COVID-19 AND ROLE OF DATA SCIENCE FOR ANTI-CORRUPTION

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Abstract

Corruptions prevail in various forms. Many governments have adopted e-governance system to control corruption. According to the Transparency International-2021, Corruption Perceptions Index (CPI) becomes higher when there are political instabilities. CPI for Afghanistan is 16 while for Bhutan it is 68 South Asian countries. Corruption negatively impacts both public and private bonds. Many corrupted people thrive well at the cost of infrastructure. E-governance allows citizens to monitor the activities of government directly through computers, smartphones, and the Internet. Maintaining transparency will help the government and public more accountable. In developing countries like Nepal where all aspects of the government have not been digitalized, e-governance may not solve all the problems. The quantity of numerical data is growing in parallel with the digitalisation of our social and economic activities. Big data is considered to be the "new oil" of AI. AI/ML is that it can pore through vast quantities of data in a short time, and can enable users to detect anomalies more quickly and accurately, make predictions and/or find meaning in high volumes of data. The data of CPI is analyzed 2018-2021 of South Asian countries by ANN, AI and ML. Algorithms have been proven to be highly accurate by academic literature. algorithm was able to predict with more than 90 percent accuracy whether there was corruption or not based on the data that was available.

Keywords: Data science, artificial intelligence, corruption, e-government

Introduction

Corruption is the abuse of entrusted power for private gains. This has been one of the serious problems in social, political, and economic sectors (Fisman and Golden, 2017a). Emerging in various forms, it undermines the efficiencies of public institutions, widens gaps in inequalities, and thereby hinders the achievement of the UN sustainable development goals (Rothstein and Varriaich, 2017). Corruption weakens democratic institutions, it distorts electoral processes, perverts the rule of law, and creates bureaucratic quagmires for personnel gains. Economic growth ruins, foreign direct investment is discouraged, and small businesses find it impossible to start-up as the cost increases while bribing government personnel and politicians. All these developments contribute to CPI. In 2016, the government of India started 'Operation Clean Money' which removed small notes from the Indian currency. It implemented updating the

'Benami Transaction' Acts. The government set out to reduce tax elusion by announcing new tools, but also by taking out outdated elements. Detaching the small banknotes was meant at reducing the black economy.

Every nation may have corruption in one or more of its manifestations. Government employees abuse their position of authority and the trust placed in them by accepting bribes as offers or by receiving cash or services in violation of the law. Illegally, they may help in tax evasion, unlawful bids, and procurements. In the public sector, corruption is defined as the misuse of an employee's authority to breach the law to obtain "profits" that benefit private companies (OECD, 2005). Numerous types and degrees of corruption, including collaboration, bribery, extortion, fraud, embezzlement, abuse of trust, and favoritism, have been documented (Chan and Owusu 2017; Moran 2001; Vargas-Hernández 2009). The digitalization of government operations could aid in the regulation of such illicit activity. This paper reviews literature related to corruption and presents some doable solutions to ameliorate some of the corrupt practices prevailing in society.

Abstract: Corruption according to the UN is present in various forms and types,

Literature Review

Out of 180 countries, Nepal is ranked 117th (CPI, 2021). Poverty is one of the main causes of corruption in Nepal, among other factors. To combat corruption, Nepal has to encourage the use of technology for more effective, transparent, and responsive service delivery. Corruption may be lessened by creating databases and utilizing artificial intelligence (AI) to examine recent occurrences (Metz and Satariano, 2020). The Right to Information Act, 2009 and the Regulations, 2009: Provisions for Disclosure of Information and Promotion of Transparency, must be effectively implemented in Nepal. In Nepal today, corruption is pervasive. There is a lack of significant dedication from political leadership. Although the Nepali government has released a work plan and anti-corruption policy, its implementation has not been sufficient. To combat corruption, the tactical plan should be fully implemented. The United Nations Office on Drugs and Crime (UNODC 2020) proposes that less than 50% of key agencies in the region utilize some limited form of data analytics as part of anti-corruption, fraud or anti-money-laundering activities. Digitalization can save government revenues by building transparent procurement processes, reducing the sheer economic drain of corruption. The digitalization of government services brings enormous potential when it comes to cooperation between government agencies and beyond. Authoritarianism makes anti-corruption efforts dependent on the whims of an elite. Ensuring that civil society and the media can speak freely and hold power to account is the only sustainable route to a corruption-free society.

COVID-19 and Corruption

Although the COVID-19 pandemic has made corruption more likely, it has also forced many government agencies to automate their processes to better prepare for emergencies. COVID-19 provides a doorway for repression and corruption in the absence of checks and balances. Despite the large financial allocations for crisis response and recovery, insufficient oversight and accountability mechanisms were in place. During COVID-19, corruption in the payment systems took many different forms, including embezzlement, preferential treatment, price extortion, unreported overpayments, and influence trading. Organized crime groups made money off of the pandemic by selling phony medical supplies, illegitimately obtained prescription drugs, and testing kits. Private sector corruption seriously hampered the rehabilitation process and jeopardized efforts for recovery and pandemic support. Not only does it undermine efforts to repair, but it also undermines public confidence in institutions and democracy. The CPI's data sources specifically address the following instances of public sector corruption: bribery, misappropriation of public funds, and officials abusing their positions for personal benefit without repercussions.

Anti-Corruption law in Nepal

The statement of King Prithvi who wrote 250 years ago "A person who gives or takes a bribe is the enemy of the nation and he deserves the death penalty" shows the rigorous attitude towards corruption in Nepal. The policy still continues as the government has passed a policy of "Zero Tolerance" to corruption. However, the problem endures in Nepalese society. The Civil Code of 1854 was the first Act that criminalized the corrupt activities of public officials in Nepal. After a century, in 1954, a special law regarding corruption came into force. Afterwards, in 1957, 1961, and 2002 new corruption control Acts were passed; and each Act, one after another, repealed the earlier ones. Nepal's signature of the United Nations Convention against Corruption (UNCAC) in 2003 is a notable step towards reform and international networking in this area. CIAA is the principal organ that is responsible for the investigation and prosecution of corruption cases. Proper utilization of judicial administration in combating corruption requires certain reforms. Even as corruption has been on the rise in Nepal, the cases registered by the Commission for the Investigation of Abuse of Authority are becoming weaker. Of the cases registered by the Authority (CIAA) at the Special Court in the financial year 2078/079, corruption was proved in only about 39 percent of cases. The Special Court has acquitted many corruption-accused, citing a lack of enough evidence.

Data Science and Digitalization for Anti-corruption

The term "big data" refers to high-volume, high-velocity, and diverse information assets that are too huge and complicated to be efficiently stored using antiquated techniques as a result of the ever-growing amount of data. The use of machinery is emerging as a crucial ally in the war against corruption. AI still lacks human-like soft abilities like empathy, persuasion, other typically interpersonal skills, even though it can process

massive amounts of data more quickly, produce results with surgical accuracy, and employ picture facial recognition techniques to identify people at crime scenes. AI cannot comprehend and analyze intangible characteristics like emotions and other behavioral qualities that drive people to commit crimes like corruption. Data systems and processes are the subject of the large field of research known as "data science," which aims to preserve data collections and derive meaning from them. To make meaning of seemingly random data clusters, data scientists utilize a variety of instruments, programs, theories, and algorithms. Many data-oriented tools, such as SQL, Python, R, Hadoop, etc., are used in data science. Every day, humans display intelligence in the form of abilities including reading written language, hearing voices, using medical equipment, identifying objects from photos, and scheduling their activities to make the most of their time. Most are learned by our brains naturally as we grow and interact with the world around us and are then refined and advanced by formal learning. The advances in AI have benefited virtually every commercial industry. Data Science can include processing the data, performing statistical analysis of the data, and presenting the data in ways to identify the root cause of corruption. The top fields in Broadcasting, transportation, and the biological and medical sciences all use AI techniques. In telecommunication, the key sectors are computer networks and the Internet, radio and television, broadcasting, telephony, videoconferencing, and Voice over Internet Protocol. Bioinformatics, biological engineering, biomechanics, drug research, genetics and genomics, medical imaging, neuroscience and neurorobotics, medical informatics, nutrition and food science, physiological parameter monitoring, and public health are the fields in which artificial intelligence is most used in the biological and medical sciences. In addition to these domains, finance also employs AI and Big Data technology, mostly for money laundering and fraud detection.
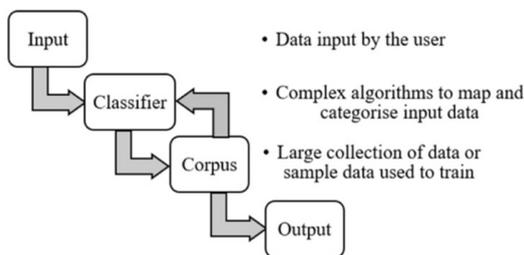
Figure 1: How machine learning works?
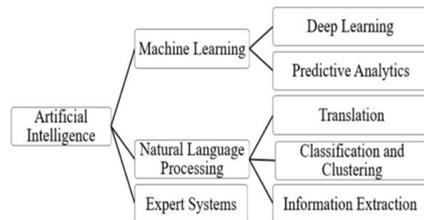
Figure 2: Overview of AI

AI tools are used for facilitating procedural automation by translating, transcribing, summarizing evidence, and even drafting compilatory parts of legal documents and arbitral awards. It has been implemented in a wide range of domains, hinting at its positive potential to affect society. It can contribute to faster, more efficient processes, invigorate the economy, address environmental challenges, and deliver breakthroughs in biological sciences, such as predicting the folding of proteins. The growing influence of AI in society has also led to the development of AI systems in the fight against corruption. It has been used to automatically predict corruption risks based on data from news

media, police archives, and financial reports. Machine-readable data is information in a format that can be easily processed by a computer without human intervention. It is the ability of computers and algorithms to perform tasks and solve complex problems that would normally require the natural human intelligence, reasoning, and prediction power needed to adapt to changing circumstances. AI is composed of several technologies including:

- Algorithm is a sequence of computer instructions, typically to solve a class of problems or to perform a computation.

- Data mining refers to the use of machine-learning algorithms to find faint patterns of relationship between data elements in large, noisy, and messy data sets, which can lead to actions to increase benefit in some form (diagnosis, profit, detection, etc.).

- Artificial Neural Network (ANN) is a learning process inspired by the neural structures of the brain. The network is a connected framework of many functions (neurons) working together to process multiple data inputs.
- Fuzzy logic is a decision-making approach which is not based on the usual true or false assessment, but rather on degrees of truth.

Data Science in Finance Institutions

Data science removes uncertainty from decision-making. In the world of finance, quick choices are required for numerous situations. Data science applications in the finance sector include fraud detection, fraud management automation, managing customer data and prediction, data mining to fight corruption, and more. Big data will be crucial in gathering and assembling information about corruption from diverse sources. The process of mining involves gathering vast amounts of data from pertinent sources, after which an AI system scans the data for patterns and anomalies to identify particular correlations between variables.
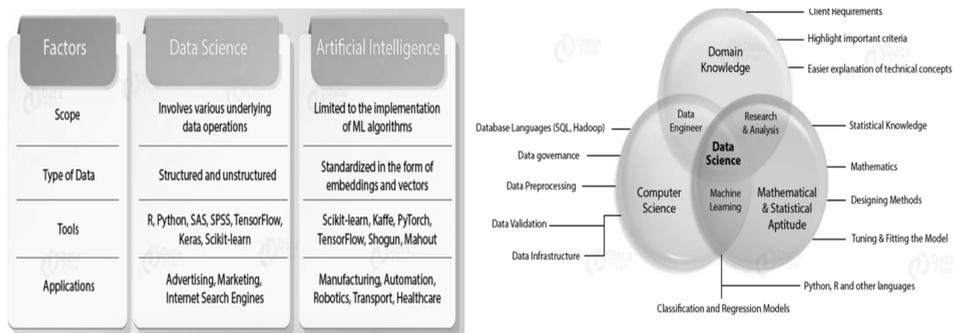
Figure 3: Data science vs AI

Another subset is the classical machine learning models, which make use of probabilities to make predictions, wherein statistical methods are used to obtain the output. The

expression 'tools of predictive justice' comes from predictive analytics, wherein historic and current facts are used to predict unknown future values or provide actionable insights.

In our highly digitized societies, AI is embedded in gadgets, cars, and consumer goods. Algorithms calculate what music you should listen to base on your previous choices. Machines suggest which book to buy or whom to invite for a date. Technology is affecting more and more parts of life in sufficiently digitized economies with a certain level of e-government, where transactions or interactions with authorities to a large extent are digital. Automated decision systems are controversial but still deployed in social security programs, within the legal sector, in policing, insurance and security. AI and machine learning are also applied to uncover or detect money laundering. Tax authorities use AI to predict risk for tax evasion, or to monitor and identify suspicious tenders or bids in public procurement. Transparency International UK is adopting AI solutions to automate searches in public records and strengthen its analytical capacity.

Research Methodology

The methodology for this study is quantitative and correlative. The public sector corruption data was taken from the World Bank's (2011), World Governance Indicators (WGI). The commonly used Corruption Perceptions Index (CPI) from Transparency International (2021) is, by comparison, an incomplete dataset, as it aggregates corruption into a single index, which leads to the inability to analyze the different facts of corruption and analyzed by SPSS. The Transparency International uses a scale from 0 to 100. 100 is very clean and 0 is highly corrupt. Algorithms never operate in a vacuum but are embedded in social contexts. Money laundering is also detected using AI and machine learning. AI helps to predict tax evasion risk and track suspicious tenders or bids in public procurement. Transparency International UK is using artificial intelligence to automate public record searches. The use of AI in governance and decision-making raises concerns about biased outcomes. The forum conducted surveys about corruption perception in the areas of export and import, public service, tax payment, contracts, and judicial decisions.

Results and Discussion

The public sector corruption data was taken from the World Bank's (2011) World Governance Indicators (WGI). The commonly used Corruption Perceptions Index (CPI) from Transparency International (2021) is, by comparison, an incomplete dataset, as it aggregates corruption into a single index, which leads to the inability to analyze the different facts of corruption and analyzed by SPSS. The Transparency International uses a scale from 0 to 100. 100 is very clean and 0 is highly corrupt. Even in South Asia, Nepal has been ranked below Bhutan (25th), Maldives (85th), India (85th) and Sri Lanka (102nd) but Pakistan (140th), Bangladesh (147th) and Afghanistan (174th) are the only countries behind Nepal. World Economic Forum dropped Nepal's sharply by six points to 34 in 2021 from 40 in 2020. The table shows the trend of CPI index in SAARC countries.

Table 1: CPI Index

Country	CPI 2021		CPI 2020		CPI 2019		CPI 2018	
	Score (100)	Rank (180)	Score (100)	Rank (180)	Score (100)	Rank (180)	Score (100)	Rank (180)
Bhutan	68	25	68	24	68	25	68	25
India	40	85	40	86	41	80	41	78
Sir Lanka	37	102	38	94	38	93	38	89
Pakistan	28	140	31	124	32	120	33	117
Maldives	40	85	43	75	29	130	31	124
Nepal	33	117	33	117	34	113	31	124
Bangladesh	26	147	26	146	26	146	26	149
Afghanistan	16	174	19	165	16	173	16	172

Source: South Asia: CPI 2018-2021 (Score: 0-100, Rank: from top)

Figure 4: Corruption score and rank of South Asian countries comparing with the least corrupted countries
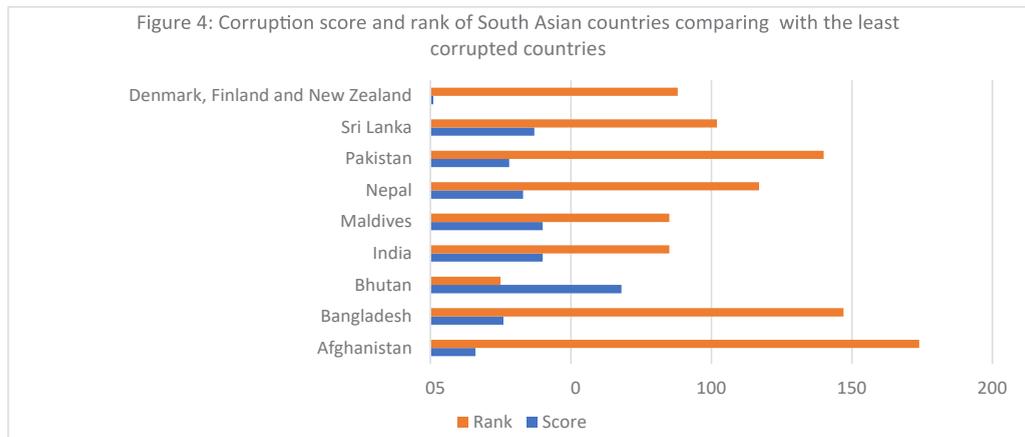
Figure 4: Nepal's Corruption score 2010-2021
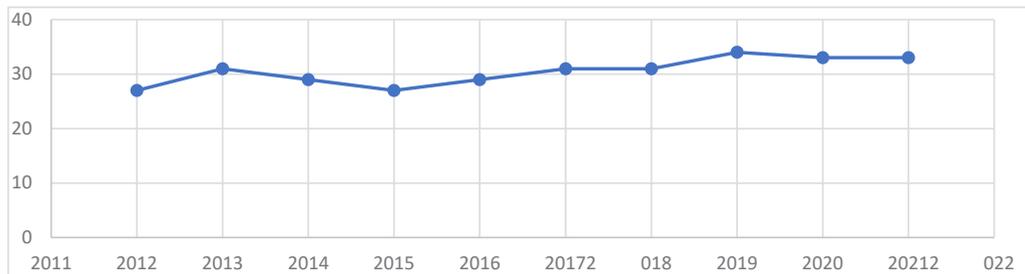
Figure 5: CIAA's Success rate (percentage)
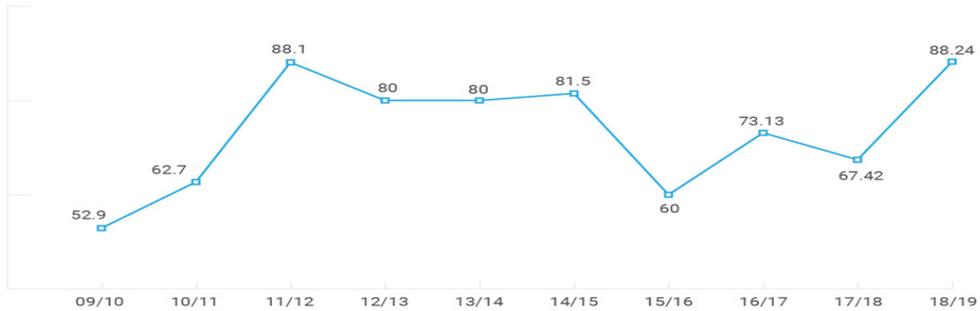
Source: CIAA (2020)

Using open data for anti-corruption

Digital data that is made available with the technical and legal characteristics necessary for it to be freely used, re-used, and redistributed by anyone, anytime, anywhere. Open data, like information, is a public good: available for all to access, use and apply. In 2013, G8 countries agreed to a set of six core principles, including that open data would be published 'openly by default' and 'usable by all' free of charge. Similar principles have been adopted by the G20 in 2015 and these countries have committed to implementing and promoting them. The roadmap to fight corruption with open data is an interactive tool to support open government reformers who want to advance anti-corruption. Open data can help prevent and tackle corruption, according to national law and experiences, by shedding light on government activities, decisions, and expenditures; as well as increasing levels of accountability, allowing citizens and government to better monitor the flow and use of public money within and across borders.

Conclusion

Nepal has a rich past of anti-corruption initiatives. But tangible outcomes are still a long way off. Many attempts have been made to address the problems caused by corruption by creating organizations, establishing standards, and raising awareness. The modern business world, development initiatives, and globalization have given corrupt individuals new opportunities. Remember that artificial intelligence is merely enhanced statistics, not magic. Bias, the monitoring environment, vulnerability to recurring losses, and inconsistencies between AI-based and methodical procedures are a few of the difficulties. The information acquired must be sufficient, true, unbiased, and relevant. AI and machine learning to explore the potential of data-driven corruption prediction and to identify data sets that prove to be of the greatest value in detecting problems, and understanding what other types of data would be useful to probe. In a digital age, power resides with those who have the code and the algorithms currently mostly large tech companies and governments. Although Nepal has attempted to improve the law and practice regarding corruption control for a long time, the results are not satisfactory. Data science tools like ML, ANN and AI should be applied in civil services to minimize corruption.

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