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Corruption minimization systems based on the detection of abnormal financial transactions: A Perspective of Bangladesh

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Abstract

Corruption is a pervasive and detrimental phenomenon in Bangladesh, affecting both moral values and economic prosperity. Upon reviewing the "quarterly anti-corruption commission report" released by the anti-corruption commission, it appears that corruption is widespread across all sectors in Bangladesh. We cannot build a corruption-free Bangladesh by changing ethics overnight. We do not want to change our moral values, but we want to build a corruption-free Bangladesh. I think we have not made much progress in eradicating or curbing corruption. "Money is the root of corruption." 80% of corruption is for money, so only monitoring money transactions can reduce corruption. Monitoring of money transactions requires migration to a cashless society. In a cashless society, financial transactions are conducted without the use of physical money, such as banknotes and coins. Instead, transactions are completed through digital means, such as credit and debit cards, mobile payments, and online banking. Digital payments are often faster and more convenient than cash transactions. Corruption can be reduced by using the proposed artificial intelligence-based system to detect anomalous digital transactions.

Keywords: Corruption; Cashless society; Artificial intelligence; Digital transactions; Data set

1. Introduction

Crimes are committed in Bangladesh every day. The Anti-Corruption Commission is making tireless efforts to build a corruption-free, developed, and prosperous Bangladesh [1] [2].

1.1. There are different types of crimes committed daily in Bangladesh

1.1.1. Money Laundering

Transforming illicitly obtained funds into authorized revenue is known as money laundering. It is challenging to track down the illegal source of money that is obtained through numerous means used by criminals to "clean" proceeds from crimes like drug trafficking, fraud, or corruption. The three steps of this technique are usually placement, layering, and integration. The "dirty" money is injected into the financial system at the placement stage, typically through bank deposits or company investments. The money is moved via a number of intricate transactions during the layering step in order to hide its origins. This can entail making foreign money transfers, buying expensive items, or shifting money across accounts. The laundered money is reintroduced into the economy as legitimate income in the final stage, integration, frequently through investments in real estate, upscale items, or lawful enterprises. The global financial system is seriously threatened by money laundering because it enables criminals to profit from their illicit operations

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without being discovered. In order to tackle this problem, a number of nations have passed anti-money laundering (AML) legislation, requiring financial institutions to keep an eye on transactions, confirm the identity of their clients, and report any questionable activity. Money laundering remains a concern because of the sophisticated methods that criminals continue to utilize to conceal their actions.

1.1.2. Bribery Transactions

Bribery is the act of offering, donating, receiving, or requesting anything of value in order to sway the decisions of an official or other person in a position of power. Bribery usually takes place in return for preferential treatment, such as getting contracts, getting out of trouble, or getting an advantage in negotiations or the courts. These exchanges damage equity, degrade public confidence, and may even spark widespread corruption. Most jurisdictions prohibit bribery, and both the provider and the recipient may suffer serious legal repercussions. Bribery is still a major problem in many industries around the world, even with tight rules.

1.1.3. Illegal Acquisition of Wealth

The practice of acquiring money, property, or assets through dubious means—such as fraud, theft, embezzlement, corruption, or drug trafficking—is referred to as illegal wealth acquisition. This wealth growth frequently entails unethical or illegal behavior, which can have a serious negative impact on people, companies, and society as a whole. In addition to upsetting economic justice, acquiring riches illegally increases inequality, undermines institutional trust, and encourages more criminal activity. Governments and law enforcement organizations endeavor to identify and bring charges against people implicated, but this is still a persistent worldwide problem.

1.1.4. VAT and AIT Evasion

Evading AIT (Advance Income Tax) and VAT (Value Added Tax) is a major problem for many economies. In order to lower their tax obligations, companies and individuals engage in these activities of underreporting or hiding revenue and transactions. While AIT evasion frequently entails underreporting income or taking advantage of legal loopholes, VAT evasion can happen through fraudulent invoicing, underreporting sales, or engaging in informal sector activities. Evasion of this kind damages public services and infrastructure by undermining government revenue. Stricter enforcement of tax rules, better tax administration, and public awareness campaigns emphasizing the advantages of a fair tax system are all necessary to combat these problems.

1.1.5. Debt default

When a borrower—whether an individual, business, or government—fails to fulfill their legal duties to repay a loan, it is known as debt default. Economic downturns, bad management, and unstable finances can all contribute to this. The consequences of default are dire; they can result in increased borrowing rates, a tarnished credit rating, and legal action. For countries, default can lead to financial crises, lower investor confidence, and impede access to global financial markets. To mitigate the risks associated with debt default, responsible financial management, emergency preparation, and open dialogue between lenders and borrowers are necessary in order to identify workable solutions and preserve economic stability.

1.1.6. Filing a false complaint

A false complaint entails purposefully giving authorities inaccurate or misleading information, which carries serious repercussions. Such acts misallocate scarce resources, deflect focus from important problems, and may unjustly damage the accused's freedom or reputation. Filing a fraudulent complaint can have legal consequences such as fines, criminal penalties, and sometimes even jail time. It can also deter real victims from coming forward by undermining the legitimacy of the justice system. Strict legal sanctions, public awareness efforts, and the maintenance of an exhaustive and unbiased inquiry process are all necessary to prevent false accusations and preserve justice and integrity.

1.1.7. Forgery:

The act of creating, modifying, or imitating papers, signatures, or other objects with the intention of misleading is known as forgery. This offense might include a broad range of actions, such as forging legal documents or counterfeiting money. Forgery has serious repercussions, such as financial harm to victims, loss of trust, and legal fines. It compromises the integrity of the legal and financial systems, which has wider societal repercussions. Strict legal regulations, cutting-edge detection tools, and public awareness are all necessary to combat forgeries. Effective controls guard against fraud and guarantee the legitimacy of papers for both people and organizations.

1.1.8. Abuse of power

Authority figures who abuse their position by using it for their own benefit or to control others are guilty of power abuse. Suppression of dissent, harassment, corruption, and favoritism are just a few ways that this misuse might appear. Fairness and justice are undermined, morale is damaged, and trust in institutions is weakened by such acts. Not only might the victims be negatively impacted, but the entire community may also be affected. Strong moral principles, open supervision procedures, and an accountability-focused culture are necessary to combat power abuse and guarantee that authority is used sensibly and for the benefit of everybody.

1.2. Cashless society perspective in Bangladesh

Developments in digital banking technology and rising mobile phone usage are propelling Bangladesh's shift to a cashless society. Reducing corruption, improving financial inclusion, and streamlining transactions are the goals of this move. In remote areas with limited access to traditional banking infrastructure, mobile banking services such as bKash, Nagad, Sure-Cash, U-cash, and Rocket are making financial services more accessible. Still, in order to guarantee a smooth transition, issues like cybersecurity, infrastructure deficiencies, and digital illiteracy must be addressed. Bangladesh's cashless economy will need to be secure and inclusive, and this will require public education, private sector innovation, and government measures.

1.2.1. Advantage

In Bangladesh, implementing a cashless society has many benefits, such as improved financial inclusion, less corruption, and heightened economic efficiency. Financial inclusion is promoted via digital transactions, which make it easier for the unbanked people to use banking services. Electronic payments also reduce corruption and tax avoidance by producing clear, traceable financial traces. Digital transactions are faster and more convenient than cash transactions, which encourages economic activity and lowers associated costs. A cashless economy can also spur technology advancement and offer useful data for improved economic development and planning.

1.2.2. Disadvantage

There are a number of drawbacks to a cashless society in Bangladesh, one of which being the potential exclusion of groups like the elderly and rural residents who lack access to digital infrastructure. Users that deal digitally may be vulnerable to security lapses and cyberfraud. Furthermore, industries that depend on handling cash may lose jobs because of the change. The reliance on electronic systems makes one more susceptible to power outages and technological malfunctions. To guarantee widespread digital literacy and cybersecurity awareness, the shift also necessitates a significant investment in technology and education, which might be difficult in a developing nation like Bangladesh.

1.2.3. Challenge

Bangladesh is facing several obstacles in its transition to a cashless society, including a lackluster digital infrastructure, particularly in rural regions, and restricted internet access. A lot of people are not digitally literate enough to use electronic payment systems safely. Cybersecurity dangers are serious and could erode confidence in online transactions. Furthermore, low-income people may find the high cost of smartphones and data subscriptions to be prohibitive. Significant investments in cybersecurity, technology, and teaching are needed to ensure broad adoption. In addition, there are still significant obstacles in the way of Bangladesh's transition to a cashless society, including dealing with opposition to change and guaranteeing fair access to digital financial services.

1.3. Artificial Intelligence

Artificial Intelligence (AI) is crucial in facilitating the transition to a cashless society by improving effectiveness, safeguarding against threats, and raising user satisfaction. Artificial Intelligence (AI) plays a significant role in facilitating this transition by contributing in the following ways:

1.3.1. Fraud detection and prevention

Artificial intelligence systems have the capability to examine transaction patterns in real-time in order to detect abnormal activity that could potentially signify instances of fraud or financial crimes [3]. Artificial intelligence systems evaluate the potential danger linked to transactions and identify questionable activity for additional scrutiny.

1.3.2. Enhancing Security

AI-driven biometric solutions, such as facial recognition or fingerprint scanning, enhance security and mitigate the potential for unwanted access to accounts. Artificial intelligence (AI) contributes to the development of sophisticated encryption methods to enhance the security of data and transactions.

1.3.3. Personalized Financial Services

Artificial intelligence (AI) utilizes data on consumer behavior and preferences to provide tailored banking services and suggestions. AI-powered chatbots offer immediate assistance and manage regular requests, enhancing customer service and interaction.

1.3.4. Streamlining Transactions

Artificial intelligence (AI) streamlines different banking operations, including loan authorizations, account administration, and transaction handling, resulting in improved speed and efficiency. Artificial intelligence (AI) utilizes predictive algorithms to forecast trends and analyze consumer behavior, enabling businesses and banks to enhance their services and plans for maximum efficiency.

1.3.5. Financial Inclusion

Artificial intelligence facilitates the development of mobile banking and digital payment systems, hence enhancing the accessibility of financial services for marginalized communities. Artificial intelligence-powered translation and communication technologies dismantle linguistic obstacles, enhancing the inclusivity of financial services [4].

1.3.6. Regulatory Compliance

Artificial Intelligence (AI) aids in ensuring compliance with Know Your Customer (KYC) and Anti-Money Laundering (AML) rules by automating the verification process and monitoring transactions for adherence to regulatory requirements. Artificial intelligence (AI) facilitates the analysis of extensive datasets to verify compliance with financial legislation and standards.

1.3.7. Consumer Behavior Insights

Artificial intelligence (AI) examines consumer purchasing patterns to provide insights and predictions, assisting firms in customizing their tactics to adapt to evolving customer habits. Artificial intelligence (AI) utilizes advanced algorithms to analyze and forecast market trends, providing valuable insights for organizations and financial institutions to enhance their strategic planning and decision-making processes.

1.3.8. Fraud Prevention in Digital Payments:

AI models undergo continual learning and adaptation to emerging fraud trends, hence enhancing the precision of fraud detection systems. Artificial intelligence systems continuously monitor digital payment transactions in real-time to identify and proactively prevent fraudulent behavior.

1.4. Abnormal transactions

Abnormal transactions in the banking sector are activities that deviate from the expected or typical financial behavior, frequently suggesting potential issues such as money laundering, fraud, or other illicit activities. Sudden and substantial deposits or withdrawals that do not correspond with a customer's typical banking behavior. Repeated and illogical transfers between accounts, particularly those that involve international transfers or multiple institutions. Transactions that are designed to circumvent reporting requirements, such as the division of a substantial deposit into smaller quantities that are just below the reporting threshold. Inconsistent account transactions with the customer's profile, such as a dormant account that becomes active abruptly or a low-income individual conducting high-value transactions. The rapid transfer of funds across multiple accounts without a distinct business purpose. Transactions that involve countries or entities that are known to have a higher risk of financial crime, or abrupt activity involving unfamiliar entities. Creating numerous accounts with minor variations in their names and conducting identical transactions across them. Repeated withdrawals of substantial amounts of cash from ATMs, particularly when these do not correspond to the account holder's typical utilization pattern.

1.4.1. Implications

Unusual transactions frequently indicate efforts to finance terrorism, launder money, evade taxes, or engage in other unlawful activities. It is mandatory for banks to adhere to regulations that mandate the reporting of suspicious activities. Failure to identify and disclose abnormal transactions may result in penalties. Banks are susceptible to substantial operational risks, such as reputational harm and prospective losses, as a result of these transactions. In the event that clients perceive the bank as unreliable or insecure in its protection of their assets, they may lose trust in the institution.

1.4.2. Detection and Prevention

Utilizing advanced software to identify anomalies and patterns that indicate anomalous transactions. Regular training is provided to bank personnel to enable them to identify indicators of suspicious activity and comprehend the reporting procedures. To guarantee that the bank comprehends the typical behavior and risk profile of its consumers, it implements rigorous KYC procedures. Compliance with local and international regulations, which includes the prompt reporting of suspicious transactions to relevant authorities.

2. Methodology

2.1. Tactical migration to a cashless society in Bangladesh:

To transition to a cashless society, every individual in the community should be encouraged to use bank transactions, mobile banking, and internet banking instead of cash transactions, and assurances must be provided regarding the security of their money. The Bangladesh Bank should withdraw 1000/=, 500/=, and 200/= taka notes from the market because people will need to go to banks for transactions involving larger amounts of money. As much as possible, transactions for government offices, private offices, schools, colleges, universities, shopping malls, purchasing and selling goods at local markets, buying and selling land and flats, and other transactions should be completed through the banking system. This will facilitate the transition to a cashless society. When buying or selling land, flats, or any item worth more than two lakh Taka, the details of the bank transaction must be submitted.

2.2. Corruption minimization systems (CMS) Architecture:

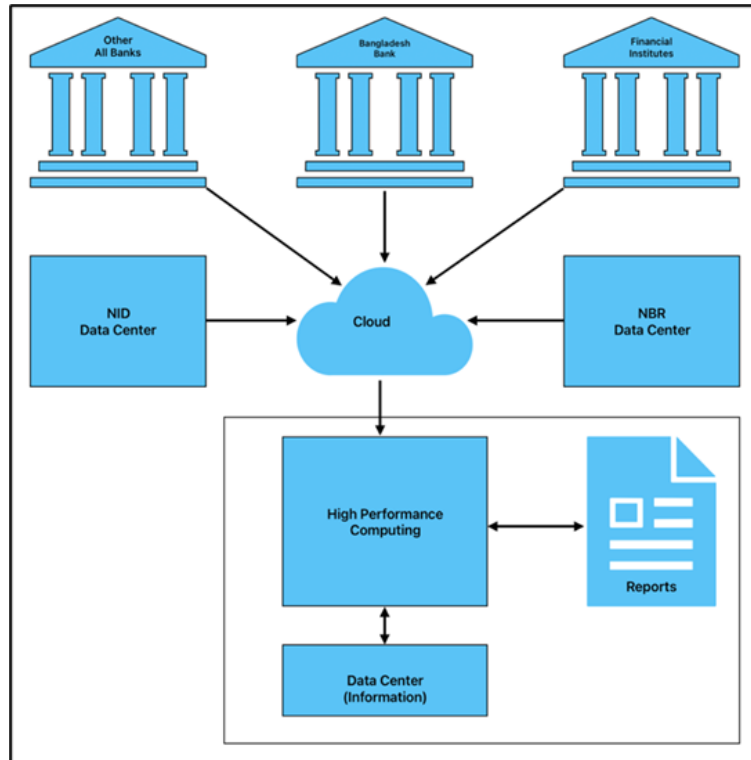


Figure 1 Corruption minimization system

The system (Fig. 1) will collect and preprocess data every day from 7:00 PM to 1:00 AM (during which banking transactions are fewer) and provide information. From 1:00 AM to 7:00 AM, CMS will process the information and

provide knowledge/insight-based data, processed data will be stored in database based on data-clustering technique [5]. This data will include a list of unusual transactions and reports with graphical representations.

2.2.1. Data Collection and Preprocessing:

Information will be collected from the NID (National ID) server.

TIN (Taxpayer Identification Number) data will be collected from the NBR (National Board of Revenue).

Bank account information will be collected through the "Read-Only Data Communication Gateway" from banks. Currently, such gateways are used in Bangladesh, like the National Payment Switch Bangladesh (NPSB) and the Credit Information Bureau (CIB).

Bank account information will be cross-matched with NID data and TIN data to verify the bank account. Information-datasets of valid and invalid information will be prepared.

Debit and credit transaction data will be collected from banks through the "Read-Only Data Communication Gateway." Transaction-datasets will be prepared through statistical analysis.

Income tax return data will be collected from the NBR, and an asset-dataset will be prepared through statistical analysis.

A law-dataset will be prepared encompassing all the laws related to corruption.

2.2.2. The preprocessed datasets include:

Information Dataset (Table 1), Transaction Dataset (Table 2), Asset Dataset (Table 3), and Law Dataset (Table 4).

Table 1 Structure of information-dataset

Sl. No.	Documents
1	UID (Unique Id)
2	NID (National Id)
3	Name
4	Address
5	Bank Name, Branch
6	Account Name
7	Profession
8	Monthly Income (approximate)

Table 2 Structure of the transaction-dataset

Sl. No.	Documents
1	UID (Unique Id)
2	NID (National Id)
3	Account Number with Bank
4	Credit Amount
5	Debit Amount
6	Threshold Amount
7	precision amount of abnormal transaction (%)

Table 3 Structure of asset-dataset

Sl. No.	Documents
1	UID (Unique Id)
2	NID (National Id)
3	TIN (Tax identification number)
4	Asset value
5	Threshold value
6	precision value of an abnormal asset (%)

Table 4 Structure of law-dataset

Sl. No.	Documents
1	UID (Unique Id)
2	NID (National Id)
3	TIN (Tax identification number)
4	Crime description
5	Section of crime law
6	Punishment of crime according to law

2.2.3. The artificial intelligence model needs to be regularly retrained with new data. Corruption strategies undergo changes as time progresses, and therefore, the AI systems created to identify them must also adapt. Machine learning models undergo constant updates with new data and feedback from human investigators, enabling them to dynamically adjust to emerging dangers. This ongoing process of learning guarantees that the system remains efficient in dealing with the evolving strategies and methods employed by corrupt entities.

2.2.4. Minimum hardware & software requirement of application development:

Table 5 Language & Library Specification

Sl. No.	Description	Specification
01	Operating System	Red Hat Enterprise Linux
02	Programming Language	Python
03	RESTful API	FastAPI
04	Python Library	Keras OpenCV TensorFlow PyTorch Scikit-Learn NumPy Matplotlib Pandas
05	Database	MongoDB Oracle Database

Table 6 Minimum Hardware Specification

Sl. No.	Device Name	Specification
01	Processor (CPU)	256 Tera Floating Point Operations Per Second
	Processor (GPU)	128 Tera Floating Point Operations Per Second
02	Primary Memory	2 Terabyte
03	Storage	Boot Drive: 4 Terabyte SSD Data Storage: 1024 Terabyte SAS

3. Results

An artificial intelligence model will be used to compile a report. A list of individuals with taxable income who do not file returns. A list of individuals who file returns but do not accurately report their income, creating a list of potential black money. A list of bank transactions that are inconsistent with income and expenditure. For example: a monthly income of 50,000 BDT, expenses of 45,000 BDT, a DPS of 3,000 BDT, leaving 2,000 BDT in the bank, but suddenly having a deposit of 1,000,000 BDT in the bank account. or, someone who has not purchased any property but has taken a loan of 1,000,000 BDT from the bank. A list of individuals who have no income but possess assets. A list of individuals with no income or loans but with high expenditures.

4. Conclusion

In the era of digital advancements, it is imperative that we adapt our instruments to effectively battle the ever-evolving corruption. AI-powered anti-corruption solutions provide a strong and adaptable solution for identifying unusual transactions and decreasing the occurrence of corrupt practices. Through the utilization of sophisticated algorithms, instantaneous data analysis, and ongoing knowledge acquisition, these systems can offer a proactive and effective method for upholding financial honesty and clarity. Nevertheless, the effective execution of such systems necessitates meticulous deliberation regarding data security, privacy, and the essential function of human supervision. As technological progress continues, the incorporation of artificial intelligence (AI) into anti-corruption initiatives will become a crucial element in the worldwide battle against corruption

Compliance with ethical standards

Disclosure of conflict of interest

This work has no conflicts of interest in terms of financial and interpersonal from any of the authors.

References

- [1] Anti-Corruption Commission, Dudok barta, April-2024, Volume- 47th, <https://acc.org.bd/site/view/publications>
- [2] Anti-Corruption Commission, Dudok barta, October-2023, Volume- 46th, <https://acc.org.bd/site/view/publications>
- [3] Gilbert, Mazin, ed. Artificial intelligence for autonomous networks. CRC Press, 2018, DOI: 10.1201/9781351130165
- [4] Mhlanga, D, FinTech, Financial Inclusion, and Sustainable Development: Disruption, Innovation, and Growth (1st ed.). Routledge., 2024, DOI:10.4324/978103265798
- [5] M. H. Rahman, F. B. Al Abid, M. N. Zaman and M. N. Akhtar, "Optimizing and enhancing performance of database engine using data clustering technique," *2015 International Conference on Advances in Electrical Engineering (ICAEE)*, Dhaka, Bangladesh, 2015, pp. 198-201, doi: 10.1109/ICAEE.2015.7506830.