidents on highways. Can machine learning algorithms be used to save lives? This motivates the authors of this study to use machine learning algorithms to forecast and look into highway accidents based on road's conditions, the drivers involved, and the surrounding area. In order In the near future, to lessen the frequency and seriousness of accidents, this study's main goal is to exactly identify the severity of traffic collision causes. Doing so will save many lives, a lot of money, and a variety of other things. The study also made an effort to develop models that the Michigan Traffic Agencies (MTA) might use to classify the severity of injuries and select a group of pertinent criteria. Making advantage of this approach will be advantageous to MTA and other responsible authorities in Michigan.

II. EXISTING SYSTEM

Current system is manual, where the government sector makes use of ledger data and analyzes the data manually. Consequently, the analysis, they will take the necessary safety precautions to lessen the amount of traffic collisions, related injuries[3]. Also, there are numerous tools. and software to maintain traffic collisions and associated injuries, these tools just collect the data and store it on the server but the analysis is not done.

Drawbacks of Existing System

1) Manual Process
2) Time Consuming
3) Expensive
4) Insufficient user satisfaction
5) Less Efficient
6) Does not find correlations between traffic accident parameters and injuries connected to those accidents[5]

III. PROPOSED SYSTEM

The proposed solution is a real-time application that aids the government sector in reducing traffic collisions and assessing the severity of injuries. Our lives depend heavily on traffic safety, hence, it is essential to make improvements as often as possible using all imaginable and accessible means. Three categories of accident severity fatal,serious,slight were used to separate the data set.[8] The suggested approach offers a technique for exploiting the data collected on traffic accidents to mine common patterns and key factors causing different types of accidents and associated injuries. System aids in the reduction of injuries and accidents related to traffic.The below Figure 1 illustrates how the modules work together to foresee the result.

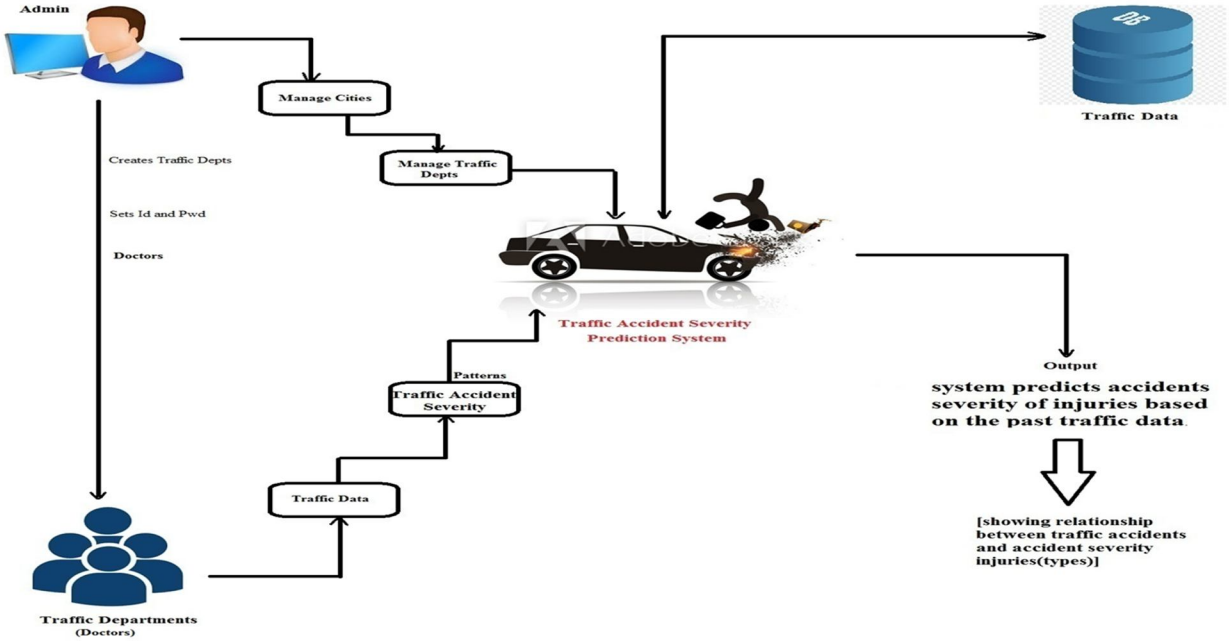

Figure 1: Proposed System Architecture

A. Unsupervised Learning

For tasks that would profit from the understanding acquired through summarizing data in fresh and fascinating ways, a descriptive model is employed. In the unsupervised learning technique, there are no specified labels. The objective is to investigate the data and discover internal structure. Transactional data lend themselves well to unsupervised learning.
In this project, "Eclat algorithm" is applied to determine how traffic accidents and injuries are related. One of the quicker algorithms for processing data is the Éclat algorithm. For both small and large data sets, this technique performs well.

B. Accidents and Injuries Pattern Prediction Process

1) Step 1: Data Collection

while working on a real-time application, the built application was connected to data servers. (Used for data archiving). Data collection entails gathering information.[4] From different sources. Data includes Year, Speed Limit, Weather-condition, School-zone, Humps, hospital zone, road type, men at work, Accidents and Injuries.[9][10]

2) Step 2: Data Preparation

Here data from servers is extracted and analyzed. The data needed for processing is kept and extraneous data removed. As a result, the project only takes into account accidents and injuries that are necessary to produce outputs.

3) Step 3: Specify Constraints

Support count
The percentage of transactions that included item (A) overall compared to all transactions included in the data collection.
Confidence
The ratio of transactions containing the item set to transactions containing LHS is used to determine an item set's confidence level.

4) Step 4: Association Rules Mining (Eclat Algorithm)

The simpler, more widely used, and more well-known data mining technique is association (or relation).For you to discover patterns, This project constructs a straightforward association between at least two elements, frequently of the same sort.

To analyze and identify patterns in data, This project employs the ECLAT algorithm. Here patterns associated with injuries and traffic accidents are produced.

The Eclat algorithm is selected owing to the following reasons.

a) Quicker Results (takes less time for Prediction)
b) Works fine for small data sets as well as huge data sets.
c) One scan of Database is enough.
d) Works fine for multiple constraints.

5) Step 5: Patterns Prediction

Here the system predicts the relationship between frequent traffic accidents with injury types.[6] The action of researching a system that uses data referred to as machine learning. Data processing using machine learning algorithms is a component of data science.[7]

IV. SYSTEM DESIGN

A data flow diagram, which is depicted in Figure 2, illustrates how the admin system processes to check the admin id and password and let him proceed.

A data flow diagram, which is depicted in Figure 3, Illustrates how the member system processes to check the member id and password and let him proceed.

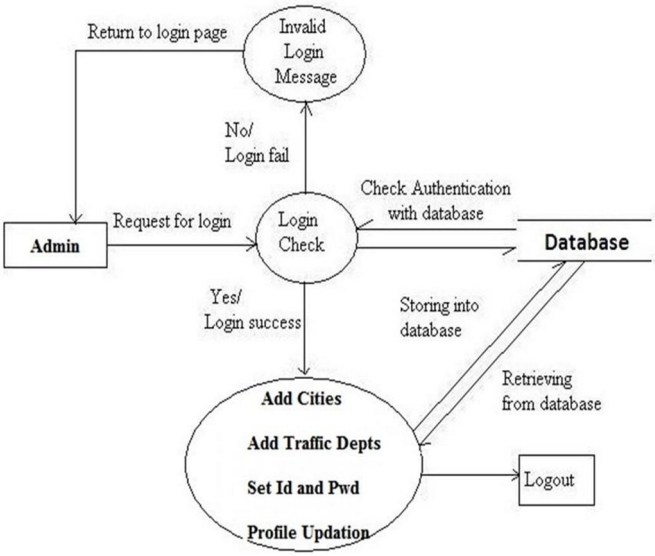

Figure 2: Data Flow Diagram of Admin.

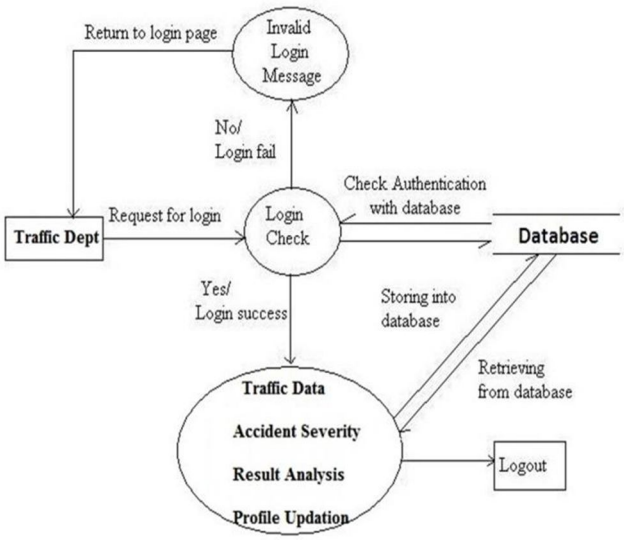

Figure 3: Data Flow Diagram of Members.

Figure 2, the Admin request for login the system checks his credentials with the database if login success. Then he is going to be directed to the admin page. Where he can add cities, traffic dept, and set ID and PASSWORD, update the existing profile in the database.

Figure 3, the Members request for login again the system checks their credentials with the existing database. If they are matched they are going to be directed to the member page. Where they can add traffic data, accident details, and predict the pattern, update the profile.

Use case diagrams visually display the communication between system components. Use cases will describe expected behavior and particular processes. As soon as use cases are established, as seen in Figure 4, they can be utilized to describe both textual and graphic representation.

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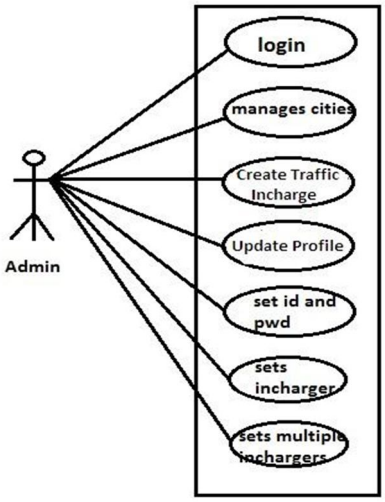


Figure 4: Use Case Diagram of Admin.

V. SYSTEM IMPLEMENTATION

The process of determining a relationship between the collision and the injuries is demonstrated in this part. When a particular road name is entered it will give us the accident and the injuries related to it and the confidence of it happening in that particular road. In Figure 5 different modules of a system are shown.

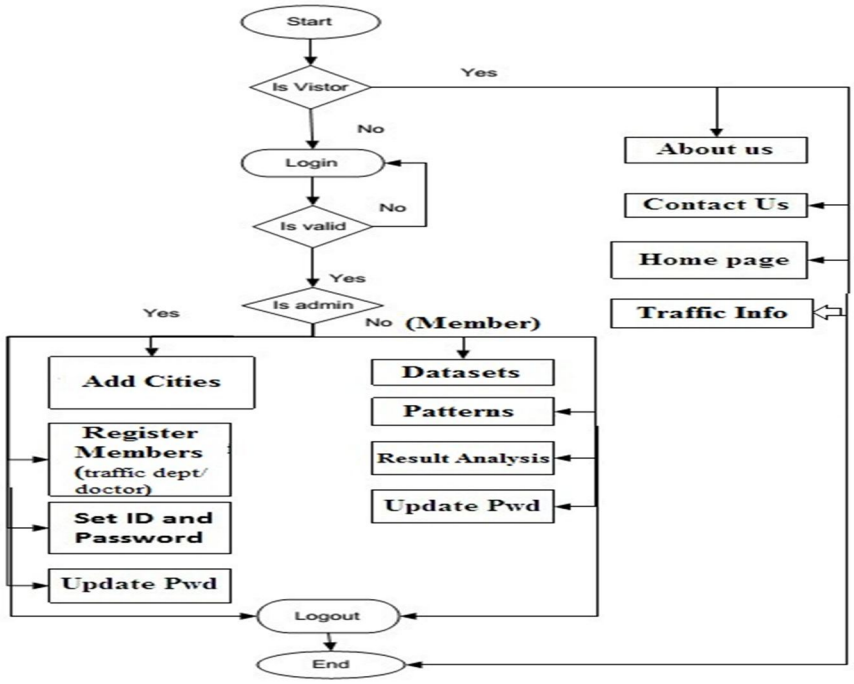


Figure 5: Different modules of system

The algorithm above demonstrates step-by-step how the system predicts the confidence of the occurrence of injury based on data from traffic accidents.

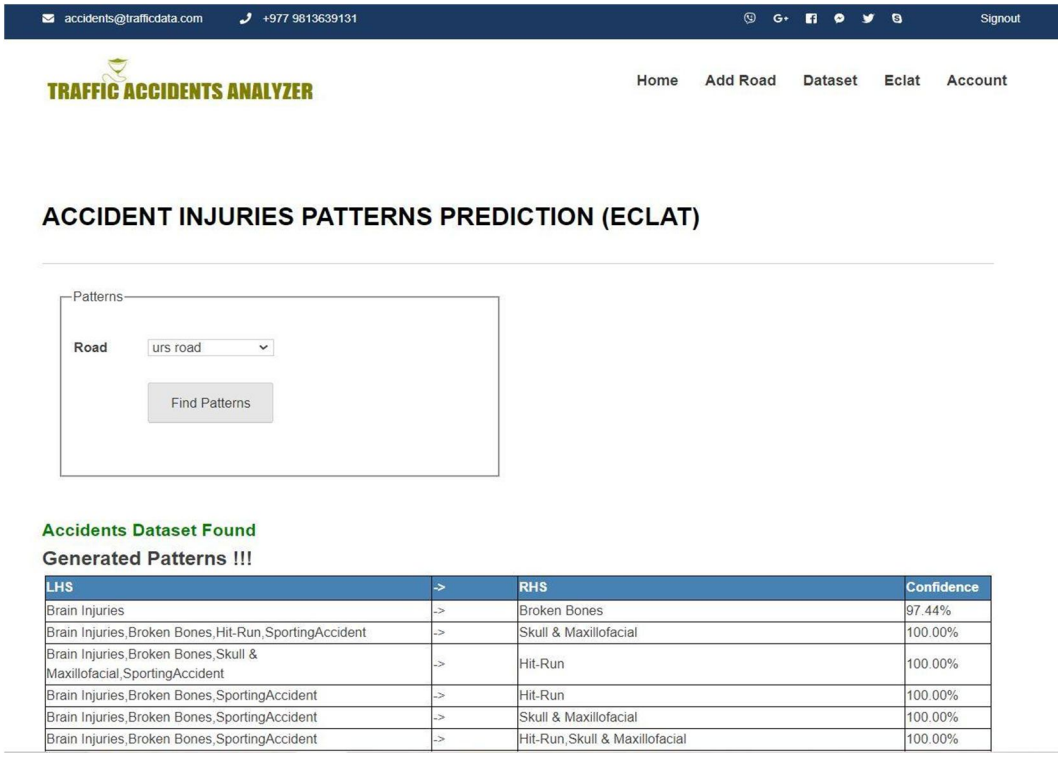
The flow starts from the visitor, if he/she is visitor , then they are going to be directed to the visitor page .

If they are admin then they will be redirected to the admin page in which they can do the following operation .

They can add cities, register members, set ID and Password ,Update Password. And can logout .

VI. RESULTS

The below Fig.No 6 This is the predict page where the prediction of related injuries with accident happens. Here it will provide the option to select the road. We need to choose the road from the drop down. When we click on the find pattern button it will predict the injuries with accident.



LHS	->	RHS	Confidence
Brain Injuries	->	Broken Bones	97.44%
Brain Injuries,Broken Bones,Hit-Run,SportingAccident	->	Skull & Maxillofacial	100.00%
Brain Injuries,Broken Bones,Skull & Maxillofacial,SportingAccident	->	Hit-Run	100.00%
Brain Injuries,Broken Bones,SportingAccident	->	Hit-Run	100.00%
Brain Injuries,Broken Bones,SportingAccident	->	Skull & Maxillofacial	100.00%
Brain Injuries,Broken Bones,SportingAccident	->	Hit-Run,Skull & Maxillofacial	100.00%

Figure 6: Patterns generated (showing relationship b/w accidents and injury types)

Experiment Results
Patterns generated (showing relationship b/w accidents and injury types)
The below Table No 1, represents the injuries related to its attributes.

Table No. 1: Patterns generated

ATTRIBUTES	RELATED INJURIES
Single Car Accident	Skull & Maxillofacial
Sporting Accident	Spine Fracture
Drunk and Drive	Back and Spinal Cord Trauma
Hit-Run	Broken Bones, Brain Injuries
Hit-Run	Brain Injuries

VII. CONCLUSION

Road safety is a vital element of our lives, thus it is crucial to continuously improve within all conceivable and available possibilities and resources. Descriptive or predictive mining conducted on historical data about actual accidents combined with additional pertinent facts like weather or road conditions presents an interesting alternative with possibly beneficial and helpful outcomes for all concerned parties. These factors encouraged the construction of this work to examine accessible data samples describing road accidents in the UK representing a very big amount information which needed the use of relatively novel in-memory data processing in this sector.

VIII. FUTURE ENHANCEMENT

It can be built as an application and can give access to people to update the accidents on the live location. After updating the accident information the nearby hospital and traffic police station will get a notification that an accident has happened and can take the precaution to avoid that type of collision in the foreseeable future.

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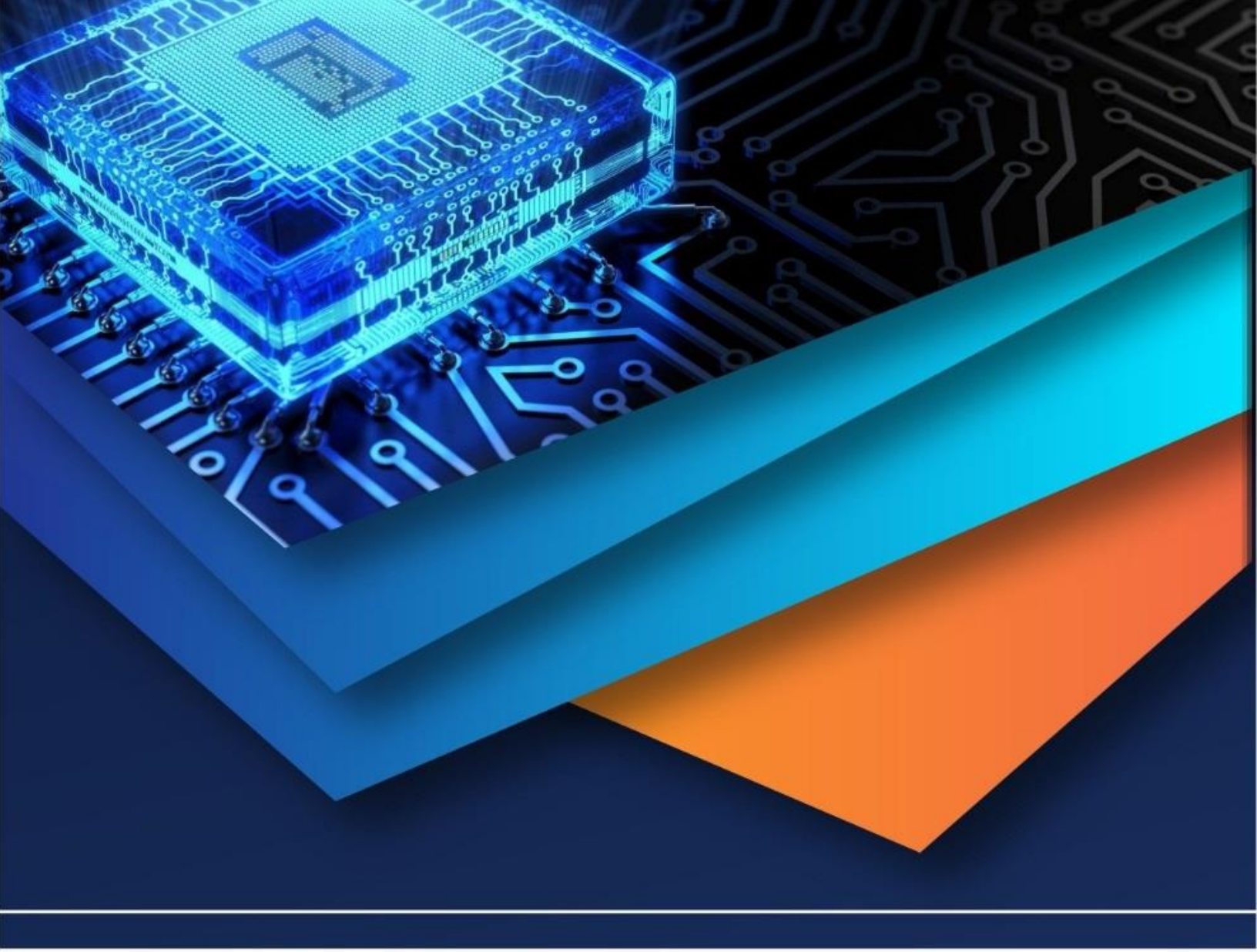

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