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### Big Data Analytics for Improving Security Management at Financial Industry

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#### ABSTRACT

The financial security industry is constantly facing new challenges and risks, as technology advances and the volume of data generated by financial institutions continues to grow exponentially. Big data analytics has the potential to revolutionize the way the financial security industry manages and mitigates these risks, by providing valuable insights and early warning signs of potential threats. Big data analytics can be used in a number of ways to improve security management in the financial security industry. These include:

**Fraud detection:** By analyzing large amounts of transaction data, financial institutions can identify patterns of fraudulent activity and take action to prevent fraud before it occurs.

**Risk management:** By analyzing data from various sources, such as financial markets and social media, financial institutions can assess the risk of certain transactions and take appropriate action to mitigate these risks.

**Compliance:** By analyzing data from customers and transactions, financial institutions can ensure compliance with regulations such as the Anti-Money Laundering (AML) and the Know Your Customer (KYC) regulations.

The use of big data analytics has the potential to greatly enhance the ability of the financial security industry to identify and mitigate risks. By providing early warning signs of potential threats, big data analytics can help financial institutions take proactive measures to protect their customers and assets. As technology continues to advance and the volume of data generated by financial institutions continues to grow, the use of big data analytics will become increasingly important for ensuring the security of the financial system.

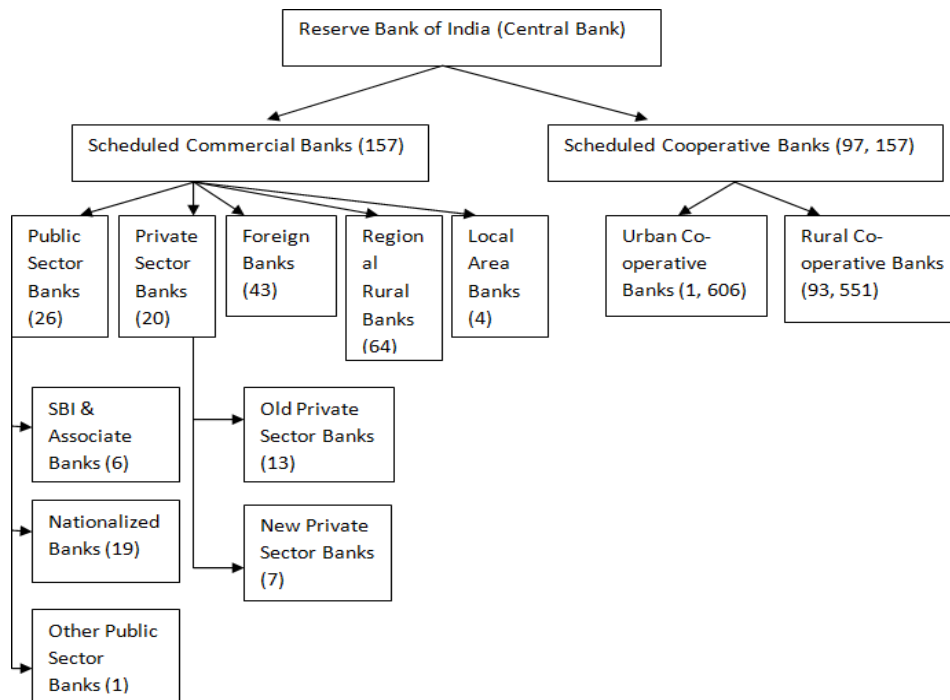
**Keywords:** Big Data, Big Data Analytics, Finance, Financial Industry, Customer, Data Management

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#### INTRODUCTION

The financial security industry is facing new challenges and risks as technology advances and the volume of data generated by financial institutions continues to grow exponentially. With the increasing use of online and mobile banking, the amount of data being generated is vast and diverse. This data can be used to gain valuable insights and improve the security of financial systems. Big data analytics has the potential to revolutionize the way the financial security industry manages and mitigates these risks by providing valuable insights and early warning signs of potential threats. Big data analytics is a powerful tool that can be used to analyze large amounts of data from various sources. This data can be structured or unstructured and can be used to identify patterns and trends that can help financial institutions make better decisions and take proactive measures to mitigate risks. By analyzing data from financial markets, social media, and other sources, financial institutions can assess the risk of certain transactions and take

appropriate action to mitigate these risks. The use of big data analytics in the financial security industry can also help financial institutions comply with regulations such as the Anti-Money Laundering (AML) and the Know Your Customer (KYC) regulations. By analyzing data from customers and transactions, financial institutions can identify potential issues and take action to prevent them. In this paper, we will explore the ways in which big data analytics can be used to enhance security management in the financial security industry. We will examine the various methods used in big data analytics and the benefits that can be gained from its use. We will also look at some of the challenges and limitations of big data analytics in the financial security industry. In summary, the use of big data analytics has the potential to greatly enhance the ability of the financial security industry to identify and mitigate risks. As technology continues to advance and the volume of data generated by financial institutions continues to grow, the use of big data analytics will become increasingly important for ensuring the security of the financial system.



**Fig 1: India's Finance industry structure**

### Big Data Analytics

Big Data Analytics (BDA) is a powerful tool that can be used to analyze large amounts of data from various sources to gain valuable insights and improve the security of financial systems. The financial security industry is facing new challenges and risks as technology advances and the volume of data generated by financial institutions continues to grow exponentially. With the increasing use of online and mobile banking, the amount of data being generated is vast and diverse. BDA can help financial institutions identify patterns, trends, and anomalies in this data, which can be used to detect potential security threats and take proactive measures to mitigate them.

One of the main ways BDA is used in the financial security industry is for fraud detection. By analyzing large amounts of transaction data, financial institutions can identify patterns of fraudulent activity and take action to prevent fraud before it occurs. BDA can also be used for risk management, by analyzing data from various sources, such as financial markets and social media, financial institutions can assess the risk of certain transactions and take appropriate action to mitigate these risks.

BDA can also be used to ensure compliance with regulations such as the Anti-Money Laundering (AML) and the Know Your Customer (KYC) regulations. By analyzing data from customers and transactions, financial institutions can identify potential issues and take action to prevent them.

BDA also enables financial institutions to implement a proactive security strategy, as it can be used to predict future events, enabling institutions to prepare and take action before any security breaches happen.

However, BDA also presents some challenges and limitations. The sheer volume of data generated can make it difficult to manage and analyze. Additionally, BDA requires specialized skills and expertise, and financial institutions may need to invest in new technologies and infrastructure to take full advantage of its capabilities.

In BDA has the potential to revolutionize the way the financial security industry manages and mitigates risks. By providing valuable insights and early warning signs of potential threats, BDA can help financial institutions take proactive measures to protect their customers and assets. With the right approach and investment, financial institutions can leverage BDA to improve security management and mitigate risks.

### Profit of Big Data Analytics in Financial Security

Big Data Analytics (BDA) can bring significant benefits to the financial security industry by providing valuable insights and early warning signs of potential threats. By analyzing large amounts of data from various sources, financial institutions can identify patterns of fraudulent activity, assess the risk of certain transactions, and ensure compliance with regulations. Some of the key benefits of BDA in the financial security industry include:

1. **Fraud detection:** BDA can help financial institutions identify patterns of fraudulent activity and take action to prevent fraud before it occurs. By analyzing large amounts of transaction data, institutions can detect fraudulent transactions and take appropriate action to prevent further losses.
2. **Risk management:** BDA can be used to analyze data from various sources, such as financial markets and social media, to assess the risk of certain transactions and take appropriate action to mitigate these risks.
3. **Compliance:** BDA can be used to ensure compliance with regulations such as the Anti-Money Laundering (AML) and the Know Your Customer (KYC) regulations. By analyzing data from customers and transactions, financial institutions can identify potential issues and take action to prevent them.
4. **Proactive security:** BDA enables financial institutions to implement a proactive security strategy, as it can be used to predict future events, enabling institutions to

prepare and take action before any security breaches happen.

5. Cost savings: BDA can help financial institutions identify and prevent fraud, which can result in significant cost savings. By detecting and preventing fraudulent activities, institutions can reduce the costs associated with fraud, such as legal fees and customer compensation.

### Financial- related Tools and Technologies of Big Data Analytics

Big Data Analytics (BDA) in the financial security industry requires a combination of tools and technologies to effectively analyze and process large amounts of data from various sources. Some of the key tools and technologies used in BDA for financial security include:

1. Data storage and management: BDA requires the ability to store and manage large amounts of data from various sources. Technologies such as Hadoop and NoSQL databases can be used to store and manage big data.
2. Data processing and analysis: Technologies such as Apache Spark and Apache Storm can be used to process and analyze large amounts of data in real-time. These technologies enable the financial institution to identify patterns, trends, and anomalies in the data.
3. Data visualization: Tools such as Tableau, QlikView, and Power BI can be used to create visualizations of the data, which can help financial institutions identify patterns and trends more easily.
4. Machine learning: Machine learning algorithms can be used to analyze large amounts of data and identify patterns that may indicate fraud or other security threats. These algorithms can also be used to predict future events, enabling institutions to prepare and take action before any security breaches happen.
5. Cloud computing: Cloud computing platforms such as Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform can be used to store, process and analyze large amounts of data.
6. Advanced Analytics: Some Financial institutions use advanced analytics tools such as natural language processing (NLP), sentiment analysis, and graph analytics to gain insights from unstructured data such as social media, customer feedback, and news articles.
7. Security and Governance: To ensure the security and governance of the data, financial institutions use technologies like encryption, data masking, access controls, and data lineage to protect sensitive data and comply with regulations.
8. Classification: Widely suited for fraud detection in the banking sector, classification is a common type of data mining technique in which the dataset is split or classified based on the preset examples [2].
9. Clustering: As its name suggests, it is the process of grouping the data based on criteria. In banking, it is the identification and grouping of similar data or transactions. For example, you can identify the clients or customers and group them under factors like service class (high-security policy demand), geographic location, service preferences, transaction method, and so on [2].
10. Association Rule: In association with various algorithms like DDA, CDA, and APRIORI, association rule helps ineffective management of the dataset. As the

banking dataset is unstructured and mixed, there are times where transactions of the same account can occur twice or co-occur in the database [22]. In such circumstances, this rule can find the binary variables to uncover unwanted information.

11. Prediction: Prediction is a data mining method of Big Data analytics that is used to calculate or forecast the bond between independent and dependent variables [3]. For example, if money is an independent variable followed by a fraudster as a dependent, with the predictive analysis, you can detect any fraud attempt with the use of historical data.
12. Decision/Random Trees: To handle an array of problems of any category, decision and random trees are the influential data mining strategies [4]. With the motto to reduce overall data entropy, huge data is split into small ones in the decision tree, and the difference of possible errors & noise of the decision tree is carried in the random tree method.  
Link/Survival Analysis: Both Link and Survival analysis are time-to-event analysis techniques that are mathematical-based models [5]. Constituting direct, and undirected mining, you can find valuable customers and predict hazard probabilities with the link or survival analysis.

### Applications of Big Data Analytics in Financial Industry

Big Data Analytics (BDA) can be used in a variety of ways to improve security in the financial industry. Some of the key applications of BDA in financial security include:

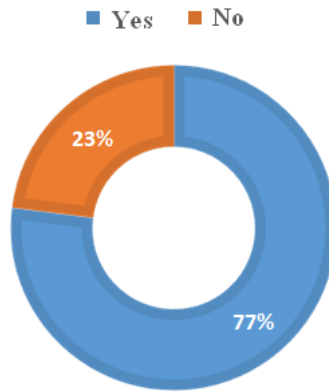
1. Fraud detection and prevention: BDA can be used to identify patterns of fraudulent activity in financial transactions. By analyzing large amounts of transaction data, financial institutions can detect fraudulent transactions and take appropriate action to prevent further losses.
2. Risk management: BDA can be used to analyze data from various sources, such as financial markets and social media, to assess the risk of certain transactions and take appropriate action to mitigate these risks.
3. Compliance: BDA can be used to ensure compliance with regulations such as the Anti-Money Laundering (AML) and the Know Your Customer (KYC) regulations. By analyzing data from customers and transactions, financial institutions can identify potential issues and take action to prevent them.
4. Cyber security: BDA can be used to monitor network activity and identify potential cyber threats. By analyzing data from network logs and intrusion detection systems, financial institutions can detect and respond to cyber attacks more quickly.
5. Customer behavior and profiling: BDA can be used to analyze data from various sources such as social media, website analytics, and customer feedback to gain insight into customer behavior and preferences. This can help financial institutions identify potential security risks and take appropriate action.
6. Proactive security: BDA enables financial institutions to implement a proactive security strategy, as it can be used to predict future events, enabling institutions to prepare and take action before any security breaches happen.

7. Advanced Analytics: BDA can be used to analyze large amounts of unstructured data such as social media, customer feedback, and news articles to gain insights into customer sentiment, behavior, and potential security threats.
8. Predictive Maintenance: Financial institutions can also use BDA to predict when equipment and systems might fail, so they can schedule preventative maintenance and

reduce the risk of system failures, which can cause security breaches.

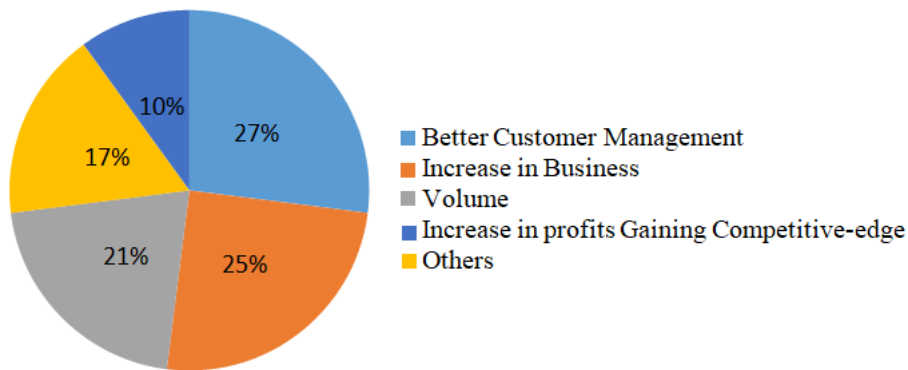
## RESULTS AND DISCUSSION

As per the recent research and survey carried out with the banks and the customer experience, certain interferences are made that are discussed in this section. When Big Data Analytics was put into practice, it is proved that the customer insight was meaning to 77% and it's a No to 23%.



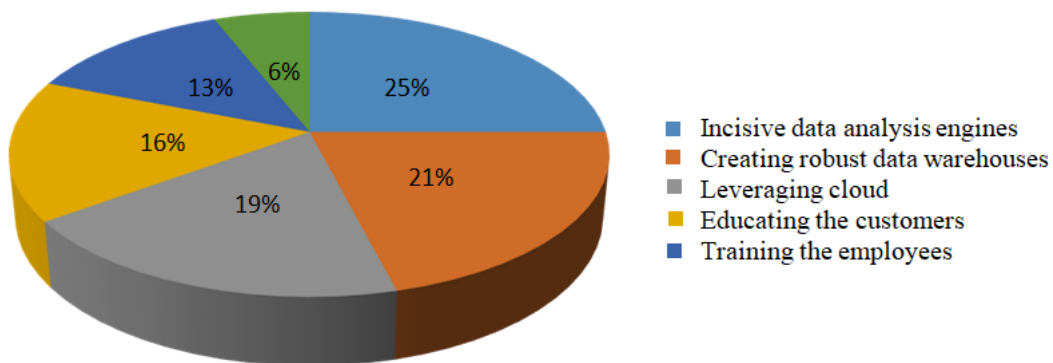
**Fig 2: Customer Insights**

Also, the results incurred based on the potential benefits driven from Big Data Analysis account to 5 factors like better customer management, increase in profit, gaining competitive edge, increase in business volume, and others.



**Fig 3: Benefits of Big Data Analytics**

Not just that, further recommendation of the better utilization of Big Data Analytics in banking also reveals the following factors to be implemented in the upcoming days. Among which comes – creating robust data warehouses, educating the customers, training the employees, leveraging cloud, and using incisive data analysis engines.



**Fig 4: Recommendations for future Big Data Analytics**

## CONCLUSION

Big data analytics has the potential to revolutionize the way the financial security industry manages and mitigates risks. By providing valuable insights and early warning signs of potential threats, big data analytics can help financial institutions take proactive measures to protect their customers and assets. The use of big data analytics in the financial security industry can be used for fraud detection, risk management, and compliance with regulations such as the Anti-Money Laundering (AML) and the Know Your Customer (KYC) regulations. By analyzing large amounts of data from various sources, financial institutions can identify patterns of fraudulent activity, assess the risk of certain transactions, and ensure compliance with regulations.

However, it is important to note that while big data analytics can provide valuable insights, it also presents some challenges and limitations. The sheer volume of data generated can make it difficult to manage and analyze. Additionally, big data analytics requires specialized skills and expertise, and financial institutions may need to invest in new technologies and infrastructure to take full advantage of its capabilities. Despite these challenges, the benefits of big data analytics in the financial security industry are clear. As technology continues to advance and the volume of data generated by financial institutions continues to grow, the use of big data analytics will become increasingly important for ensuring the security of the financial system. With the right approach and investment, financial institutions can leverage big data analytics to improve security management and mitigate risks.

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