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Detection of Money Laundering using DataMining Techniques

Leela C P [1]
M.Tech scholar,
AIT Chikamagaluru,
Karnataka, India

Bhavana D E[3]
Asst. Professor,
AIT Chikamagaluru,
Karnataka, India

Dr Pushpa Ravikumar [2]
Professor & Head,
AIT Chikamagaluru,
Karnataka, India

Keerthishree[4]
Asst. Professor,
AIT Chikamagaluru,
Karnataka, India

Abstract:- The illegal act of hiding the source of money obtained illegally through a complex web of financial transfers or commercial transactions is known as money laundering. All things considered, this process implies and indirectly gives the money launderer back the "clean" money. Money laundering is the process of changing the hue of money. It is also a virus that affects the finance sector. The three steps are integration, layering, and placement. There are several methods used globally to identify money laundering at various phases. This is our new approach, which is more accurate and starts with deep learning. Here, we have some algorithms Randoms Forest, Decision Tree and also ANN techniques to detect fraud by implementing in a code. We can detect money laundering is occurred or not if yes it will show the alert message. **Numerous financial institutions and industries profit from this, particularly banks**.

Keywords:- *Money Laundering, Decision Tree(DT), Random Forest(RF), Artificial Neural Network(ANN).*

I. INTRODUCTION

Money laundering is the process of disguising illegally obtained funds as legitimate or "clean" by entwining them with a web of intricate financial transactions. The goal of money laundering is to hide the true source of the cash so that law enforcement can't easily link them to their illicit origin. Money laundering is the act of moving funds gained via a series of intricate financial transactions in order to disguise their true identity or appear "clean." The goal of money laundering is to hide the true source of the cash so that law enforcement can't easily link them to their illicit origin. Consequently, offenders might profit financially from their illicit activities without attracting notice to themselves. However, it is the duty of the financial industry and institutions to identify any illicit behaviour at each level of the procedure.

Income obtained through tax evasion mimics real income through this approach. Before money reaches the intended beneficiary's account, it passes through the whole global financial system. Tracing the money trail utilised for illicit operations can be difficult, particularly in the future. Financial crimes may be committed in a number of ways by utilising the economy's monetary system. [2][3][15].

There are several ways to introduce money into the financial system, including smurfing. Transfers between several bank accounts will be done to change the money's shape. This will help create a complex layer that will obfuscate the money's source and make it challenging to track them. Because deep learning makes it easier for financial institutions to see suspicious patterns and behaviours in vast volumes of transactional data, it is employed in the detection and prevention of money laundering [1].

A. Money Laundering

There are several ways to enter money into the financial system, one of which is smurfing. To alter its shape, the money will also be moved between several bank accounts. This will aid in the formation of a complex layer that will obscure the money' origins and make monitoring them difficult.

B. Machine Learning

Financial institutions may use machine learning to detect and halt money laundering by using it to help them spot questionable patterns and behaviours in large amounts of transactional data.

C. Deep Learning

Because deep learning makes it easier for financial institutions to see suspicious patterns and behaviours in vast volumes of transactional data, it is employed in the detection and prevention of money laundering.

II. LITRATUR SURVAY

Money laundering is the process of masking the proceeds of illegal activity by using a convoluted web of financial transactions. Financial institutions must abide by the law in all of their dealings and report any dubious activity to the appropriate authorities. Consequently, accurate money laundering detection may be achieved with the application of Explainable ANN and Deep Learning [1].

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The financial industry is growing all over the world despite the growing challenges of financial scandals, money laundering, and terrorism funding. The shortcomings of the financial system are a major topic of discussion. This assessment examines prior research, the advancement of knowledge, and real-world applications in the battle against money laundering and the support of terrorism. Additionally, proposals for possible future research are presented, along with information on the gaps in the preventative measures that governments have put in place to combat anti-terrorism funding (ATF) and anti-money laundering (AML) [2].

Money laundering is the process of turning illicit funds that appear to have come from a reliable source into lawful funds. Put another way, it inserts illegally obtained funds into the regular financial cycle or money circulation process while disguising them as legal tender. This research indicates that the SARS has a primarily negative influence, and that corruption and the SARS are two concurrent elements influencing the money laundering issue. [3].

The article examines global guidelines for preventing money laundering and corruption-related offences. In addition to their scope, several sections of the aforementioned international legal acts govern the investigation of crimes pertaining to money laundering, funding of terrorism, and corruption. The definition of the International Financial Acts [4].

A comprehensive review of the literature on money laundering was conducted, with particular attention paid to the databases Pro-Quest, Scopus, and Science-Direct. Large research themes were identified following a survey of the literature. The subject of detecting money laundering was then investigated in further detail. Main techniques for this kind of detection that make use of ML and DL have been found [5].
This paper's goal is to increase the application module's correctness. The paper is organized as, section I is with literature survey, II gives the research methodology , Machine Learning algorithms employed in III, IV with result and analysis, section V represents conclusion and VI is with the references.

III. RESEARCH METHODOLOGY

Machine Leaning Algorithms employed are,

- Decision Tree
- Random Forest
- Artificial Neural Network

The transfer of control from one state to another is depicted in a statechart diagram. A state is an object's existence that modifies itself in response to an external event. Statechart diagrams are mostly used to represent an object's lifecycle from creation to termination.

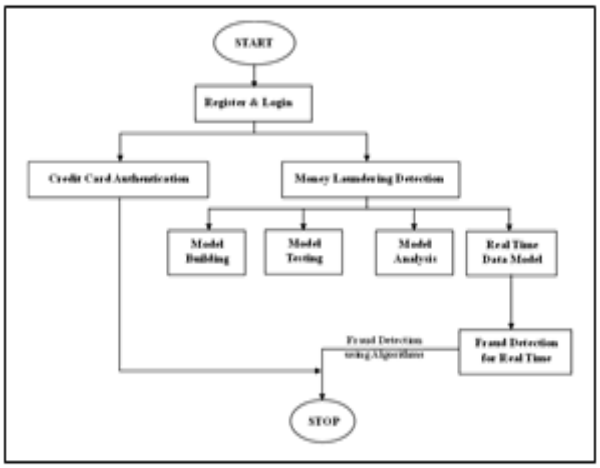

Fig. 1. State Chart Diagram

Fig 1. Represents the state chart diagram, the transfer of control from one state to another. Here model starts from registration state followed by login. Then it consists of Model Budling, Model Testing, Model Analysis and Real time data testing, through DT, RF and ANN algorithm execution. This diagram is used to represent the object's lifecycle of working model from creation to termination.

By increasing the transaction dataset size and also by increasing the number of hidden layers of ANN the desired accuracy has been achieved.

IV. RESULTS AND ANALYSIS

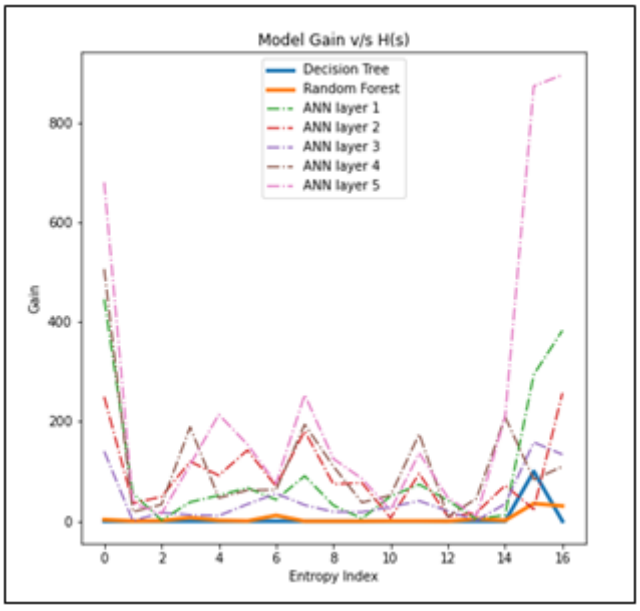

Fig. 2. Comparitive Chart for DT, RF and ANN

Fig 3, respresents the comparitive analysis of the model. Here, each algorithm is analysed by ploting ROC Curve for information Gain against the Entropy Index. By the comparision of algorithms the implementation of ANN gives more accuracy than DT and RF. It is also possible to create a confusion matrix to see performance measures like recall, accuracy, precision, and F1-score.

V. CONCLUSION

The main goal of money laundering is to convert dirty money into clean money. It is impossible to overestimate the role financial institutions play in money laundering. The results presented in this research lend support to the notion that financial institution fraud may be detected using DT, RF and ANN models. In this approach, the implementation of ANN is more accurate with 70% of accuracy. The study results reinforce the notion that models for DT, RF and ANN can be developed to spot unlawful conduct in financial institutions. Deep Learning with Explainable ANN can be used for Accurate detection of money laundering [1], is proposed but not implemented. Here Decision Tree has the accuracy of 50%, followed by Random Forest with 62% and Artificial Neural Network with more accuracy of 70%. Hence we can analyse that ANN gives the better results when compared to DT and RF. By increasing the transaction dataset size and also by increasing the number of hidden layers of ANN the desired accuracy has been achieved.

REFERENCES

[1]. Dattatray Vishnu Kute, Biswajeet Pradhan, Nagesh Shukla and Abdullah Alamri, Deep Learning and Explainable Artificial Intelligence Techniques Applied for Detecting Money Laundering-A Critical Review, IEEE 15 june 2021.

[2]. Al-Suwaidi, N. A., & Nobanee, *A survey of the existing literature and a future research agenda.* Journal of Money Laundering Control, Antimoney laundering and anti-terrorism fi nancing, 2020, Vol. 24 No. 2, pp. 396-426.

[3]. Amara, I., Khlif, H., & El Ammari, Strength of auditing and reporting standards, corruption and money laundering: A cross- country investigation. Managerial Auditing Journal, 2020, Vol. 35 No. 9, pp. 1243-1259.

[4]. F. A. T. Force. International Standards On Combating Money Laundering and TheFinancing Of Terrorism & Proliferation—FATF Recommendations, F.A.T.Force, Editor. 2020, Financial Action Task Force. 2021Global Money Laundering, crime, U.N.O.oD.a.., Vienna, Austria, Feb 2021.

[5]. M. Tiwari, A. Gepp, and K. Kumar, A review of money laundering literature: The state of research in key areas, Vol. 32 No. 2, pp. 271-303, 2020.

[6]. Ardizzi, G., De Franceschis, P., & Giammatteo,M. Cash payment anomalies and money laundering: An econometric analysis of Italian municipalities. International Review of Law and Economics, 2018.

[7]. Ardizzi, G., Petraglia, C., Piacenza, M., Schneider, F., & Turati, G. (2012). *Estimating Money Laundering through a "Cash Deposit Demand"* approach. 1–27, 2012.

[8]. Ardizzi, G., Petraglia, C., Piacenza, M., Schneider, F., & Turati, *Money Laundering as a crime in the fi nancial Sector: A new approach to quantitative assessment, with an application to Italy*. Journalof Money, Credit and Banking, 46(8), 1555–1590,2014.

[9]. Arnone, M., & Borlini, L. International anti-money laundering programs: Empirical assessment and issues in criminal regulation. Journal of Money Laundering Control, 13(3),226–271, 2010.

[10]. Ba, H., & Huynh, Money laundering risk from emerging markets: The case of Vietnam. Journal of Money Laundering Control, 2018

[11]. Badal-Valero, E., Alvarez-Jareño, J. A., & Pavía, J. M. *Combining Benford's Law and machine learning to detect money laundering*. An actual Spanish court case. Forensic Science International,2018.

[12]. Canhoto, Leveraging machine learning in the global fi ght against money laundering and terrorism financing: An affordances perspective. Journal of Business Research, 1–12.2020.

[13]. Chao, X., Kou, G., Peng, Y., & Alsaadi, F. E. (2019). *Behavior monitoring methods for trade based money laundering integrating macro and micro prudential regulation*, A case from China.Technological and Economic Development of Economy,25(6) 2019.9383

[14]. Chen, Z., Van Khoa, L. D., Teoh, E. N.,Nazir, A., Karuppiah, E. K., & Lam, K. S. (2018). Machine learning, 2018

[15]. F. A. T. Force. International Standards On Combating Money Laundering and TheFinancing Of Terrorism & Proliferation—FATF Recommendations, F.A.T.Force, Editor. 2020, Financial Action Task Force. 2021Global Money Laundering, crime, U.N.O.oD.a.., Vienna, Austria, Feb 2021.

[16]. Georgios Pavlidis, *Global sanctions against corruption and asset recovery: a European approach*, Journal of Money Laundering Control: Volume 26 Issue 1, at: issue 1 2nd march 2023.

[17]. Mohammed Ahmad Naheem, *Presenting a Legal and Regulatory Analysis of the United Arab Emiration'spast present and future* Chen, Z., Van Khoa, L. D., Teoh, E. N.,Nazir, A., Karuppiah, E. K., & Lam, K. S. (2018). Machine learning, 2018

[18]. F. A. T. Force. International Standards On Combating Money Laundering and TheFinancing Of Terrorism & Proliferation—FATF Recommendations, F.A.T.Force, Editor. 2020, Financial Action Task Force. 2021Global Money Laundering, crime, U.N.O.oD.a.., Vienna, Austria, Feb 2021.

[19]. Georgios Pavlidis, *Global sanctions against corruption and asset recovery: a European approach*, Journal of Money Laundering Control: Volume 26 Issue 1, at: issue 1 2nd march 2023.

[20]. Mohammed Ahmad Naheem, Presenting a Legal and Regulatory Analysis of the United Arab Emiration'spast present and future legislation on combating Money Laundering and Terrorist Financing, article published on: 2 march 2023, 1368-5201

[21]. Amara, I., & Khlif, Financial crime, corruption and tax evasion: A cross- country investigation. Journal of Money Laundering Control, 2018.