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Health Monitoring System Using Machine Learning Techniques Algorithm

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Abstract: ***One of the most crucial aspects of someone's capacity to progress in life is their physical and mental well-being. Given the resources and requirements of society, the health-care system seeks to improve the populace as effectively as feasible. Due to a lack of timely medical equipment and treatments, death rates are growing in most nations. These health concerns can be prevented by offering standard healthcare services. The Flask framework was used to create the web application that houses our health monitoring system.***
In this Health Monitoring System, we employed Decision Tree Classification (Supervised Machine Learning method) to precisely anticipate outcomes.
We used our own dataset to train and test our model. We could anticipate the patient's health level and area of risk based on that evaluation.
Keywords: Health Monitoring System, Decision tree algorithm, Flask, Risk level. etc.

I. INTRODUCTION

Proper health monitoring is the main problem of today. Patients experience severe health issues as a result of inadequate health monitoring systems. Today, a patient's health can be tracked online by a wide variety of gadgets. These tools are being fully utilised by medical practitioners to keep track of their patients' health. With the emergence of hundreds of new healthcare technology startups, machine learning is transforming the healthcare sector. In this study, we will develop a health monitoring system that keeps track of the patient's BMI, age, gender, body temperature, blood pressure, pulse rate, alcohol use, and smoking habits. This approach can assist people in managing a healthy lifestyle by providing early risk projections and suitable personalised advice. We propose to (a) identify health risk factors, (b) conduct data collection from controlled trials, (c) perform data analyses, and (d) perform a predictive analysis with machine learning algorithms for future health risk predictions and behavioural interventions in order to develop a system that is intelligent, automated, personalised, contextual, and behavioural recommendations to achieve personal wellness goals. This system employs the decision tree classification method, which contributes to high accuracy and reliable patient health risk level prediction.

The main issue today is proper health monitoring. Patients experience major health-related problems as a result of inadequate health monitoring systems. There are numerous tools available today for online patient health monitoring. Health professionals are fully utilising these tools to monitor the wellbeing of their patients. Machine learning is transforming the healthcare sector with the emergence of hundreds of new healthcare technology firms. We'll create a health monitoring system in this article that keeps track of the patient's BMI, age, gender, body temperature, blood pressure, pulse rate, if they drink alcohol, and whether they smoke. With accurate customised suggestions and early risk projections, this system can help people manage a healthy lifestyle.

II. LITERATURE REVIEW

1) *Kartikee Uplenchwar et al* a Raspberry Pi and Arduino-based IOT-based health monitoring system was developed. The transmitting part, the processing unit, and the receiving section make up the major three stages of this system. The biological sensors that make up the transmitting end are primarily employed to detect the bio potential signals coming from the patient's body [5]. By using wearable sensors, a set of five parameters—electrocardiogram (ECG), pulse rate, weight, temperature, and position detection—have been discovered. These sensors are linked to a Raspberry Pi and an Arduino. When the Raspberry Pi is online, it functions as a server and transmits data to a certain URL. On any mobile device, including connected computers and smartphones, the crucial parameters can be seen and monitored under same network. But this system has no live monitoring and data storing facility.

2) *Stephanie B. Baker et al* Internet of Things for Smart Healthcare: Technologies, Challenges, and Opportunities was the topic of a paper that was presented. The systems aimed at a particular condition could also use the specialised sensors, such as blood-glucose, fall detection, and joint angle sensors. Data is sent to the central node from sensor nodes attached to it. It processes the data that aids in the execution of some decisions before sending the data to a remote place. Machine learning algorithms have the ability to spot previously undetected trends in medical data, propose diagnosis and treatment plans, and provide advice to medical practitioners about specific patients. As a result, cloud storage systems ought to be created in a way that makes machine learning on large data sets possible [6].
3) *Kirankumar et al* used the Raspberry Pi 2 to construct a low-cost web-based human health monitoring system. This includes the patient's vital signs, including their body temperature, heart rate, and blood pressure. It also includes an alcohol sensor to check whether the patient has consumed alcohol, an ECG sensor, a sound sensor, an EMG sensor to check their level of stress, and a camera to record their live streaming video [7].The Raspberry Pi 2 microcontroller assists in gathering all these parameters, which are then displayed on a computer's Putty SSL Client. The Raspberry Pi's Wi-Fi module links the module to the internet by utilising the local Wi-Fi network. This makes it possible to keep track of a patient or a baby online thanks to a specially created webpage for it. The limitation of the system is that Cloud cannot identify specific doctor for consultation from the sensor data.

III. EXISTING SYSTEM

1) In the conventional system, the patient must receive a specific treatment in order to be cured; otherwise, his condition may worsen and he may even pass away. Unfortunately, the present monitoring systems frequently produce erroneous reports.
2) In actuality, the monitoring system may sound an alarm even when there is no genuine severe condition. However, in other instances, they are brought on by incorrect parameter or monitoring device settings.
3) In addition, the monitoring systems do not take into account how the observed parameters relate to one another. Each parameter is measured independently, which may produce inaccurate results. Therefore, fraudulent reports pose a serious risk to the patient's life.
4) They fail to report patients' actual conditions, which can complicate monitoring task more complicate. Furthermore, the working condition of the medical staff become more difficult and make patients under more pressure.

IV. PROPOSED SYSTEM

The main issue today is proper health monitoring. Patients experience major health-related problems as a result of inadequate health monitoring systems. There are numerous tools available today for online patient health monitoring. Health professionals are fully utilising these tools to monitor the wellbeing of their patients. Machine learning is transforming the healthcare sector with the emergence of hundreds of new healthcare technology firms. We'll create a health monitoring system in this article that keeps track of the patient's BMI, age, gender, body temperature, blood pressure, pulse rate, if they drink alcohol, and whether they smoke. With accurate customised suggestions and early risk projections, this system can help people manage a healthy lifestyle.

We propose to (a) identify health risk factors, (b) conduct data collection from controlled trials, (c) perform data analyses, and (d) perform a predictive analysis with machine learning algorithms for future health risk predictions and behavioural interventions in order to develop a system that is intelligent, automated, personalised, contextual, and behavioural recommendations to achieve personal wellness goals. This system employs the decision tree classification method, which contributes to high accuracy and reliable patient health risk level prediction.

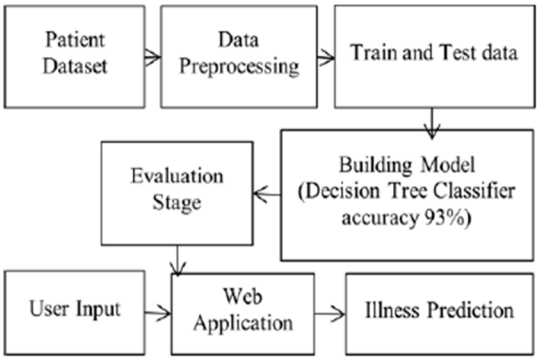

Fig. 1. Health Monitoring System

V. PROJECT LIFE CYCLE

A traditional model used in the system development life cycle to design a system with a linear and sequential approach is the waterfall model. Because the model progresses methodically from one phase to the next in a downward direction, it is known as a waterfall model. The waterfall methodology does not outline how to address requirement changes by going back to a prior phase. The waterfall method was first applied to the development of software.

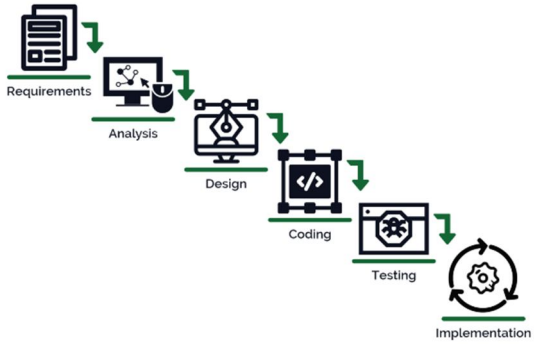

Fig.2. Project Life Cycle

VI. PROJECT METHODOLOGY

A. Model Evaluation

With the aid of the classification accuracy metric, the model is assessed following the prediction procedure. The accuracy metric measures the proportion of our model's predictions to all of the forecasts. When the dataset is evaluated and the results are forecasted, it appears that the optimal solution has an accuracy score of 93%.

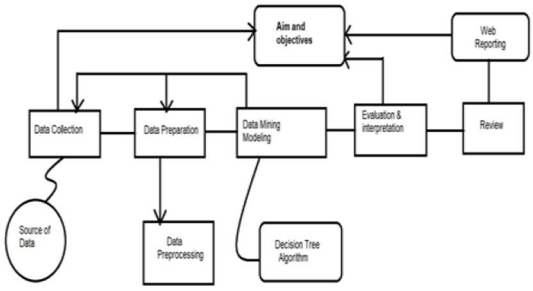

Fig.3. Flow Chart for Proposed System

We have developed a web application using the Flask framework that allows anyone to submit their health information as parameters and obtain their level of health risk on a scale of 0, 1, and 2.

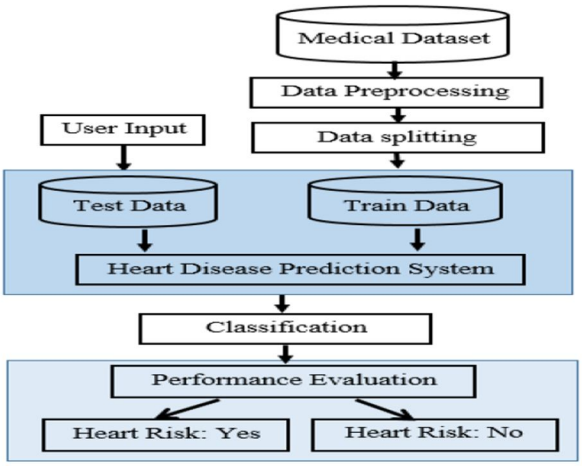

Fig.4. Heart Disease Prediction

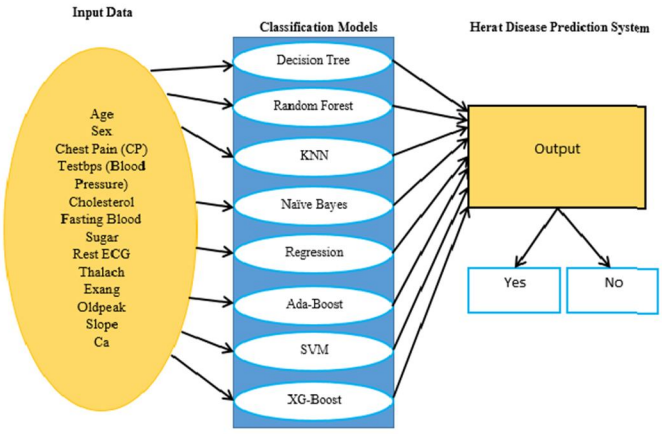

Fig.5. Manual checkup systems to detect heart disease.

Using a manual diagnosis approach, every patient can learn their heart status. From the very first to the very last step, the patient may view the state of his heart. In order to check their cardiac condition, patients must input their data into the system. The system's trained classification models are prepared to display results based on the supplied data. The technology will tell if one's heart is sick or not, and it also knows how accurate its results are.

B. Web Based Application

The accuracy of the eight methods used for the provided data. Despite the fact that all approaches will produce the same outcomes, accuracy will vary. The suggested approach offers a web-based checking system for patients who can access it from home.

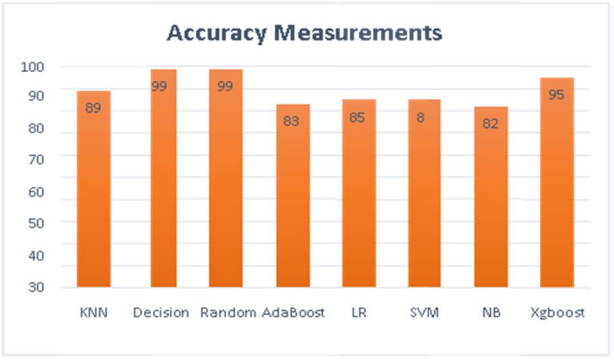

Fig.6. Accuracy Measurement on web based system

The heart disease prediction system's data flow diagram is shown in the section below Fig. 7. The user needs sign in to the system in order to use it conveniently.

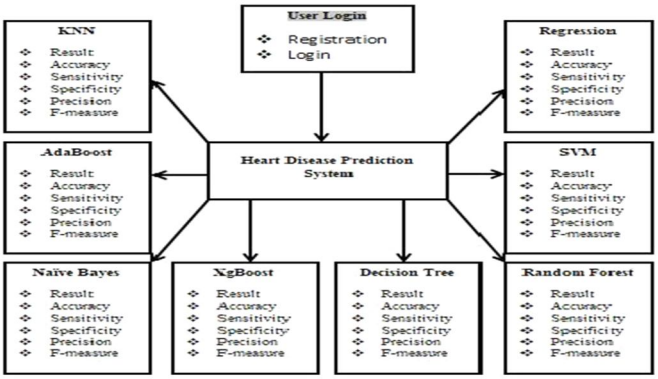

Fig.7. Data Flow diagram of Heart Disease Prediction System

VII. RESULTS AND DISCUSSION

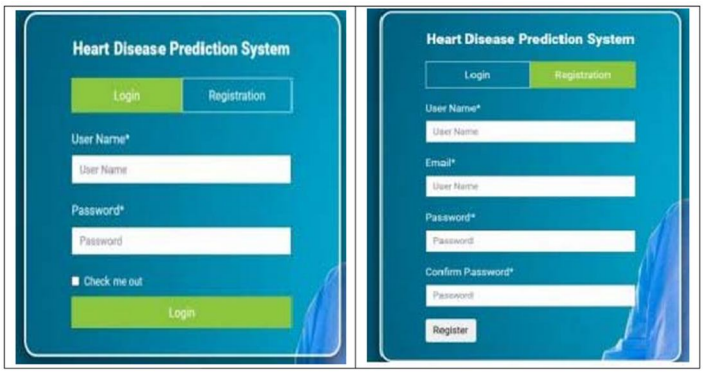

Fig.8. User registration and login form.

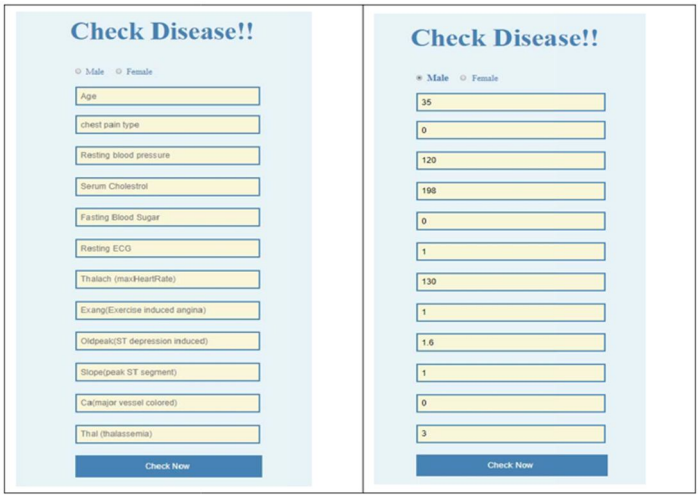

Fig.9. Attributes of HDPS.

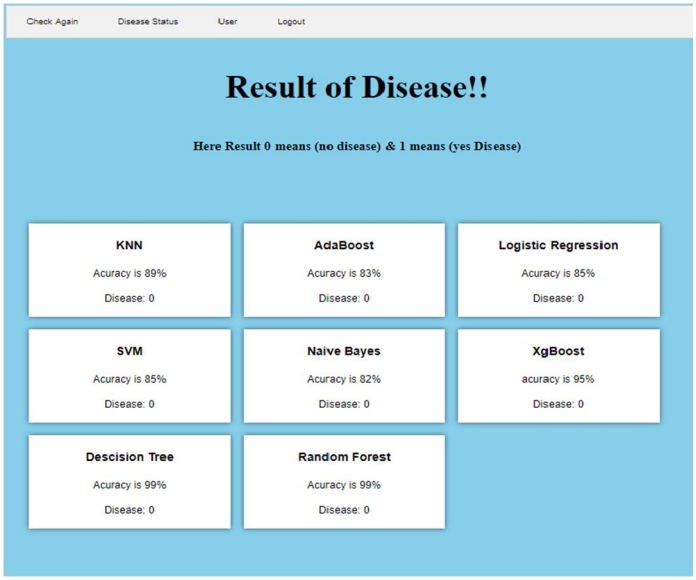

Fig.10. Results and accuracy of HDPS.

The literature evaluation of heart disease prediction systems and overviews of current approaches are shown in the research article, which allows us to refine our method. In our method, we analysed various machine learning classification methods to manually and on the web platform predict the heart illness of each patient using the heart patients dataset from Alim et al. (2020).
The investigation reveals that Decision Tree and Random Forest approaches are 99% more accurate than other algorithms. Between these approaches, Decision Tree (0.0121) has a less classification error than Random Forest (0.0146). The goal of this research's further expansion is to use more advanced machine learning approaches to diagnose heart problems with 100% accuracy. By creating an Android app, research will be expanded upon for bettering user accessibility.

VIII. ADVANTAGES

1) Applications of health monitoring using machine learning include early identification of cardiovascular diseases and cardiac disorders, as well as Clinical Decision Support System (CDSS) that can help doctors, nurses, patients, and other carers in making better decisions.
2) The system can also be used by regular individuals to identify whether they have a major health issue and to seek care by getting in touch with neighbouring hospitals.
3) Hundreds of new healthcare technology businesses are transforming the healthcare sector as a result of machine learning..

IX. DIS-ADVANTAGES

1) System is complicated.
2) System is Costly

X. APPLICATION

Applications of health monitoring utilising machine learning include early identification of cardiovascular diseases and chronic diseases, as well as Clinical Decision Support System (CDSS) that can help doctors, nurses, patients, and other carers in making better decisions. By contacting neighbouring hospitals, regular people can use this system to find out if they are suffering from a significant health issue and get care. With hundreds of new healthcare technology startups, machine learning is changing how the healthcare sector operates.

XI. CONCLUSIONS

Instead of seeking treatment after a diagnosis, this research offers a way to prevent the condition through early intervention. With the help of the suggested system, healthcare workers can make better decisions, spot trends and innovations, and increase the effectiveness of research and clinical trials. It is also feasible to anticipate diseases more accurately. It enhances the way healthcare services are delivered, reduces costs, and carefully manages patient data.

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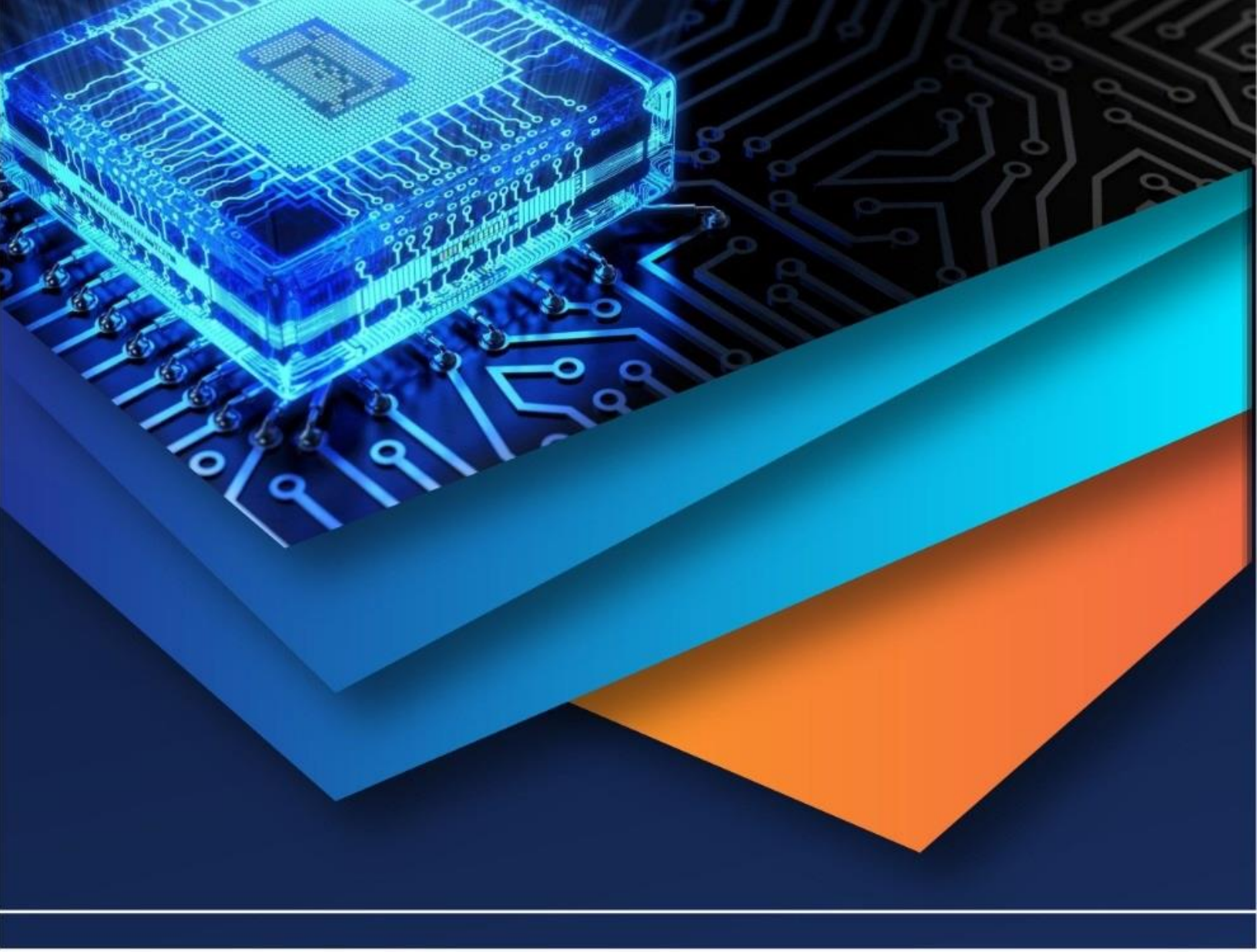

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