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Data Analytics: A Catalyst for Innovation and Decision-Making across Industries

Sauparnak Banerjee[1], Pralay Dhar[2], Anirban Bhar[3], Shambhu Nath Saha[4]
[1, 2]*B.Tech Student, Department of Information Technology, Narula Institute of Technology, Kolkata, India*
[3]*Assistant Professor, Department of Information Technology, Narula Institute of Technology, Kolkata, India*
[4]*Assistant Professor, Department of Information Technology, Narula Institute of Technology, Kolkata, India*

Abstract: ***Data analytics has developed as an essential tool in the modern era of digital technology, where it plays a crucial role in driving innovation and allowing informed decision-making across a variety of different industries. This research study investigates the enormous impact that data analytics has had on companies and organizations, shedding light on its function as a driving force behind innovation and decision-making. This article investigates how data analytics techniques and technologies enable enterprises to extract important insights from huge datasets, hence stimulating innovation and optimizing decision-making processes. This is accomplished through an exhaustive study of current literature, case studies, and real-world examples. Ultimately, the focus of the research is on how these techniques and technologies empower industries. Businesses have the opportunity to gain a competitive advantage, improve their operational efficiency, and more effectively adapt to the ever-changing demands of the market when they make use of sophisticated data analytics technologies.***
Keywords: Data analytics, Decision-making, Impact-simulation, Optimization, Operational efficiency.

I. INTRODUCTION

Analysing, cleansing, and modelling data for insights, conclusions, and decision-making support is what we call "data analytics." It is essential in many disciplines, including as commerce, medicine, finance, marketing, and even science. Several important points illuminate the evolution and significance of data analytics:

The amount of data created globally has increased dramatically since the introduction of digital technologies. Both database-style structured data and social media/sensor-style unstructured data are included here. Organizations can make sense of this mountain of data with the help of data analytics.

Businesses can learn more about their customers' habits, market tendencies, and internal operations with the use of data analytics. Business tactics can be optimized, customer happiness can be raised, and profits can be increased by researching client preferences and purchasing habits.

Data analytics helps firms to make data-driven decisions. Opportunities, hazards, and effective tactics can all be found through the use of advanced analytics tools, which can be utilized by enterprises. It gives you an edge over the competition by helping you make smart choices quickly.

Predictive modelling is one of the most important developments in data analytics. Companies can foresee future trends and results by poring over data from the past. This skill has several applications outside of finance, including risk assessment in the medical field, illness prediction in public health, and demand forecasting in the online retail sector.

Analytics performed on healthcare data aid in patient diagnosis, therapy improvement, and new drug development. It is used in the scientific community to help with things like data analysis, simulations, and drawing conclusions from experiments. Evidence-based decisions made with the help of data analytics speed up development in various areas.

When it comes to solving societal problems and shaping public policy, data analytics is indispensable. It can be used for disaster preparedness, public transportation improvement, illness monitoring, and demographic analysis. Governments and organizations can increase people's standard of living by making better use of data.

There are several reasons why it's crucial to study data analytics; doing so helps us better understand, apply, and develop the area. Learning data analytics is important for the following reasons:

Using data analytics, scientists and experts may mine massive datasets for hidden patterns and insights. Students who major in data analytics learn how to use statistical methods to discover hidden insights in data that lead to better business decisions.

Data analytics is used by businesses and other organizations to make informed decisions. Data analytics education prepares students to evaluate data and deliver insights to aid in strategic decision-making. Decisions based on data tend to boost productivity, cut costs, and boost results.

Predictive modelling, in which past data is utilized to foretell future events, is made possible by data analytics. Professionals can learn to create predictive models by studying data analytics, allowing them to foresee trends, customer behaviour, and market demands. This forethought is crucial when trying to allocate resources and set priorities.

The ability to analyse data effectively is crucial to the success of any business. Businesses can enhance their operations by examining operational data to find bottlenecks, inefficiencies, and other problem areas. Productivity rises, waste is cut down, and processes are simplified thanks to this optimization.

Companies who understand how to use data analytics to their advantage have a leg up on the competition in the modern business world. Learning data analytics helps business professionals better understand and respond to shifts in consumer tastes, supplier practices, and industry dynamics. To stay ahead in the market and adjust to shifting conditions, this information is essential.

Customers' wants and preferences can be better understood with the help of data analytics. Learning data analytics equips people to create new goods and services in response to consumer needs. Putting the consumer first improves product design and guarantees that services are tailored to the requirements of the market.

Analysing experimental data, running simulations, and drawing conclusions all rely heavily on the use of data analytics in the research and scientific communities. Research in several fields has benefited greatly from the application of statistical approaches and machine learning algorithms to data collected through the study of data analytics.

The ability to analyse data effectively is a valuable tool in today's complex world. Learning data analytics equips professionals to take on difficult problems in sectors as varied as medicine, economics, ecology, and sociology. To find problems' origins, investigate possible answers, and provide suggestions supported by evidence, data analysis is vital.

The ethical concerns of data analytics are becoming increasingly important as the field grows in importance. Data analytics courses typically cover topics like data privacy, security, and ethics. Experts in this sector have a duty to safeguard the confidentiality of their clients' information and to act ethically at all times.

In conclusion, the study of data analytics serves a wide range of purposes, from advancing scientific research and tackling difficult societal problems to enabling organizations to make informed decisions and acquire a competitive edge. Learning data analytics is becoming more and more relevant in many fields as we move toward a data-driven society.

II. LITERATURE REVIEW

The first documented use of the term "Big Data" was in a 1998 presentation deck for Silicon Graphics (SGI) titled "Big Data as well as the Next Wave of InfraStress" by John Mashey. The first book to describe 'Big Data' published in 1998, and it was a data mining publication written by [3]; this shows that mining these datasets has always been important. However, in 2000, a study by [2] was the first scholarly work to include the term "Big Data" in its title. The genesis of the term 'Big Data' is due to the truth that we are creating a large amount of data every day. Outstanding statistics about internet use were presented by [1] in his keynote address at the KDD BigMine' 12Workshop. These included the following: Google processes over 1 billion queries per day, Twitter sends over 250 million tweets per day, Facebook sends over 800 million updates per day, and YouTube receives over 4 billion views per day. The amount of data being produced today is enormous—on the order of zettabytes—and growing at a rate of roughly 40% each year. Big companies like Google, Apple, Facebook, Yahoo, and Twitter are starting to pay close attention to the data being generated by mobile devices in an effort to identify actionable trends that will improve the user experience.

The term "Operational Data Analytics" (ODA) refers to a group of different analysis methods. They are all meant to continuously collect, store, and analyse near real-time performance monitoring data, making it available for instant use in a number of operational contexts. On the fly, it can be used to improve KPIs like Power Usage Effectiveness (PUE) and make system tasks run more smoothly [4]. The output of ODA models can either be shown to system administrators and users to help them with daily tasks [5–10] or it can be turned into new settings for system knobs, giving them power over the system being monitored [11,12]. - but a study on HPC ODA [11] showed that most HPC centres only use ODA for visualization tasks, as control tasks are usually too complicated for them to be done. Most HPC ODA methods use standard data mining and statistics [12,13], but machine learning is becoming more popular [14,15].

HPC ODA can be used at different levels of operation based on the needs of each place. At the data centre level, ODA can help figure out what's wrong and make sure that infrastructure and building-wide systems work better, like those for communication, power transfer, and cooling [16,17,18].

At the HPC system level, on the other hand, ODA can be used to boost quality of service, resource utilization, and energy efficiency. One way this is done is by using complex schedulers to place user jobs, which usually use extra system information like energy budgets, thermal limits, or I/O features to work within certain limits [19–22]. Also, ODA can make long-term energy efficiency and reliability better at the compute node level. This can be done by using runtime systems that can tune system knobs (like CPU frequency) dynamically based on hardware and application behaviour [23,24,25] or by using models to find strange behaviour and stop catastrophic failures [14,26,27]. Last but not least, some frameworks allow applications to be optimized by automatically fine-tuning important parameters [28, 29].

You can add more advanced prediction methods to HPC systems and compute node-oriented ODA techniques. For example, using heuristics or learning techniques to guess how long user jobs will take and how they will be submitted can help with scheduling [30–32]. Predicting the computational profile of jobs (for example, how much energy they use or how much network traffic they make) and comparing this to past data can also make scheduling, runtime, and problem detection systems work better [33–36].

III.DATA ANALYTICS AND INNOVATION

In the digital age, data analytics has become a strong driver of innovation that has changed how companies work, make decisions, and create value. By using the huge amounts of data that are available, businesses can gain deep insights that can lead to new ideas, better efficiency, and a competitive edge. The combination of data analytics and new ideas is changing industries, accelerating progress, and encouraging a mindset of always getting better.

Data analytics gives businesses useful information from a variety of sources. Making smart choices is what drives innovation; it helps companies spot market trends, customer tastes, and new business possibilities. Companies can direct their efforts to innovate in the right way by making choices based on facts and data.

A type of data analytics called predictive analytics helps businesses guess what trends and actions people will have in the future. Businesses can come up with new products and services to meet future needs if they know what might happen. This kind of insight is very helpful for making new products, predicting demand, and making long-term plans.

Businesses can make personalized goods and services by looking at customer behaviour and preferences with the help of data analytics. Customizing products and services to meet the specific wants of each customer makes them happier and more loyal to the brand. Personalization based on data is a big part of what drives innovation in businesses that focus on the customer.

Data analytics helps businesses improve their internal processes, which cuts down on waste and costs. Finding bottlenecks and streamlining workflows makes it possible to come up with new ways to create processes. This makes sure that operations are flexible, scalable, and able to adapt to change.

Data analytics gives us information about how well goods and services work that are already out there. Businesses can improve their products by adding new features, making them better, or making completely new goods that meet the needs of the market by looking at customer feedback and market response.

By looking at experimental data, simulating situations, and finding patterns, data analytics speeds up innovation in research and development. Analysis of large amounts of data is often what leads to scientific breakthroughs. This can happen in health, technology, and other scientific fields. As data analytics spreads, it is more important than ever to keep private and sensitive data safe. To keep the public's trust and follow the rules, organizations must put in place strong data security measures and follow ethical guidelines. For analysis to make sense, the facts must be correct and reliable. Bad data can make it hard to come up with new ideas and lead to wrong assumptions. To make sure the integrity of their datasets, organizations need to spend money on data quality assurance methods. There is a talent gap in the business because of the need for skilled data scientists and analysts. Companies need to spend money on education and training programs to make sure their employees know how to use data analytics tools and methods.

Data analytics is a key part of innovation because it helps businesses turn raw data into insights that they can use and new ways to solve problems. Businesses can improve their goods, make processes run more smoothly, and give customers the best experiences possible by using data to help them make decisions. As technology keeps getting better, the way that data analytics and new ideas work together will drive even more progress, creating a dynamic and ever-changing environment for businesses all over the world.

IV. DATA ANALYTICS AND DECISION-MAKING

Data analytics has become an important part of making decisions, changing how people and businesses make decisions and plan their strategies. In a time when there is a lot of data, using the power of data analytics helps people make better decisions based on facts. This piece talks about the big changes that data analytics has made to the way decisions are made, including its importance, benefits, and problems.

A. *What Data Analytics Can Do to Help You Make Choices*

Data analytics uses huge and varied records to give people who make decisions a lot of useful information. These new ideas help us see things more clearly, both in the past and now, so we can make better decisions about the future.

A type of data analytics called predictive analytics helps businesses guess what will happen and what trends will happen in the future. Decision-makers can predict possible outcomes by looking at past data. This reduces doubt and lets them plan ahead.

Data analytics helps people solve problems by finding trends, correlations, and links between data points. It helps figure out what the problems are, what their causes are, and how to solve them using facts instead of gut feelings.

Data analytics makes it possible to test and measure goods, services, and business plans. Based on performance data, decision-makers can see how well their plans are working, change their plans in real time, and keep getting better.

By using data analytics to find places with high return on investment, businesses can better decide where to put their resources. This method makes sure that money goes to the projects that are most likely to produce good results.

B. *Pros of using Data Analytics to make Decisions*

Data analytics cuts down on human mistake and bias, giving you accurate and trustworthy information. People who make decisions can rely on suggestions that are based on facts to help them make better decisions.

Data analytics can give you information in real time with the help of new tools and technologies. This flexibility lets businesses act quickly when conditions change or new opportunities arise.

Making choices based on good information lowers operational costs and waste of resources. Companies that use data analytics get an edge over their competitors because it helps them simplify processes and make smart use of their resources. They can follow market trends, do better than competitors, and better meet customer wants if they make decisions based on data.

V. THE ROLE OF DATA ANALYTICS IN THE FINANCIAL SECTOR

Data analytics are used in the banking industry to make informed decisions, minimize risks, as well as discovering new chances. Data analytics is used by financial firms to:

1) *Assess Risk:* Data analytics could be used for reviewing insurance underwriting risk, credit risk in securities portfolio and also borrower's risk when lending. Financial entities use information from different sources like market data, financial statements, and credit reports in creating risk models. Such models are useful for financial institutions to ensure they make appropriate decisions regarding loan issuance to individuals, investments, and insurance.
2) *Detect Fraud:* Data analytics can help uncover fraud and other financial crimes. Financial institutions use data analytics to help detect trends and abnormalities in consumers' transactions, account activity, and related data. This could help them identify possible instances of frauds.
3) *Enhance Customer Service:* Data analytics can also improve customer service by understanding what the requirements and needs of the customers are. With data analytics, financial institutions segment their consumers identify their needs and offer tailored commodities and services to them. Data analytics can also be used to improve customer relatedness by identifying and dealing with consumers' pain points.
4) *Improve your Investing Decisions:* Through identifying the cheap stocks and predicting of the market behaviour, data analytics assist you in making right decision on investment. The application of data analytics in the development of investment model using market sentiments, companies financials, and economic statistics by financial institution. These models enable financial providers identify possible areas to invest and also allow for better informed investment decision making.

The following are some particular instances of data analytics' application in the banking industry:

a) Data analytics provides information for banks on which they base their evaluation of a loan applicants' credit worthiness. This reduces the default risk of banks and enhances their profits.
b) Some investment companies use data analytics for finding undervalued securities. This also leads to high returns for investment firms' clients.
c) Hedge funds use data analytics to forecast market shift. As a consequence, this supports the cost-effective decision-making process of hedge funds.
d) Insurance companies use data analytics to ascertain whether to insure or not based on their underlying risks. This leads to increases in the profitability while cutting down on the losses for insurance companies.

e) Payment processors use data analytics to detect financial crimes like fraud. In this manner, it cuts down on losses for these institutions and shields them in order to protect their customers.

In conclusion, data analytics are quite useful for the banking sector, where they help in making the right decisions, mitigating risks and opening up opportunities. Financial institutions are increasingly using data analytics to improve profitability and gain an advantage over competition.

A. *For Instance*

Through data analytics, a bank may build a model predicting whether a borrower will likely default. By employing such a model, the bank may be able to make more effective choices regarding whom to lend and at what rate of interest.

VI. DATA ANALYTICS IN THE EDUCATION SECTOR

Data analytics are used extensively in the education sector to enhance student learning outcomes, better allocate resources, and make effective decisions. Data analytics is used by educational institutions too.

A. *Determine which Students are at Risk of Falling Behind*

Through data analytics, they may be able to ascertain if particular students are experiencing academic challenges using grades on exams, assignments, and different forms of assessment. Identifying such pupils will enable teachers to offer them additional support and resources to aid them in attaining, after which point.

The following are some particular instances of data analytics' application in the education sector:

Schools use data analytics in order to discover who among the children have higher chances of dropping out. This facilitates the provision of additional help and support to the children so that they are able to complete their education.

Data analytics assist instructors track their students' performance and identify points where the students need additional assistance. It also provides assistance to teachers so as to enable them to teach well with students' needs at hand.

Administrators use data analytics as one of the tools for deciding on curriculum, staffing, and school budget issues. Administrators are able to utilize resources effectively, while at the same time maintaining uniform standards of instruction for all students.

Data analytic scholars scrutinize trends in learning process to discover best ways of teaching. It also extends our understanding about education, which helps in the design of new programmes and teaching materials.

Therefore, data analytics is a useful tool that could be used to improve student learning outcomes, resource allocation, and decision making in the world of education. The role of data analytics in improving profitability as well as gaining an edge for education institutions has become increasingly prominent over time.

B. *For Instance*

Data analytics can help a school to locate children who struggle with math. Then, the school may help out these students with additional arithmetic classes or move them to another class where they would have better support in math.

VII. SPORTS DATA ANALYTICS APPLICATIONS

Insights from IPLs and ISLs for efficiency, informed decision making as well as getting an upper hand, IPLs and ISLs deploy heavy usage of data analytics greatly. The teams, coaches, and players use data analyses in.

1) *Talent Identification and Recruitment:* Using data analytics, teams search and recruit talented players across the world. These organizations use various sources of information that include video footage, scouting reviews, and statistics to choose players who can excel in IPL and ISL.
2) *Create Training Schedules:* Data analytics help coaches make individualized schedules for players. In order to formulate appropriate training programs geared towards the weaknesses and strengths of individual players, they keep records on player-performance data such as ability/skill progression, injury records, and physical conditioning level.
3) *Make Tactical Decisions:* Through data analytics, players and coaches provide game tactics through it during games. They use real-time data on player stations, ball movements, and shootings in order to position their players well, to decide how and where to attack and how to defend themselves.
4) *Analyse Player Performance:* Coaches and analysts use data analytics to assess their players' performances. They use indicators such as batting averages or bowling averages to identify zones that require improvement of players' performance. They also use data analytic methods to establish if players should continue on the pitch and how they are performing in order to ascertain whether their performance is worthy of consideration.

The following are some particular instances of data analytics' application in the IPL and ISL:

a) IPL teams use data analysis to find out which bowlers are likely to achieve success against a specific set of batsmen. This makes captains pick good bowlers for bat to be eliminated and also to construct the good bowling.

b) Indian Super League teams use data to track how the ball moves across the pitch, indicating goal scoring areas. This information could be used by coaches to develop offence-defence scenarios.

c) Data analytics are employed by gamers in order to identify personal strengths and weaknesses. convert written to human For example, a batter can analyse their battling average against diverse bowlers or strike rates.

d) Coaches then use data analytics during games to make tactical adjustments and substitutions. For example, using data analytics, a coach can identify a player who is tired and struggling with one particular opponent. The coach can then substitute another player for that player, or change the team' s strategy.

e) Considering all this, data analytics is an effective tool that is very common for the IPL and ISL. It helps teams, coaches, and players achieve higher productivity, improve decision-making, and obtain an advantage over competitors.

A. For Instance

Mumbai Indians can use the data analytics to identify a batsman who could be vulnerable to leg spin. Then, the Mumbai Indians would instruct their captain to deliver more leg spin to that batsman for removing purpose.

B. One More Instance

Using some data analysis Bengaluru may find an area in the pitch for opponent's goal from the free kicks as one may see. Then, goalie of Bengaluru FC could be instructed to place himself exactly at this particular part of the field during the free kicks.

VIII. EXAMPLES OF THE APPLICATION OF DATA ANALYTICS IN HEALTHCARE: DIABETES AND CANCER TREATMENT

I Big data analytics are highly applicable in healthcare and can make better decisions, reduce costs, and improve quality of services among other benefits. Data analytics is used by healthcare practitioners to:

1) *Identify and Diagnose Diseases:* Data analytics could be applied to look at data from clinical trials, patient records, and other resources for disease identification or diagnosis. For example, data analytics could generate an algorithm that identifies individuals prone to certain diseases such as diabetes or cancer.

2) *Create Individualized Treatment Plans:* Using data analytics, one can consider each patient's distinguishing characteristics and their previous health history before preparing an individual treatment plan for them. The analysis of patient's tumour type, stage, and others using data analytics may be possible to develop the best cancer treatment approach.

3) *Enhance Patient Outcomes:* Data analytics offers a mechanism for tracking patient progress and identifying areas of improvement in care delivery that should ultimately lead to improved patient outcomes. For example, data analytics can be used to identify those people who are likely to develop complications of their diabetes and create therapies that will prevent those complications.

4) *Cut Costs:* Data analytics can also help identify locations of wastages and/or inefficiencies for purposes of cost-cutting. For example, data analytics could identify individuals overusing the health care services and develop strategies to reduce the volume.

Here are some particular instances of how diabetes and cancer treatment use data analytics:

Cancer treatment: Cancer treatments and therapies have greatly benefited from data analytics in terms of developing and refining existing ones. For example, data analytics can identify genes which initiate some types of cancer, and create individual approaches in treatment.

Data analytics is additionally used to generate customised treatment regimens for cancer patients based on different tumour characteristics of every patient.

Diabetes: Diabetes can also be managed effectively with the use of data analytics to avoid its related complications. As an example, data analytics can be used to develop algorithms that predict if a patient at risk of having a hypoglycemics incident. Data analytics is also used in generating personalized treatment plans for diabetic patients with regard to their individual blood sugar readings, other medical problems as well as their lifestyles.

However, data analytics can be said to be one of the important tools in medicine which helps improve patients' care, reduce costs, and make better decisions. Healthcare providers are using data analytics more frequently as it helps them to comprehend patient data and make informed decisions regarding patient care.

A. *For Instance*

A cancer centre can use data analytics to identify which patients are most susceptible to developing metastatic breast cancer. The cancer center may then offer these patients more intense forms of screening and treatments aimed at increasing their chances for survivability.

For example, data analysis using statistical methods like logistic regression can help predict people at risk of getting diabetic retinopathy which can cause blindness (i.e., diabetologist). Therefore, such patients with diabetes clinic can go to an ophthalmologist for more frequent eye examinations that may include alternative drugs to prevent vision loss.

IX. CONCLUSION AND FUTURE SCOPE

The following are some of the main ways that data analytics is promoting creativity and informed decision-making in many industries:

1) *Enhanced Operational Effectiveness:* Companies can use data analytics to identify and eliminate their operational wastages. For example, a retailer may use data analytics to find out which products of theirs sell well and which do not. Therefore, the use may help in optimizing the location of products and inventory levels.
2) *Improved decision-making:* Data analytic offers supporting evidences that help firms to make better decisions. For example, a bank may employ data analytics to ascertain whether there is a high risk in lending money to an individual borrower. Such information will thus enable a better decision on whether to grant or deny the loan.
3) *New Product and Service Innovation:* By using data analytics, firms have new prospects for product and service innovation. For example, a software company could use data analytics to find out what aspects of their products customers prefer. This information can then be used in the development of new features and products that will most likely appeal to users.

Data analytics, a powerful technology that can reshape different industries. Through analytics of data, organizations are able to optimize their operational functions, formulate better decisions and design novel products or services in a way that they were not before.

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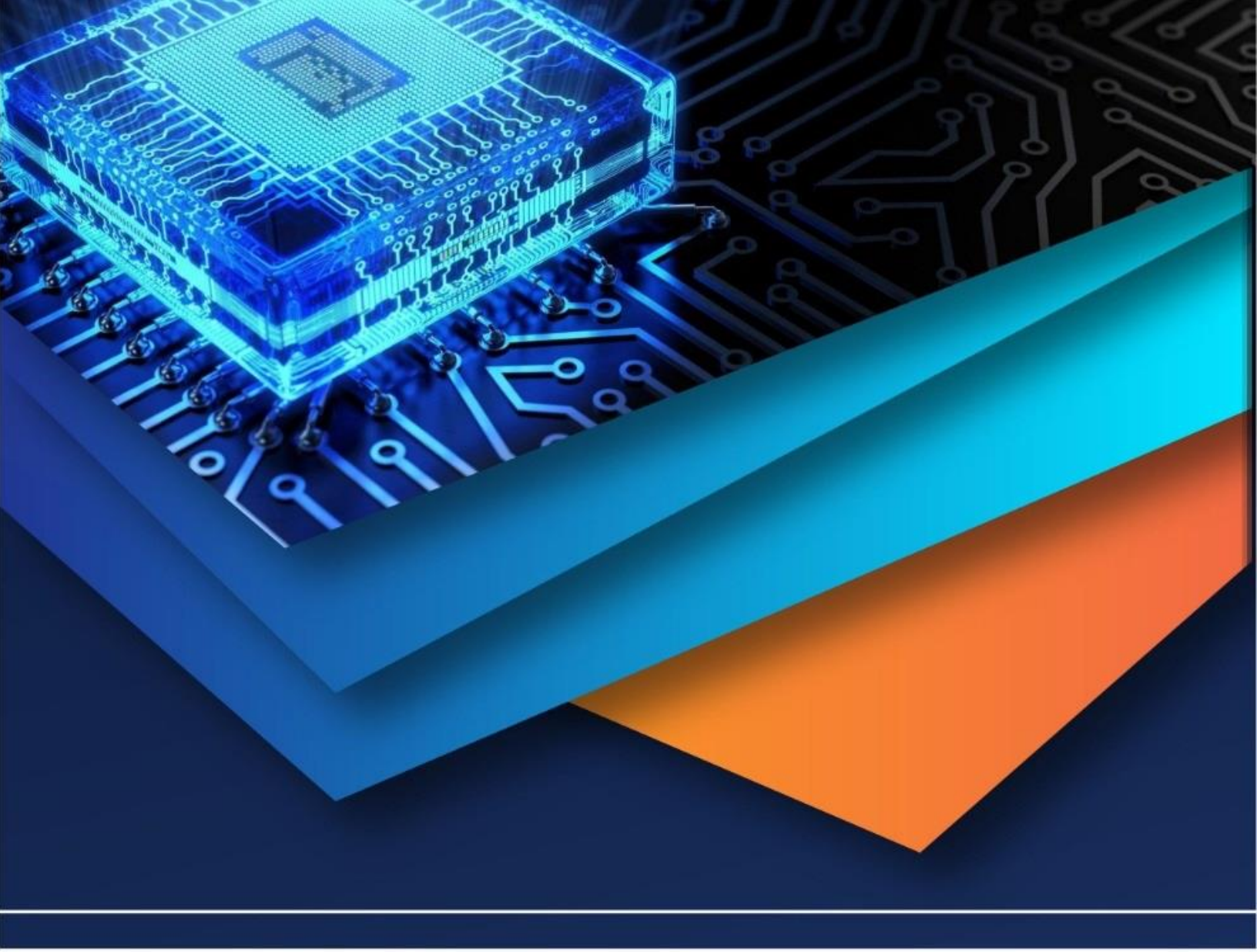

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