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A Comprehensive Study of Data Analytics & its Application in the Banking Sector

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Abstract: ***Data analysis is a process where the data is inspected, cleaned, transformed & modelled with the goal of optimizing and creating a bunch of useful information to gain and develop insights which are relevant to the organization. Data analysis has the potential to gain conclusions which can help to overtake the margin of leadership in the respective field which gives important decisions, the data analysis can be implemented in a variety of real-life applications such as the banking sector. The banks operate with so many users and staff but only a real analyst can unlock the prospects required to gain the necessary profits. We look at how data analysis can help the banking sector to achieve better overall results. This paper provides an insight about how data analytics is successfully deployed in the banking & finance sector.***
Keywords: Big Data, Customer Segmentation, Data Analysis, Risk Management, Fraud Detection, Banking & Finance Sector, Feedback Analysis & Transaction Analysis.

I. INTRODUCTION

Banking industry is one of the highest revenues generating sectors. Every minute, huge and enormous amounts of transactions take place all over the world making it a data intensive industry. The data stored by the banks is complex that eventually falls under big data and has been growing tremendously. Also due to the advancement in technology many customers have opted for the choices of digital banking. The increase in use of tablets, mobile phones and other means of digital banking have made it easy for the customers to perform different activities. The data from these activities can be used to analyse the product performance, customer base and the industry trend. The use of data has enabled us to unlock secrets of money movements and prevent major problems. This helped the banks in understanding the consumer behaviour and has also made the extraction of data much faster and way easier than before. The big data technique has been adopted internationally and has proven to be beneficial in sentiment analysis, product cross selling, regulatory compliances and so on and so forth.

The banking sector has seen a drastic change in the terms of the amount of data which is being generated by the banks. Since the inclusion of technologically advanced ways of banking like net banking, NEFT and RTGS payments, the amount of data has increased henceforth. Data analytics has helped to control the flow of data and resolve the issues related to security to a greater extent. The banks have found an easy way of organizing and analysing the data of many customers who are associated with the bank.

II. BANKING SECTOR

The Indian banking sector has seen huge reforms after the demonetization and digitalization. The process of data analytics has beneficial characteristics like volume, velocity, and variety of data. The new policies and the new technological trends have paved the way for efficient use of data analytics. Analytics could be a part of every major banking system. The banking ranges from customers and risk to finance, workforce, and supply chain. The importance of secure transactions and integrity of the records is at par with analytics when it's not run as a series of mutually independent programs. Today, the challenge is to develop analytic strengths that span across the backbone of the bank & it's organization. Furthermore, banks need to procure both external and internal data from structured and unstructured sources. That's why analytics has taken on renewed importance recently.

III.DATA ANALYTICS

Data Analytics is a field that offers ways to research, systematically extract information from, or otherwise deal with data sets that are wide-ranging and complex to be treated by traditional data-processing application software. Data with many fields offer greater statistical power, while data with higher complexity may cause the next false discovery rate. Data analysis challenges include capturing and storing of data, data analysis, sharing, transfer, visualization, querying, updating, and information privacy. Data analysis was originally related to three key concepts: volume, variety, and velocity. The analysis of huge data presents challenges in sampling, and thus previously with only observations and sampling. In conclusion, big data often comprises data sizes that surpasses the capacity of traditional software to deal within an acceptable time and value. Banking sectors can use advanced analytics

techniques such as text analytics, machine learning, predictive analytics, data mining, statistics and natural language processing to gain new insights from previously untapped data sources independently or together with existing enterprise data. Data analytics is not only an essential asset for a company but also a vital component to obtain a competitive advantage.

A Few sectors where data analytics can make a difference are:

1) *Product Development:* Data analytics enhances both prediction and knowledge discovery capabilities. It provides a better understanding of the current state of the business or process and comes up with a solid foundation to predict future outcomes. Data analytics helps to change the process or trigger a need for new product development that matches the market needs.
2) *Targeted Content:* Being aware of what customers want beforehand makes marketing campaigns more customer oriented. It enables organizations to formulate their advertisements to target specifically a segment of the entire customer base. It also helps them to predict the segment of customer base that will provide a positive response to the campaign. Furthermore, it saves money as well as the cost of convincing the customers to make the right buy or sell call as per his needs and improve the overall efficiency of the market.
3) *Operational Efficiency:* Data analytics assists companies in identifying other possible methods to develop easy and well-organized operations or maximize their profits. It helps to encounter potential problems, eliminating any situation of waiting for them to occur and then taking actions on the same. This enables companies to decide which operations have yielded them the best overall results under various situations and identify which operational areas are vulnerable and need to be improved.

IV. APPLICATION OF DATA ANALYTICS

Some of the applications of data analysis in the banking sector are as follows.

A. *Customer Segmentation*

Customer Segmentation is defined as a process in which the common characteristic of a system allows companies and industries to group effectively & appropriately. The first step towards utilizing most of the bank is to know which audience is more relevant to your organization which helps in catering the demands of the users. In Customer segmentation, the process involves dividing customers into groups. The main need for customer segmentation is the fact that in the current market, it is more important to know about the customer's behavior and what are their preferences. To create effective solutions needed for the marketing sector, the most crucial phase is to understand the and categorize the user's needs and demands and target the audience accordingly. When we look from the perspective of the banking sector, we can target the entry level or the people who have recently started investing as they can look at different options and plans to check which is more suitable to them as compared to the previous customers who already have selected a plan. The audience looks at pricing options and the bank should provide it in the most cost-effective manner.

B. *Spending Pattern Of Customers*

Customer spending patterns are a powerful yet often overlooked dataset which allows the banks to get information on how a particular group of customer likes to spend their money on a particular item. The banks access data of the customer spending from the previous records and formulate their conclusions based on the trends followed by the customers. Through a solid understanding of their spending patterns the banks work upon the various effective banking solutions which benefit the customer to a great extent. The data consisting of the spending patterns of the customer also allows the banks to carry out the process of customer segmentation and in turn let the banks know about the more potential customers.

C. *Risk Management*

In the banking sector, risk management is regarded as the "logical development and execution of a plan to deal with minimal losses. Risk management focuses on the practices of the banking industry which looks at the institution's exposure to losses and protects the value of the assets. Banking overall is a risky business. Risk management starts with identifying and assessing the potential risk that comes up with the banking businesses. This is later followed by the development and execution of an action plan to deal with the consequences and how to manage the losses which have been incurred. further, after reviewing the risks and losses, come up with an effective solution which can make the division take up minimal marginal loss for their academic year. Risk management in banking answers to the questions such as what kind of events can damage the banking business and how much damage can be taken up & what kind of action is the most suitable one to be taken by the institution to manage those risks.

Data Analytics helps in identifying risks that can impact the growth of businesses. Data analytics protects from risks of various forms:

Management of risks associated with third parties: The companies which decide to engage vendors in their business may get compromised in terms of their integrity of their security systems by these vendors. Hence the operational and reputational risks linked to the deployment of the third parties must be managed using data analytics, which will closely monitor their activities that will ease the process of protecting the private data of the company.

Crucial in detecting churn rate for organizations: Losing customers can be reduced by determining the probability of the same to occur. When we monitor the behavior of clients, we come across complaints and feedback which will influence our approach in policy making.

D. Product Cross Selling

Cross selling is a technique or practice of selling a product to an already existing customer. It may prove to be easier for bankers to sell their financial products to already existing customers rather than to the new one's as they are well aware of their clients' needs. But a large chunk of them might only utilize one or two products and hence this might prove to be challenging for the banks to sell a full range of products. Fortunately, banks have an asset in the form of customer data which when evaluated salubriously can generate useful insights on cross selling opportunities. This strategic approach is where data analytics comes into action. Data analysis allows banks to evaluate customer behavior through recent account activities and sometimes even through online activities such as reviews and feedback. So rather than offering one generalized offer, financial institutions can personalize their products to a selected prospect group which could improve a campaign's return on investment.

E. Feedback Analysis

Customer feedback is one of the most important aspects of end user service quality. A feedback allows the developer to know about the flaws which might be present or the improvements which may be required to function the system smoothly. In feedback analysis the input comes from the user regarding the quality of the output provided by the system and whether it is up to the mark or not. Every service manager needs to understand the problems of the customers & the issues that are faced while accessing the service.

F. Fraud Detection

A fraud risk management model is a framework outlining all strategies associated with how fraud may be identified, assessed, mitigated, monitored, and said to senior management. Fraud Risk Management technique could have a significantly high-quality impact on the overall charges of fraud in a bank. To have a fraud management system with fraud risk control application is beneficial to the banks. Visibility into fraud danger control strategies allows enhanced decision-making around how fraud is handled. The use of predictive analysis can be very useful in detecting money laundering and other fraudulent acts. A large volume of data is incurred from various sources which keep a close monitoring on different activities carried out related to the bank at different platforms. This increases the probability of any fraudulent activities to get detected before it takes place.

V. MPLEMENTATION

Fig-1: Banking Data set

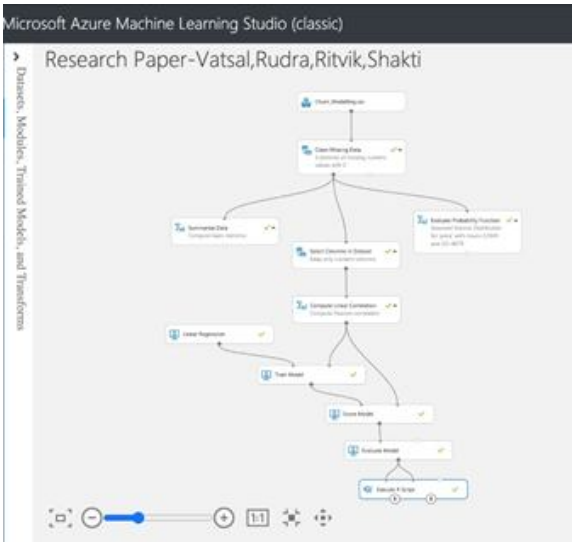

Fig-2: Dataset Processing and Analysis: Regression Dataset on banking dataset

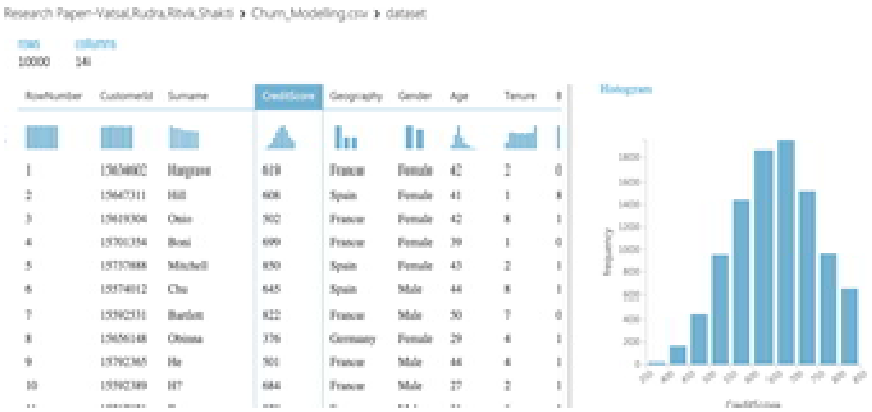

Fig -3: Dataset

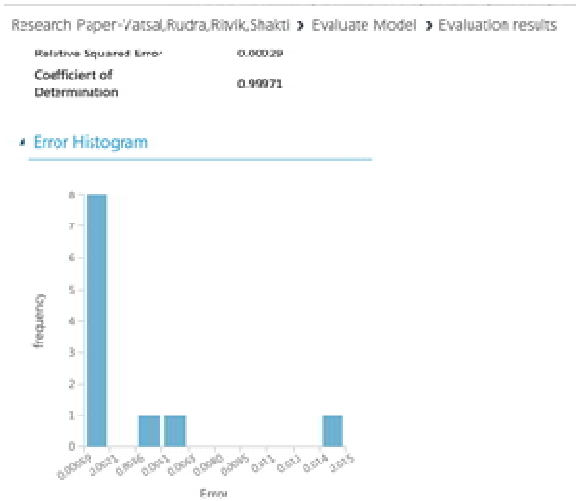

Fig -4: Calculated RMSE Histogram

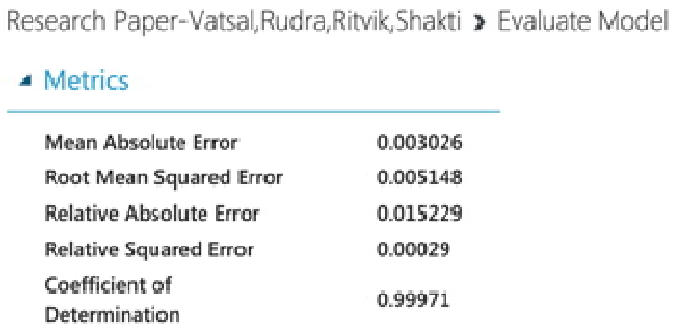

Fig -5: Metrics of the model

VI. FUTURE OF DATA ANALYSIS IN BANKING

For the banks to remain relevant and competitive, they must rethink their operations and adopt data-driven approaches. Additionally, Data analytics will help you develop and expand your business within the banking sector.

We all know that the banking sector has quickly embraced digital banking and is looking forward to more such advancements soon. Data analytics is critical for decision making and plays an important role in data security, including Risk Management, Transaction Analysis and many such factors which make the data of the users vulnerable to attacks from the outside world. In addition to this data analysis also helps in Cloud based Data Processing, AI Driven predictive Banking to name a few.

The AI algorithm accomplishes anti-money laundering activities in a few seconds, which otherwise takes a large period. It also enables banks to oversee chunks of data at a record speed with which they can derive valuable insights from it. Features like AI bots, digital payment advisers and biometric fraud detection mechanisms result in higher quality of services to a larger customer base. All this leads to increased revenue, reduced costs and boost in profits.

The combination of IoT and data analytics can be of great use in terms of data processing. It analyzes a huge pile of data which is generated by connecting devices within the server and allows them to optimize their operations at all levels, thereby increasing productivity. Organizations can deduce numerous benefits from this: optimize operations, control processes automatically, reach out to more customers and empower employees. This concept of Iot data analytics has already proven to be successful in the fields like retail, healthcare, telematics, manufacturing, and smart cities. Organizations may install smart sensors throughout their facilities to collect and analyze the data based on engagement, performance ratings and hence improve in the required areas. IoT can also be used to attract customers. IOT data can be used to determine the required parameters and hence suggest the customers with different financial plans according to their needs. This also enhances product management.

VII. CONCLUSION

To summarize the concept, Analytics provides banks with more marketing muscle & flexibility in the areas of functionality like Compliance, Fraud, NPA monitoring, and Calculating Value at Risk. The sectors benefit greatly from Analytics to ensure optimal performance, and to take important decisions where timing is everything. It will not be an exaggeration to say that the day-to-day functionalities in a banking environment will be severely limited and handicapped if analytic tools were not made available to them. These tools can help banks differentiate themselves and remain competitive in the future.

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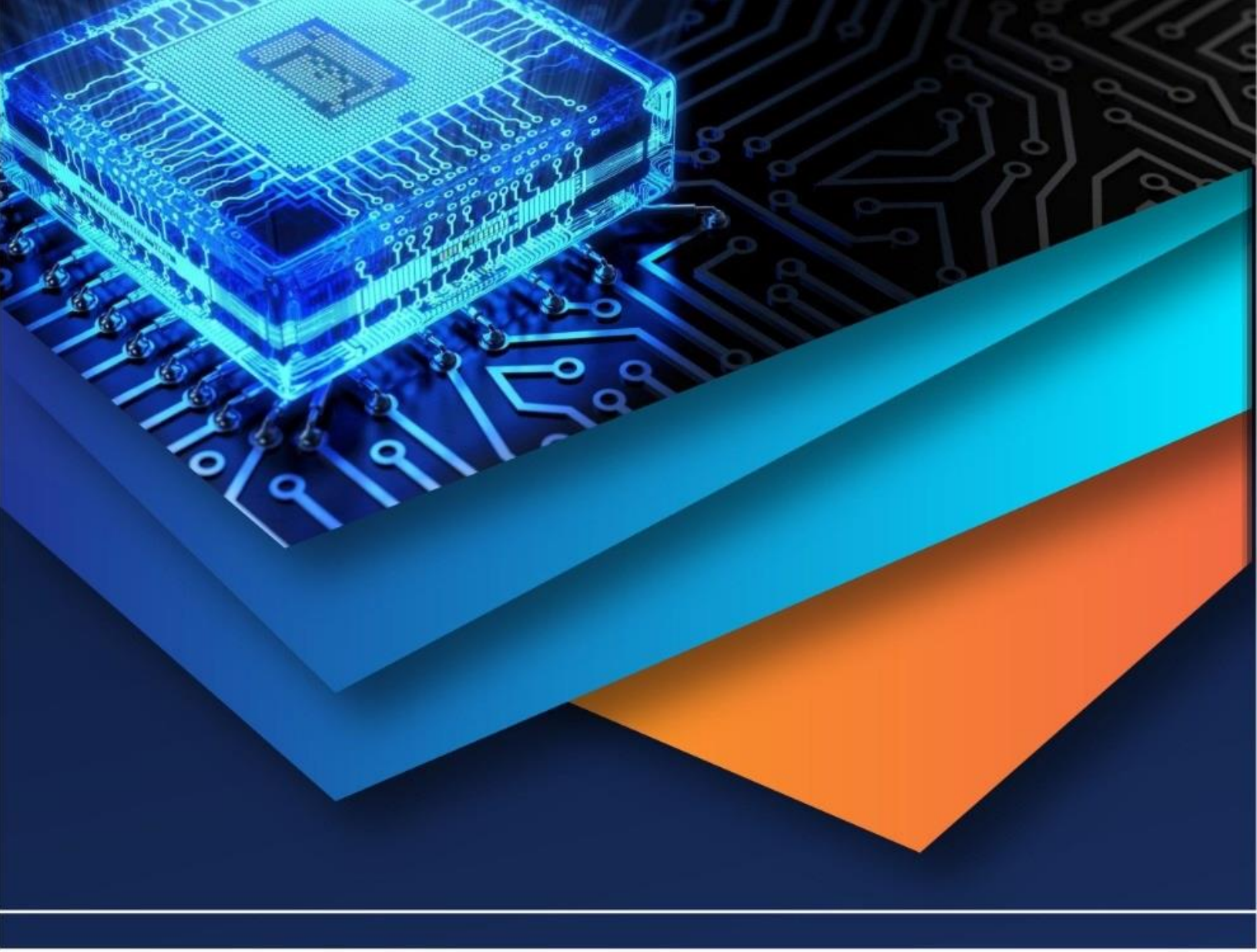

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