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Research Article

Process Mining Techniques for Detecting Fraud in Banks: A Study

Swati Srivastava[1] , Dr Roheet Bhatnagar[2]

Manipal University Jaipur[1] , Manipal University Jaipur[2]
Srivastavaswati2011@gmail.com[1],roheet.bhatnagar@jaipur.manipal.edu[2]

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Abstract:

Banks play an important role in a nation's economy, benefiting both residents and governments. In the recent past, many fraudulent happenings in banks have been identified as a result of vested interests. This paper examines the most common forms of insider fraud that occur in banks and attempts to categorise them. We include a description, factors associated to certain categories of fraud, and challenges in detecting frauds in this article. It is critical to identify such fraudulent events automatically until it is too late and get the individuals or groups of individuals into agreement. The process mining techniques is useful because it aids in the detection of irregular data.

Keywords: Fraudster, Account Payable, Fraud Detection, Process Mining, Loan process.

1. INTRODUCTION

Banking is a tool that allows banks to bridge the gap between funding sources and execution. "The acceptance, for the purpose of lending or investment, of money deposits from the public, repayable on demand or otherwise, and withdrawal by cheque, draught, or other means" is what banking means (Banking Regulation Act, 1949). The concept of banking, as we know it today, began in the late 18th century. Moneylenders were the ones who came up with the idea of taking deposits and issuing receipts, according to the Central Banking Committee of 1931.It is unavoidable that such a large industry be subject to numerous frauds. “Despite having a powerful regulator, the financial services industry has emerged as the most vulnerable sector to fraud,” according to a KPMG India fraud survey conducted in 2012[3]. Misuse of technology in the banking sector involves overpayments to suppliers or a self-bank account, exchanging potentially sensitive information, and using the company's technology tools for inappropriate activities such as overlapping business relationships. Additionally, delivering services on mobile and social media sites with a restricted understanding of security standards presents a significant risk to both consumers and financial institutions.” Employees topped the list as the single-largest perpetrators of fraud, accounting for 36 percent of the number, according to survey respondents. The banking industry has emerged as one of the most important markets, influencing the lies of ordinary people and corporations directly or indirectly. It is important to ensure that banking processes are both safe and stable. A banking security breach could result in significant losses. The loan mechanism is one of the most critical aspects of any banking system. It is a service offered by almost all banks that allows customers to take out a certain amount of credit based on their eligibility as determined by the bank and repay it over time with a certain interest capitalization. The credit (loan) can be used for a variety of reasons, including the purchase of new cars, the purchase of a home, educational purposes, business loans, personal loans, and so on.

1.1. WHAT IS A FRAUD

What is the concept of a fraud?

“An act or instance of deceit, an artifice by which the right or interest of another is hurt, a deceptive trick or stratagem,” according to the Oxford dictionary.

“Any of the criminal activities marked by deception, concealment, or breach of trust,” according to the IIA [7] International Standards for Professional Practice. These actions do not include the threat of violence or the use of physical power. Parties & organisations commit fraud to property, or services; acquire money, to gain a personal or business advantage or to prevent payment or loss of services.”

1.2. FACTORS INVOLVED IN THE FRAUD:

Why do people defraud others? Donald Cressey, a well-known criminologist, suggested a fraud triangle model[8] to describe the factors that lead to anyone committing

occupational fraud. It consists primarily of three components, which are described and explained below, and which lead to fraudulent behaviour:

1. Financial need/motivation that is perceived to be unshareable:

   Another part of the fraud triangle is motivation, which is also known as incentive. It is the pressure or "need" felt by the individual who commits the fraud. It could be a genuine financial or other need, such as significant medical bills or debts. It may also be a perceived financial need, such as an individual who desires material goods but lacks the financial resources to obtain them.

2. Perceived possibility:

   The willingness to commit a fraud can be described as opportunity. Since fraudsters do not want to be discovered, they must assume that their actions will not be detected.

3. Rationalization:

   Employees may justify their actions by deciding that fraud is acceptable for a variety of reasons. In most forms of frauds, rationalisation is a critical part.

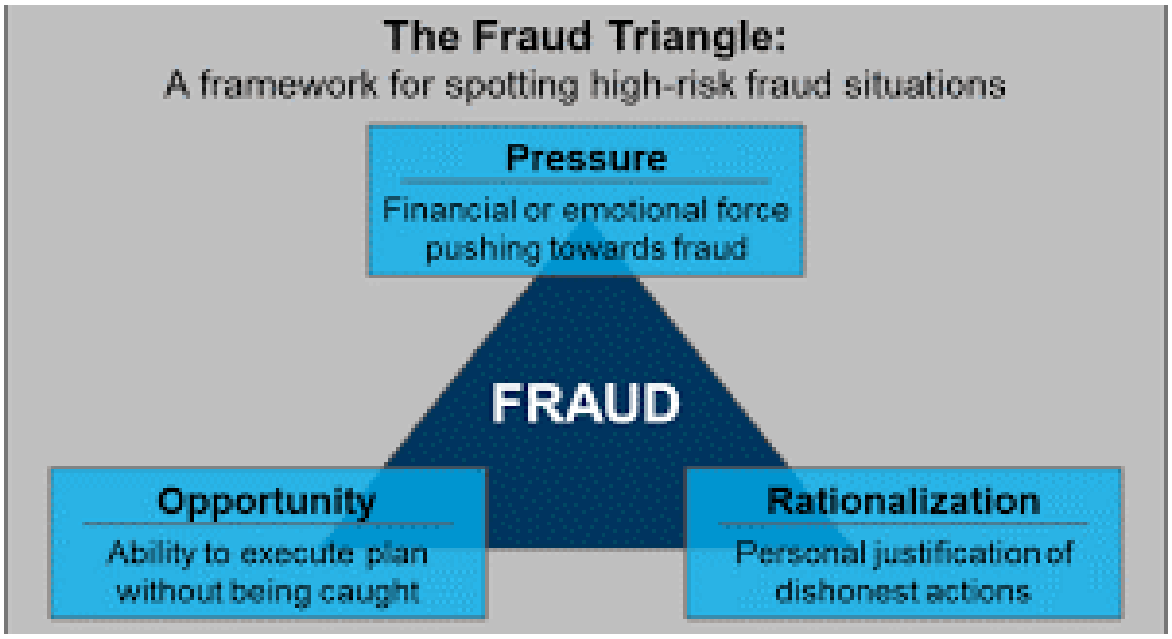

Figure 1: The Donald Cressey hypothesis led to the development of the fraud triangle.

1.3. PREVAILING MECHANISHMS FOR FRAUD DETECTIONS:

Before we can understand the problems, we must first understand how fraud is currently identified in banks. The following are some of the methods for detecting a fraud:

1. Anonymous complaints/whistleblowers ("Public Interest Disclosure and Protection of Informer" (PIDPI)).

2. Internal audits or statutory audits at a central level

3. Vigilance Department Verification by Chance/Random

According to Deloitte's India banking fraud survey from 2012, 53 percent of respondents said fraud was discovered through internal audit reviews. The vast majority of cases were discovered as a result of a formal or informal complaint process. Frauds were found by anonymous complaints and whistle blower mechanisms, respectively, according to 43 percent and 37 percent of respondents. However, the surprising result is that more than 20% of frauds were found by chance during vigilance department random checks. [9]

1.4. DIFFICULTIES IN FRAUD DETECTION:

1. The current systems, as mentioned above, have a flaw that makes them vulnerable to fraud detection. Within six months, the bulk of the frauds were found, with 23% discovered after a year [11]. As we all know, the longer the duration, the more significant the effects. Insider fraudsters typically take a "slow and steady" approach to committing fraud. To put it another way, the insiders stole “small” sums of money and carried out their crimes “slowly” over a long period of time, likely to escape detection. The lower half of the cases (those lasting less than 32 months) had an estimated actual monetary impact of $382,750, while the upper half (those lasting 32 months or more) had an average actual monetary impact of $479,000. [12]
2. Internal audits and Vigilance verifications are carried out on a sporadic basis. It is difficult to manually check each and every record because each branch would have thousands of records and most banks have undergone computerization and CBS. However, fraud does not occur at random. The fraudster devises his scheme in such a way that it is undetectable by a random search.
3. A lack of experience is also a major factor in fraud going undetected. Since the majority of our bank officials and internal auditors have no idea how a CBS works. How will the audit trail be verified? How to spot a thief in the act. This leaves a lot of space for a con artist to get away.
4. The vigilance departments of several banks are attempting to use technology to detect fraud. However, the conventional rule-based, descriptive questions, and analytics receive the majority of the attention. The majority of businesses employ spreadsheet and database software such as Microsoft Excel and MS Access. Although these tools are important in any data analytics programme, they are often used to match, group, order, enter, or filter data that is primarily descriptive. However, in general, these methods are sluggish and ineffective at detecting fraud. Since these aren't designed for that. There are more advanced methods focused on process mining techniques that can be used.

1.5.PROCESS MINING

The lost link between model-based process analysis & data-oriented analytical techniques is process mining. Data science expertise that can be specifically implemented in several domains to analyze and optimize processes. Data science is the career of the future and there will be no survival for companies that are unable to use (big) data smartly. Focusing on data storage & data processing is not enough. Data scientists also need to link data to process analysis. The difference between conventional model-based process analysis (such as simulation & other business process management techniques) and data-centric analysis techniques (such as machine learning & data mining) is bridged by process mining.process mining seek out confront event knowledge (i.e., observed behaviour) with process models (hand-made or discovered automatically). This technology has only recently become available but can be applied to any form of an operational process (organizations & systems). Examples of applications include evaluating hospital care procedures, improving international customer service processes, recognizing customers' browsing habits using a booking site, analysing luggage handling device failures, and improving an X-ray machine's user interface. Both applications have in common the need to link complex behaviour to process models. Hence, we refer to this as "data science in action".

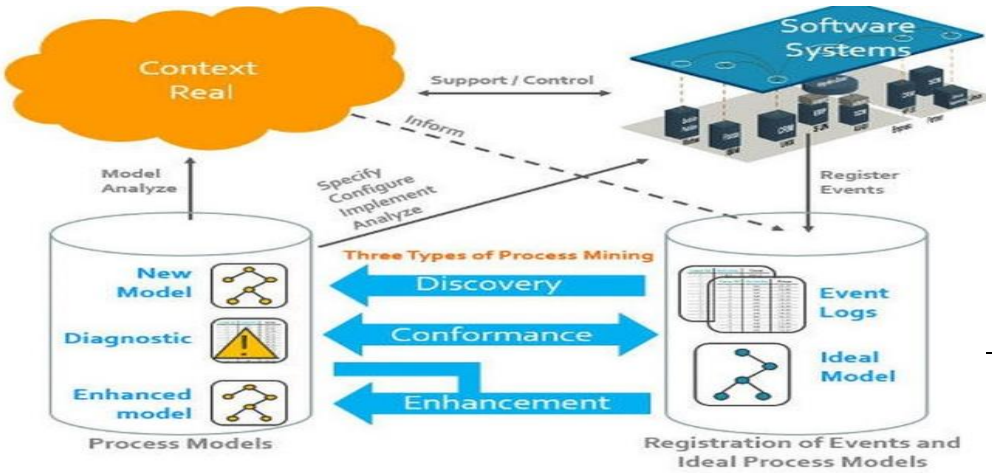

Fig. 1. Process Mining, adapted from BPMteca @ Pedrorobledobpm (2018).

1.6.. FRAUD DETECTION IN BANKS USING PROCESS MINING TECHNIQUES

Many different approaches have been used to detect fraud and malicious activities in various banking processes. The use of the process mining is quite efficient and reliable as this approach if implemented well, enact similar to that of humans' audit system with a difference that it can process a large amount of data in a more efficient and timely manner compared to that of humans. Some multiple algorithms and approaches have been used by researchers and scholars all over the world to accomplish this task. A few of them have been discussed with references as: In Soane Lagraa et. al researchers have used process mining for behaviour change. A notion of behaviour change sequence has been introduced so that an irregularity can be identified if there is a pattern that has been identified as safe shows any unusual change. It uses a sequence event string that is used for processing the task. This sequence event string is a data set that denes certain parameters that are eligible to be used in process mining. This method aims to identify a change in the attributes in the sequence events. The change here refers to an intrinsic change of attributes and parameters in the sequence event string. This change then finally helps to let the concerned authority know about malicious login events and behavioural changes in user login attempts. This can help decide whether the portal for the loan processing system has not been compromised.In Dewi Rahmawati et al. researchers have used a heuristic miner algorithm in process mining for detecting fraud in the event logs of Good and Services Procurement. Heuristic Algorithms are efficient and provide more promising results of usage. Researchers have used the heuristic miner algorithm instead of the Alpha++ algorithm. The reason for using the heuristic algorithm is that it can calculate the frequency relation between activities in the logs to determine the causal dependency. It can also help in determining the dominance level of various processes consisting of thousands of logs as well as identifies the behaviours that are uncommon in any of the processes. Using the heuristic miner algorithm, researchers have got an accuracy of 88% with 120 test data and 13 error data. A threshold limit has been also used known as value fitness through which judgment of fraud and malicious activity can be inferred easily. In Rafael Accorsi et al.researchers /reviewers surveyed the efficiency and potential of the process mining approach to accomplish the audit process of various business processes and business process management systems. Researchers have also put a major part of their efforts into the process discovery method. The process discovery method is the technique using which a process event can be reconstructed as it was made by using a pre-defined approach. More particularly, the focus of the process discovery method is to reconstruct process structure from elements like event logs, data ow, etc. Based on this information gathered, researchers wanted to make adherence to the automation of security and privacy requirements of the business process. In Michael Werner, researchers have worked on the visualization of the data obtained through process mining. The data source is considered to be financial audits. They have used an exceptionally good concept of materiality maps for data visualization. They have followed up an approach for process mining that helps in extracting the relevant and usable data. Further proceedings can be made accordingly and visualization of the data using a materiality map is made. This visualization methodology might helpful in detecting various patterns and also helps to judge certain faults that could detect fraud or malicious elements in the process.

Table 1. Process mining in Banking Sector

Author	Objective	Tools and Technique	Contribution
Isabel González Flores, Josué Rivera Riquenes (2020)	The objective of this work is to highlight the benefits of the analysis of the information available in the event records of computer systems, using process mining techniques as a new form of audit.	ProM: being an open-source and freely distributed tool, it has been used forprocess mining. It allows the discovery process, conformity checking, social network analysis, organizational mining, decision mining Disc: considered to be the most commonly used privative tool for process mining.	• The quality of the extracted data is directly proportional to the result of theanalysis, and its reliability, completeness and validity must be guaranteed. • The information systems do not record the event data in a homogeneous manner, so the joint work of the Process Mining analyst and the relevant specialists of the organization is crucial for theextraction of the event log. • In the analysis of the results, the workers

			of the organization must participate, in order to have a correct vision of each context.
Egbunike Patrick Amaechi, Ezeabasili Vincent Nnanyereugo (2013)	The study is set to assess the financial ratios computed, along with those to determine if they can help detect fraud in the financial statements.	The study compared data on total population composed of both problem and non-problem banks. Secondly, problem and non-problem banks were added equally to this assessment. Thus, the study was to look at extended proportions in duration using logistic regression modeling	The paper has introduced an alternative set of financial ratios in fraud detection modeling to determine the probability of a fraud event. It is anticipated on the basis that financial ratios provide early warning signals that corporations should watch closely. While it does not ensure 100% fraud detection, it does provide an indication for vulnerable fraud areas chasing endless red flags without direction.
M.R Taiwo, B.A Badejo, B.A. Okuneye (2017)	To examine the various challenges of detecting and facing fraud in Nigeria's banking sector.	The study shown comparison of the data from the overall population which is composed of both problem as well as non-problem bank. On the other hand, the problem & non-problem banks were uniformly pair-matched using logistic regression modeling.	The paper has been presented an another dataset containing financial ratios in fraud detection modeling to be used for determining the potentiality of fraud occurrence. This is prediction is done on the basis that financial ratios holds provision for early warning signals which should be keenly watched by corporations. However, it doesn't ensures a 100% fraud detection capability.
I O Eweoya, A A Adebiyi, A A Azeta1 (2019)	Data mining approaches and other learning algorithms of machine learning were employed in developing prediction or detection models.	The work employed a supervised approach learning which is based on machine learning for prediction of possibility of occurrence of a fraud in a loan application process using hidden trends in data despite of providing loans which generally not meant for approval.	The defaults in credit or loan led to the shut down of many of the banks. Along with, many countries have versed recession because of the fraudulent activities in loan administration and paving a tougher way for the people. An accuracy of 81.3% had been achieved using SVM in kernel mode with benign true positive & false negative rates to verify its influences if deputed loan scrutiny.
Alan Reinstein and Brian Patrick Green (2014)	The study of banks and savings & loans that focusses on related issues of misstatement degree, occurrence, method & their transformation over the course of time.	The management fraud regarding financial service organizations have been examined by focusing on SIC Codes.	The economic situation that inspired the new specific regulations may no longer exist. For eg., fraud related to the valuation of loan portfolios may grow during periods of economic recession. The related discovery & subsequent reporting of such fraudulent activity may lag behind a period of strong economic growth.
OkokpujieKennedy O., Chinyere Grace Kennedy S. N. John, F. Olajide, C. Anele (2016)	Detecting different frauds through the deployment of data-mining techniques	This paper addressed bank fraud detection, the usages of association, clustering, data mining techniques; classification & forecasting so to analyze the customer data in order to detect those patterns that could direct to frauds.	- Real time fraud detection proposal that would save banks from huge losses. - It will be able to leverage customers from financial loans too. - It will rigid the people's confidence on safety and putting their money in banks. - It will make the society better place along with reduction in finance related losses. - It will also led to the discouragement of fraudsters to sustain their activity.
DewiRahmawati, RiyanartoSarno, ChastineFatichah, Dwi Sunaryono (2017)	To determine the fraud that exists in business processes	This research proposes a method hidden Markov model & activity information recorded in event logs. HMM used to calculate the probability of fraud probability created on the event log.	This work determines the indicators of fraud & the weight of no fraud using HMM's algo.

Dr. Radhakrishna Rambola, Prateek Varshney, Prashant Vishwakarma (2018)	This paper is addressing the explication of data mining techniques on detecting frauds and recovering upon in in banking sector.	The tools and techniques employed to detect fraud in research are association, clustering, prediction classification, and serial patterns.	This research paper covers a lot of problems related to banking information security and how to easily overcome the banking system fraud problems through the techniques provided by data mining.
Galina Baader, Helmut Krcmar (2018)	Reducing the number of false positives by integrating an approach based on the red flag with process mining.	1. SQL Script 2.ERP Systems 3.Celonis Process Mining	In business process example, along with occurring red flags & trends in fraud detection, is also shown in a dashboard style overview of the red flags shown.
Rafael Accorsi Thomas Stocker (2011)	The ways in which the process can be mined can be prolonged to better suit security analysis.	1. Conformance monitoring mechanisms used to check the hoped-for security specifications in the process of requesting loans. 2. The definition of data-ow knowledge from logs is a specific problem we see here.	It could verify the capacious majority of many requirements by combination of various techniques with informally confining a group of properties of which conformance checking is not being sufficient.
Orhan Engin and Ibrahim E. Yazici (2020)	Research has defined how the technique of process mining can be used in real estate transactions that communicate with clients & systems.	A fuzzy Celonis model-based software was used to obtain processes from the data stack, and the data stack was visualized using edge and node filters.	The results have shown that process mining is an important technique in process development and process design studies.
Lalit Wangikar, Syed M. Kumail Akbar and Arjel D. Bautista (2012)	Making predictions about the possible end result of a loan application.	1. Disco 2.Microsoft Excel 3. CART Implementation from Salford Systems	
PoohridateArpasat, Parham Porouhan, Wichian Premchaiswadi (2015)	The primary aim of the analysis was to analyze variations of data from a bank customer service call center to deal with benchmark results, control disparities, and customer and customer incoming calls.	In order to deal with benchmark performance, monitoring differences, and client and customer incoming calls, the main purpose of the study was to analyze combinations of data from a bank customer service call center.	This research will bring profound benefits to bank managers and customer service administrators, who eventually help fix existing weaknesses in existing customer service processes while resolving or making better choices for a wide range of customer needs and demands. Provides viewpoints and observations t o the degree of management.
Nick Gehrke (2010)	They implement an algorithm to allow financial entries and open objects to remodel instances of processes that generate financial entries. In this way, auditors can discover how the balance sheet items in the system have been produced.	As a well-known and commonly used ERP method, they chose SAP to implement a fundamental mining algorithm in the programming language of Java and to visualize individual process instances.	Financial process visualization can help auditors and process managers change their focus on financial processes: from the collection of T-account entries to the process-oriented perspective associated with the value flow on financial accounts..
Sandro Sozzo, Emmanuel	The aim is to figure out the Edison model,	Bayesian Networks	The paper's key contribution is the study of the impact of lost data on the reform of the

Haven and Catarina Moreira and Andreas Wichert (2018)	which reflects the fundamental roles that style up the service for the loan application. Examine the impact of this incomplete event log for this		institution's business processes. As the alternate mathematical model to conventional probability models, they rely on the use of quantum-like probabilistic assumptions.

1.7. **DETECTION OF ABOVE FRAUDS**

Table. 2 Fraud detection in banking sector

Author	**Objective**	**Data**	**Algorithm**	**Type of fraud/area analyzed**	**Performance**
Jans et al (2011)	To address internal transaction fraud	Purchase order from company	process diagnostics on ProM	purchase-to-pay process cycle	In this paper process mining is applied on a case study which in the context of transaction fraud
Accorsi et al (2013)	To seek the potential of process mining as abasis for security audits of business process	Traces of loan applications	Fuzzy Logic	Security Auditing	This approach can identify compliance with security & privacy requirements
Rahmawati et al (2016)	To detect fraudulent activities during procurement of goods &services in company.	Event logs	Heuristic miner	Goods & Services procurement cycle.	Results were obtained using Heuristic Miner Algorithm. Identification Accuracy of 0.88% was obtained.
Jans et al (2017)	To explore value addition of process mining to internal audit.	Already audited SAP records of procurement process at a major European financial services provider.)	Fuzzy Heuristic	procurement of goods and services	The authors are able to identify several instances of audit relevant frauds likely such as payments made without proper approvals or no approvals, violations made in exclusion of duty controls, and violations related to enterprise specified internal procedures.
Baader et al (2018)	To lessen the total of false positives occurring in conventional fraud detection method	Simulated data	Event logs & process mining	purchase-to-pay process cycle	The False positive rate in the examined dataset comes out to be 0.37%. However, this methodology was not applied on a real dataset of company.
Werner et al (2019)	To introduce a novel methodology to envision process mining outcomes ofclement financial audits in an cumulative manner as		CPN		The complexity of process mining is reduced with comparatively less data & better visualization. However, the proposed approach is not tested on real data.

	materiality maps.				
Chiu et al (2020)	To propose a framework that links non-standard variants/activities in process mining with corresponding fraud schemes to detect potential fraudulent transactions.	ERP data	Association rules	Fraudulent transactions in procure-to-pay and order to cash cycle	The proposed approach was able to detect fraudulent and suspicious transactions that were not identified in manual audit procedure. However , a clear indicator of performance is not given.

2.IDENTIFICATION OF BANKING FRAUDS

2.1. Types Of Frauds in Banking Sector :

In virtually all the world's economies, the banking sector is one of the most important sectors, stemming from its large influence on the magnitude and direction of economic growth and transformation. [1] But in today's age, banks face immense challenges to produce a fair financial audit. Fraud detection is one such problem. Fraud is characterized as a concerted action by an individual or group of individuals to alter the truth or reality for selfish personal gains, and it has now become the single most real threat to the growth of the banking industry. [1] Fraud has led to the loss of vast sums of money in the financial sector and the economy of the nation in general. Fraud is an epidemic that has been eating deeply into the financial sector.

1. Internal fraud: It is a fraud committed by employees and managers of an organization, operating either individually or in groups, or collusion with external parties. Management deception can be very difficult to identify because executives have access to most data and processes and can conceal their decisions because they realize that others do not necessarily question their choices. They will also pressure junior employees to commit fraud on their behalf. Ex: theft of credit, worthless deposits.
2. External fraud is fraud committed by businesses, such as manufacturers, rivals, associates, and consumers, involving third parties. Potential clients, governments & crime organizations comprise these criminals. The perpetrators may operate independently or may cooperate with the staff to defraud the bank.
3. Advance fraud: Banks offer advances to individuals, businesses, organizations for the benefit of their financial needs, such as house loans, transfers or loans for working capital facilities, conveyance or credit for services for working capital, company growth, etc.
4. Cyber fraud: With mechanisms such as phishing, keylogging, spyware, malware, and other internet-based fraud directly aimed at bank customers, the threat has pushed customers into cyberspace.
5. Deposit fraud: To gain money from depositors by posing as a bank or other financial entity fraudulently.
6. Off-balance sheet: typically means an asset or liability or operation of funding that is not on the balance sheet of the business. Complete return swaps are an example of an aspect of an off-balance sheet.

2.2.Statistics About Frauds in Banking

1. Numerous forms of identity fraud may be identified by customers. In 2018, more than one form of identity theft was included in 17% of identity theft statistics. *Source: Customer Sentinel Network, Federal Trade Commission.*

Table 3: Data of frauds reported in the year 2018

Type of identity theft	***Number of reports in a year***	***Percent of total top 5***

Credit card fraud — of existing accounts	*32,328*	*10.1*
Miscellaneous identity theft	*87,764*	*27.2*
Credit card fraud of new accounts	*1,30,938*	*40.51*
Mobile telephone—new accounts	*33,465*	*10.4*
Fraud in Tax	*38,964*	*12.1*
Total	***3,23,458***	***100.00%***

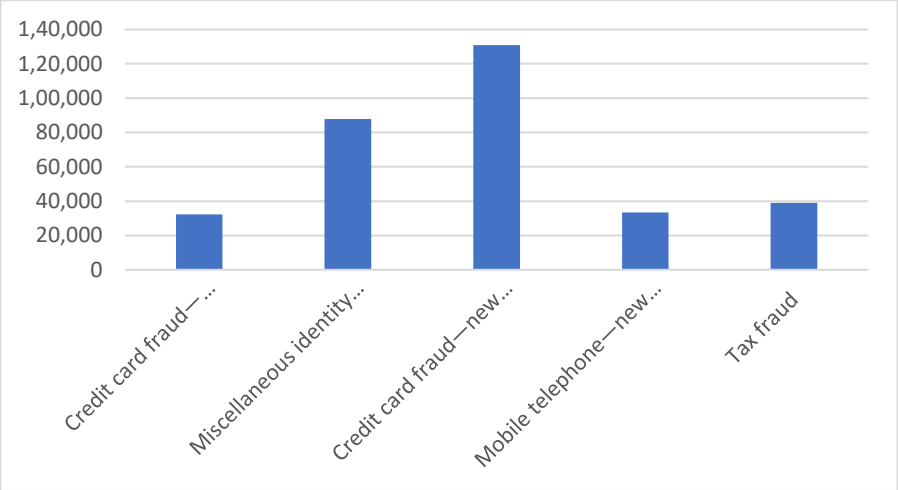

Figure 2: Statistical Representation of Identity Theft in the year 2018

2. Numerous forms of identity fraud may be identified by customers. In 2019, more than one form of identity theft was included in 18% of identity theft statistics. *Source: Customer Sentinel Network, Federal Trade Commission.*

Table 4: Data of frauds reported in the year 2019

Type of identity theft	***Number of reports***	***Percent of total top5***
Auto loan or lease	*38,563*	*7.2*
Personal / Business loan	*43,914*	*7.9*
Miscellaneous identity theft	*1,66,873*	*30.8*

Credit card fraud of new accounts	*2,46,763*	*45.72*
Mobile telephone of new accounts	*44,210*	*8.3*
Total	***5,40,326***	***100.00%***

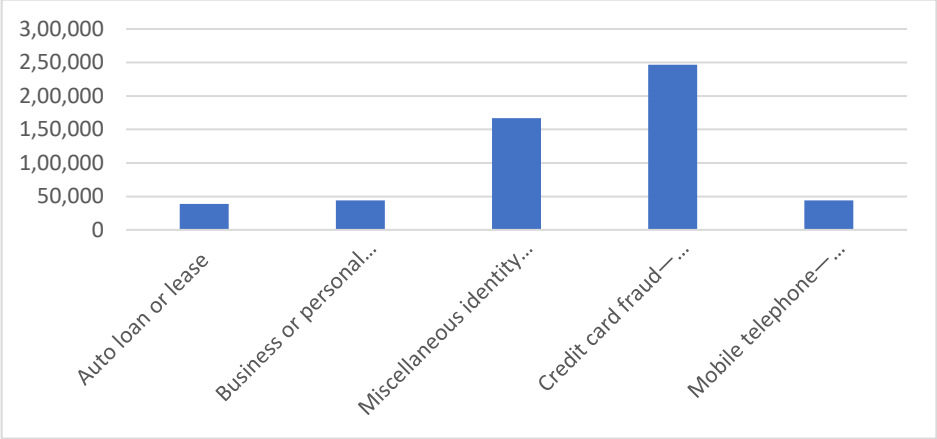

Figure 3: Statistical Representation of Identity Theft in the year 2019

3. Percentages based on the total number of reports by calendar years from the Customer Sentinel Network. These figures exclude registry concerns about "Do Not Call". *Source: Customer Sentinel Network, Federal Trade Commission.*

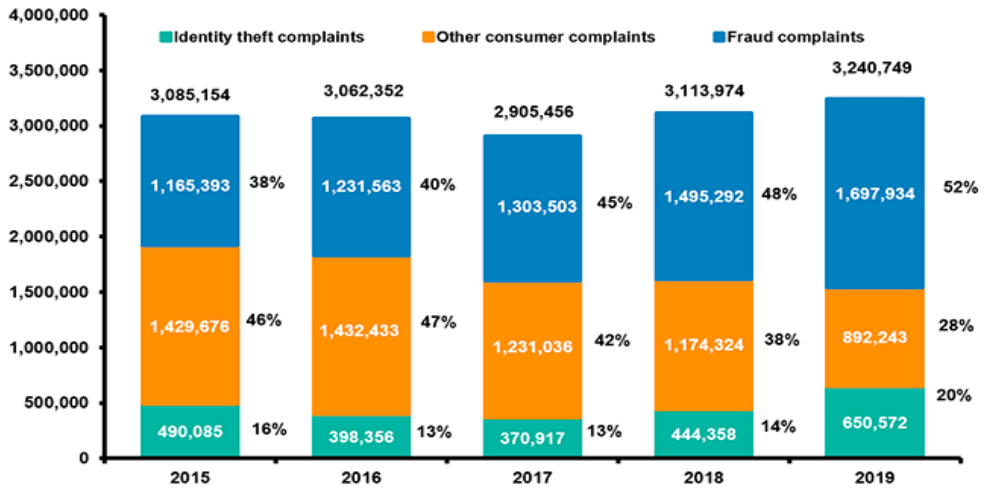

Figure 5: Identity Theft And Fraud Reports, 2015-2019

2.3.Classification of fraud

Table 3. Fraud by Insiders

Serial No.	**Types**	**Description**
1	Uninsured deposits	Asking a fake bank for deposits..
2	Wire Fraud	Fraudulent claims to acquire cash through cable, radio or television, etc.
3	Theft of identity	Fictitious bank workers use customers' personal details and abuse it.
4	Rogue Traders	Employees, on behalf of their boss, make illegal deals.
5	Demand Draft fraud	Fraud by insincere bank employees triggered by the misleading Demand Draft.
6	Fraudulent Loans	Loan lent by a fraudulent or non-existent individual under the control of a dishonest bank officer.
7	Forged documents	Documents used to hide trivial information through deception.

Table 4: Fraud by others

Serial No.	**Types**	**Description**
1	Counterfeit Credit Cards	Fraud by copying or skimming the data on the magnetic stripe of the card by creating copies of valid credit cards.
2	Bill Discounting fraud	Fraudulently discounting a large bank bill after gaining confidence with the bank.
3	Accounting Fraud	Creative accounting & cheat concealing of original financial status when dealing with bank.
4	Fake Currency Notes	Forgery of notes on currencies.

5	Forgery & altered cheques	Changing cheque entries & misusing them.
6	Stolen cheques	Stealing a hefty amount of cheque & misusing it.
7	Cheque Kiting	Usage of the float to make use of non-existent bank account assets.
8	Credit Card fraud	Fraud committed by use of payment card in a transaction.
9	Stolen Payment Cards	Misuse of credit or debit cards after some have stolen them.
10	Money Laundering	Any scheme whereby the true origin of funds is obscured.
11	Theft of identity & impersonation	By collecting customer details & using it to withdraw cash from the bank.
12	Internet fraud & phishing	Fraud via the internet by imitating it.
13	Fraudulent Loan applications	To cover a credit history riddled with financial difficulties by using fake information and receiving risky loans as a sound investment for a bank.
14	Skimming of card information	Fraud by connecting the card stripe reader to ATMs etc. in order to obtain unauthorized access to the magnetic stripe material.
15	Cyber Fraud	Tech fraud, such as computer fraud, etc.

2.4.Need of Process Mining in Banking

For banks covering every aspect of banking operations, these 5 reasons process mining is relevant and can make the difference between adopting the imperative of change and staying bound to outdated technology. The secret to better results in productivity and effectiveness is process mining in each case.

1. Enhancing internal and external compliance For banks, process mining is vital as it can provide a seamless view of any external transaction or internal process from start to nish, allowing management to monitor the way the process unfolds. It can be automatically generated at any point where a compliance response is required. This helps ensure that banks act following the regulations under which they operate, by accelerating things such as reporting to authorities' suspicious transactions and reducing the potential for errors.

2. Managing the complexity of organization and process mining can uncover in-depth, actionable information about how complex processes operate, as well as how they communicate within an organization with other processes. The use of process mining enables banks to view multiple systems as a cohesive whole within their organization, and multiple processes within those systems. This overarching vision means that banks have the data they need to identify opportunities to renew their processes and/or standardize them as needed.
3. Innovation fundingProcess mining helps banks and financial companies eliminate the risk of innovation by providing insights into the operation of internal systems and highlighting optimization opportunities. This enables banks to regard "innovation" as an ongoing transformation of the way they function, not as a small and disruptive occurrence.
4. Management of transition effectively Process mining will soften the impact when change eventually happens by helping organizations make smarter, more open, and data-driven decisions. It removes the assumption that choices are being made for the wrong reasons, or that change is being introduced only for the sake of it. Process mining may be used as a monitoring device for the modifications themselves after any given period of transition, examining the health and efficacy of any new or modified systems, and fixing any negative aspects.
5. Exceeding wishes of clients Process mining helps banks understand the behaviour of customers and connect their processes to forecast experiences through potential customer journeys. It is the interaction within an enterprise between the underlying processes and how, where, where, and why customers engage with those processes. Taking a customer-centred view of business processes ensures that banks can take advantage of customer viewpoints (consumers, employees, or other companies) and alter the way they work to deliver more meaningful customer experiences.

3.FUTURE WORK: A BIGGER PERSPECTIVE

For banks covering every aspect of banking operations, these reasons process mining is relevant and can make the difference between adopting the imperative of change and staying bound to out dated technology. These curette better results introductive it and effectiveness is process mining in each case.

3.1.Enhancing internal and external compliance

For banks, process mining is vital as it can provide a seamless view of any external transactionorinternalprocessfromstarttonish,allowingmanagementtomonitortheway the process unfolds. It can be automatically generated at any point where a compliance responseisrequired.Thishelpsensurethatbanksactfollowingtheregulationsunderwhich theyoperate,byacceleratingthingssuchasreportingtoauthorities'suspicioustransactions and reducing the potential for errors.

3.2.Managing the complexity of organization and process

Process mining can uncovering depth, action able information about complex processes operate, as well as how they communicate within an organization with other processes. The use of process mining enables bank to view multiple system sass cohesive whole within their organization, and multiple processes within those systems. This over arching vision means that banks have the data they need to identify opportunities to René the processes and/or standard them as needed.

3.2.Innovation funding

Process mining helps banks and financial companies eliminate the risk of innovation by providing insights in to the operation fingernails stems and highlighting optimization opportunities.

3.3.Management of transition effectively

Process mining will soften the impact when change eventually happens by helping organizations makes matter, more open, and data driven decisions .Tire moves the assumption that choices are being made forth wrong reasons, at change is being in traduce dolly forth fit .Process mining may be used as a monitoring device forth modifications themselves after any given period of transition, examining the health and efficacy of any new or modified systems ,and fixing any negative aspects.

3.4.Exceeding wishes of clients

Process mining helps banks understand the behavior of customer sand connect their processes to forecast experiences through potential customer journeys .It is the interaction within an enterprise between the underlying processes and how ,where ,where ,and why customers engage with those processes .Taking a customer centered view of business processes ensures that banks can take advantage of customer view points(consumers ,employees ,or other companies) and alter the way they work to deliver more meaningful customer experiences.

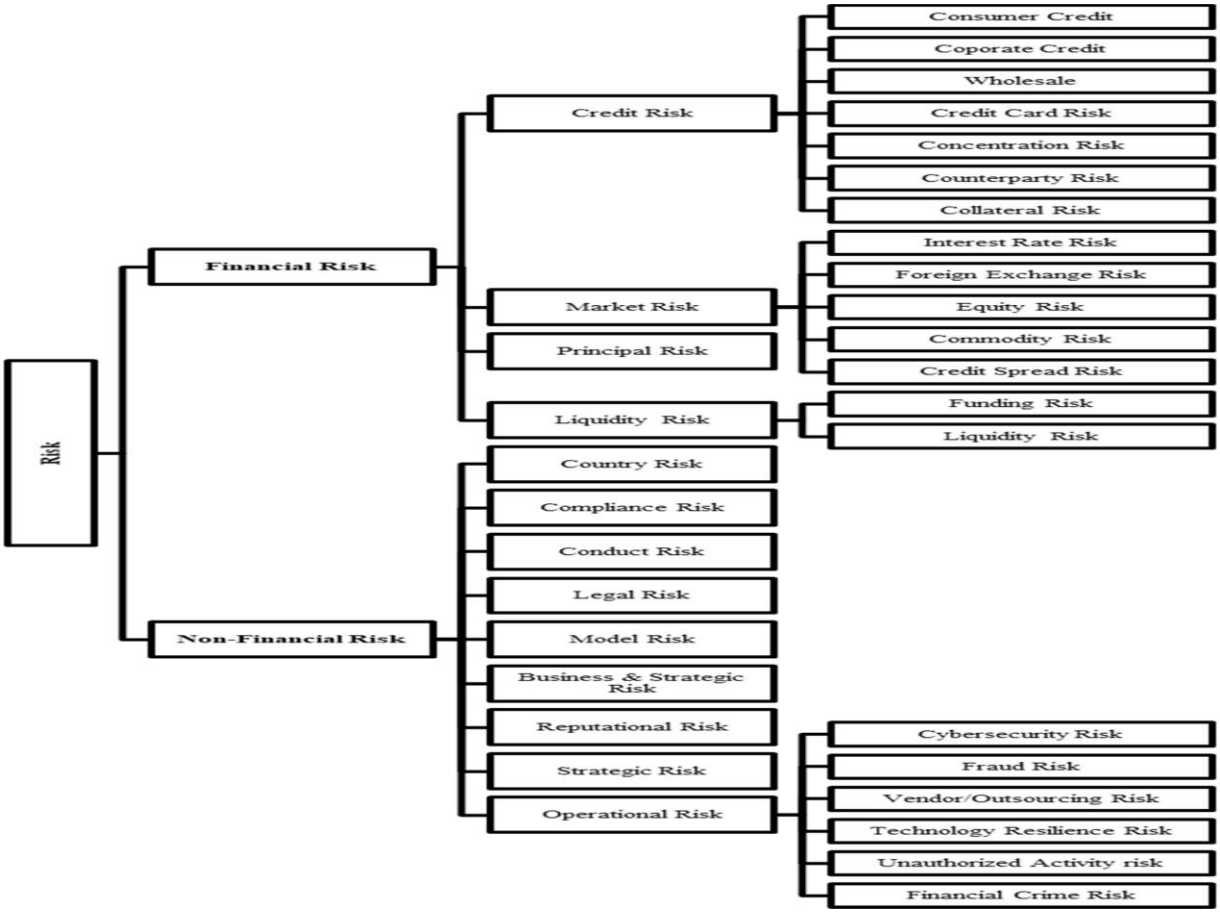

Figure 2: **Research factors of Fraud on banking**

4. CONCLUSION

This paper explains what a banking scam is and how to avoid it. It then goes on to classify various types of frauds, their meanings, the factors that influence them, and the difficulties that come with detecting them. The paper lists and describes various process mining techniques and their general applications, as well as the best available process mining techniques for detecting insider fraud, as suggested by several researchers and currently used in various industries. We also shed light on the big data view of banking and fraud detection as part of our future work.In conclusion, we can say that fraud detection & prevention is a top priority for the banking industry, and process mining techniques can help reduce fraud cases significantly. To achieve the goal, we can use any or all of the methods mentioned above.

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