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# AN EFFECTIVE SPAM DETECTION TECHNIQUES FOR IOT DEVICES USING MACHINE LEARNING

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**ABSTRACT**

The rapid growth of the Internet of Things (IoT) has enabled billions of interconnected devices to exchange data and provide intelligent services across various domains, including healthcare, smart homes, industrial automation, and transportation. However, the increasing deployment of IoT devices has also introduced significant security challenges, particularly in the form of spam attacks, malicious communications, and unauthorized network activities. Traditional spam detection mechanisms are often inadequate for resource-constrained IoT environments due to their limited processing capabilities and evolving attack patterns. This paper presents an effective spam detection technique for IoT devices using machine learning algorithms. The proposed framework analyzes network traffic patterns, communication behaviors, device interactions, and message characteristics to identify spam activities and malicious transmissions. Machine learning models are employed to classify legitimate and spam communications based on extracted features and behavioral indicators. Data preprocessing, feature selection, and model optimization techniques are incorporated to improve detection accuracy and computational efficiency. Experimental analysis demonstrates that the proposed approach effectively detects spam activities, reduces false positive rates, and enhances the security of IoT networks. The developed framework provides an intelligent, scalable, and efficient solution for protecting IoT ecosystems from spam-related cyber threats.

## I. INTRODUCTION

The Internet of Things (IoT) makes it possible for real-world items to implement and merge regardless of their geographical locations. Privacy and protection measures are crucial yet difficult to implement in such a network management and control environment. To resolve security threats such intrusions, spoofing attacks, DoS attacks, jamming, eavesdropping, spam, and malware, IoT applications must safeguard user privacy. IoT device safety precautions vary depending on the size and kind of organisation using them.

The security gateways are forced to collaborate by user behaviour. Stated differently, the location, kind, and use of IoT devices determine the security measures [1]. For example, the smart organization's IoT security cameras can record various metrics for analysis and intelligent decision-making [2]. Since the majority of IoT devices are online dependant, the utmost caution should be used with web-based devices. It is typical in the workplace for IoT devices to be effectively utilised for implementing security and privacy features.

For instance, wearable technology should protect privacy by collecting and transmitting user health data to a linked smartphone. According to market research, 25–30% of active workers link their personal IoT devices to the company network. Both consumers and attackers are drawn to the IoT because of its growing scope. However, IoT devices adopt a defensive approach and determine the crucial parameters in the security protocols for the trade-off between security, privacy, and computation as a result of the advent of machine learning in various attack

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scenarios. Since an IoT system with limited resources typically finds it difficult to estimate the current network and timely attack state, this job is arduous.

## II. LITERATURE SURVEY

**IoT Security: Ongoing Challenges and Research Opportunities**

The Internet of Things (IoT) opens opportunities for wearable devices, home appliances, and software to share and communicate information on the Internet. Given that the shared data contains a large amount of private information, preserving information security on the shared data is an important issue that cannot be neglected. In this paper, we begin with general information security background of IoT and continue on with information security related challenges that IoT will encountered. Finally, we will also point out research directions that could be the future work for the solutions to the security challenges that IoT encounters.

**Blockchain for IoT security and privacy**

Internet of Things (IoT) security and privacy remain a major challenge, mainly due to the massive scale and distributed nature of IoT networks. Blockchain-based approaches provide decentralized security and privacy, yet they involve significant energy, delay, and computational overhead that is not suitable for most resource-constrained IoT devices. In our previous work, we presented a lightweight instantiation of a BC particularly geared for use in IoT by eliminating the Proof of Work (POW) and the concept of coins. Our approach was exemplified in a smart home setting and consists of three main tiers namely: cloud storage, overlay, and smart home. In this paper we delve deeper and outline the various core components and functions of the smart home tier. Each smart home is equipped with an always online, high resource device, known as "miner" that is responsible for handling all communication within and external to the home. The miner also preserves a private and secure BC, used for controlling and auditing communications. We show that our proposed BC-based smart home framework is secure by thoroughly analysing its security with respect to the fundamental security goals of confidentiality, integrity, and availability. Finally, we present simulation results to highlight that the overheads (in terms of traffic, processing time and energy consumption) introduced by our approach are insignificant relative to its security and privacy gains.

**Botnets and Internet of Things Security**

Recent distributed denial-of-service attacks demonstrate the high vulnerability of Internet of Things (IoT) systems and devices. Addressing this challenge will require scalable security solutions optimized for the IoT ecosystem.

## III. SYSTEM ANALYSIS AND DESIGN

**EXISTING SYSTEM**

Denial of service (DDoS) attacks: The attackers can flood the target database with unwanted requests to stop IoT devices from having access to various services. These malicious requests produced by a network of IoT devices are commonly known as bots [3]. DDoS can exhaust all the resources provided by the service provider. It can block authentic users and can make the network resource unavailable.

RFID attacks: These are the attacks imposed at the physical layer of IoT device. This attack leads to loose the integrity of the device. Attackers attempt to modify the data either at the node storage or while it is in the transmission within network. The common attacks possible at the sensor node are attacks on availability, attacks on authenticity, attacks on confidentiality, Cryptography keys brute-forcing [4]. The countermeasures to ensure prevention of such attacks includes password protection, **data encryption and restricted access control.**

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Internet attacks: The IoT device can stay connected with Internet to access various resources. The spammers who want to steal other systems information or want their
target website to be visited continuously, use spamming techniques [5]. The common technique used for the same is Ad fraud. It generates the artificial clicks at a targeted website for monetary profit. Such practicing team is known as cyber criminals.

NFC attacks: These attacks are mainly concerned with electronic payment frauds. The possible attacks are unencrypted traffic, Eavesdropping, and Tag modification. The solution for this problem is the conditional privacy protection. So, the attacker fails to create the same profile with the help of user's public key [6]. This model is based on random public keys by trusted service manager.

**Disadvantages**

- In the existing work, the system is less effective due to lack of Spam Detection in IoT using Machine Learning framework.
- This system is less performance in which it is clear that Supervised machine learning techniques is absence.

## PROPOSED SYSTEM

The digital world is completely dependent upon the smart devices. The information retrieved from these devices should be spam free. The information retrieval from various IoT devices is a big challenge because it is collected from various domains. As there are multiple devices involved in IoT, so a large volume of data is generated having heterogeneity and variety. We can call this data as IoT data. IoT data has various features such as real-time, multi-source, rich and sparse.

**Advantages**

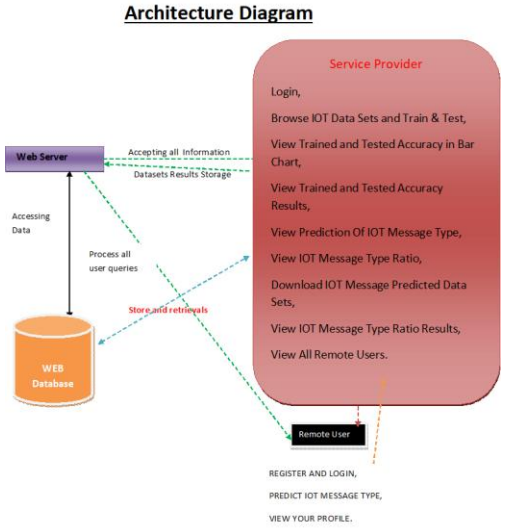
1) The proposed scheme of spam detection is validated using five different machine learning models.

2) An algorithm is proposed to compute the spamicity score of each model which is then used for detection and intelligent decision making.

3) Based upon the spamicity score computed in previous step, the reliability of IoT devices is analyzed using different evaluation metrics.

## IV. SYSTEM DESIGN

### SYSTEM ARCHITECTURE




## V. SYSTEM IMPLEMENTATION

### Modules

### Service Provider

In this module, the Service Provider has to login by using valid user name and password. After login successful he can do some operations such as Login, Browse IOT Data Sets and Train & Test, View Trained and Tested Accuracy in Bar Chart, View Trained and Tested Accuracy Results, View Prediction Of IOT Message Type, View IOT Message Type Ratio, Download IOT Message Predicted Data Sets, View IOT Message Type Ratio Results, View All Remote Users.

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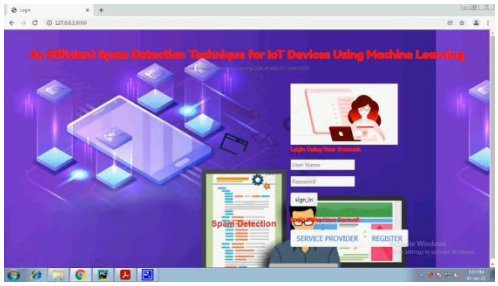
**View and Authorize Users**

In this module, the admin can view the list of users who all registered. In this, the admin can view the user's details such as, user name, email, address and admin authorizes the users.

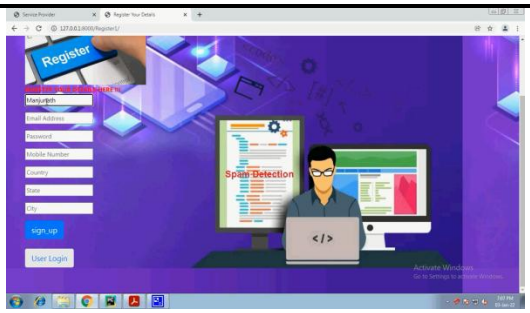
**Remote User**

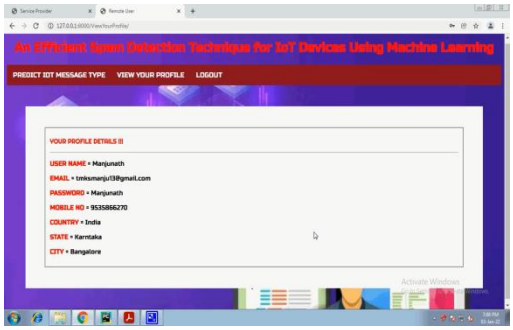
In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will be stored to the database. After registration successful, he has to login by using authorized user name and password. Once Login is successful user will do some operations like REGISTER AND LOGIN, PREDICT IOT MESSAGE TYPE, VIEW YOUR PROFILE.

## VI. SCREEN SHOTS

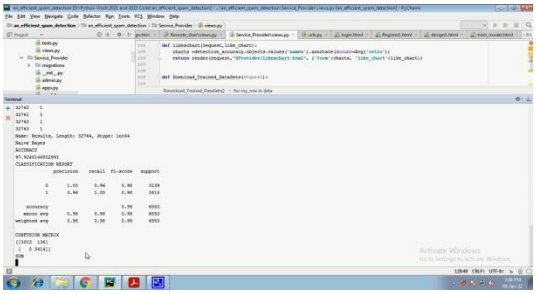








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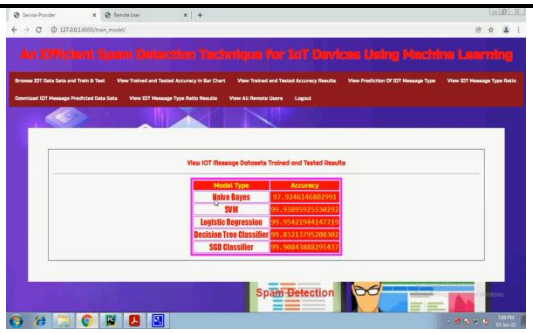


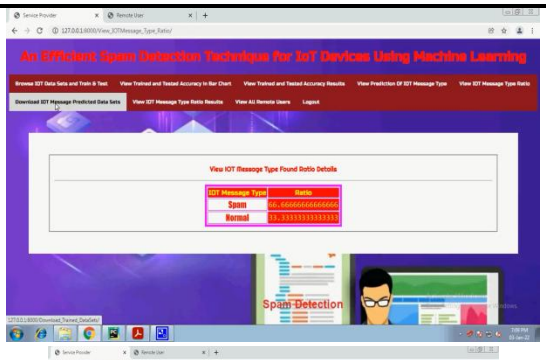


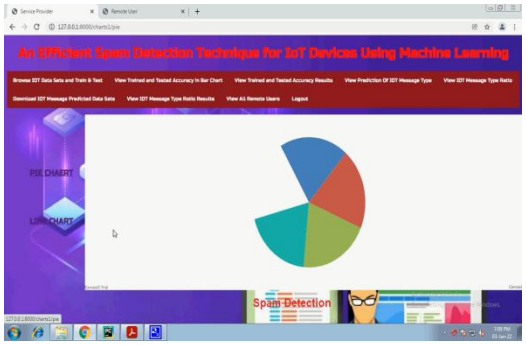


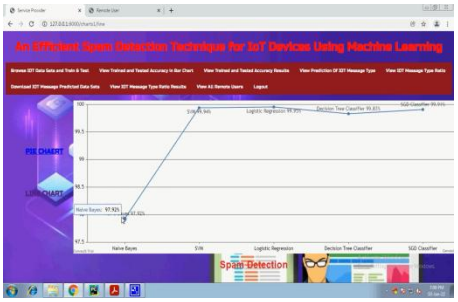



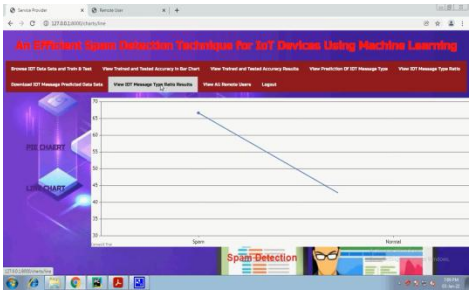


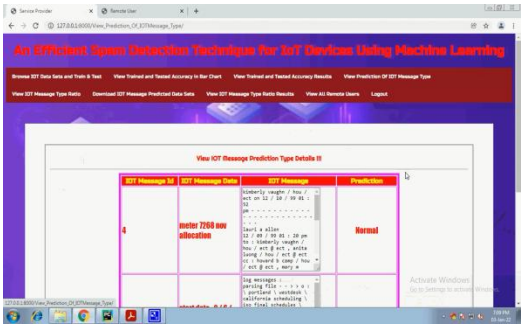



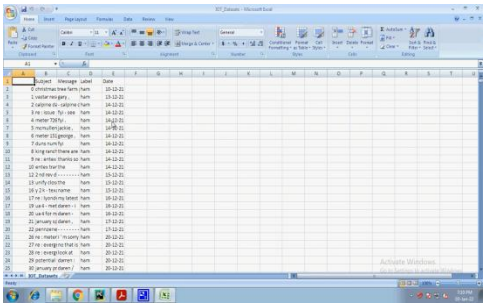

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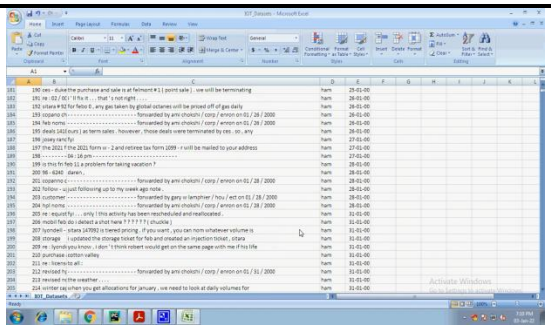

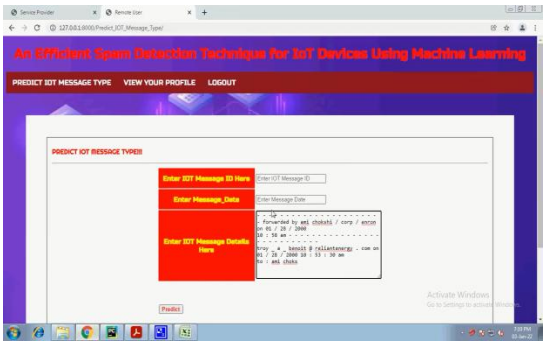


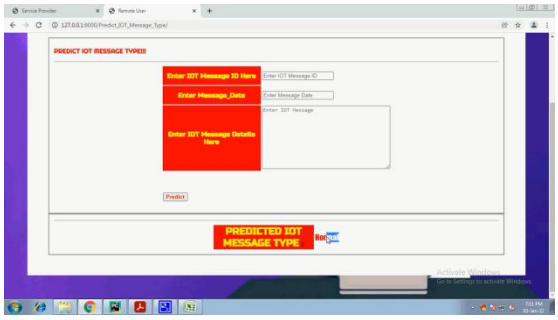


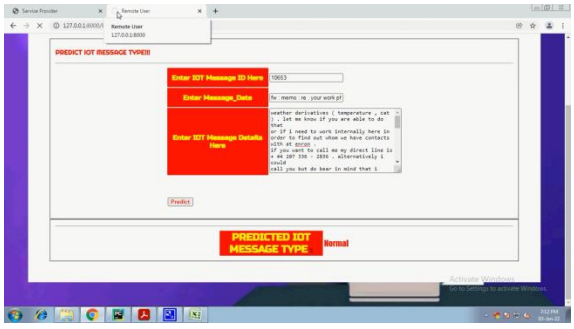


## VII. CONCLUSIONS

This study presented a machine learning-based framework for effective spam detection in Internet of Things environments. The proposed approach utilizes network traffic analysis, communication pattern evaluation, and intelligent classification techniques to identify spam activities and malicious communications among IoT devices. By leveraging machine learning algorithms, the system effectively distinguishes legitimate device interactions from spam-related activities while maintaining high detection accuracy and low false alarm rates. Experimental observations indicate that machine learning-based spam detection significantly improves security performance compared to traditional rule-based methods. Furthermore, the automated learning capability enables continuous adaptation to evolving spam strategies and emerging IoT threats. The proposed framework contributes to enhanced IoT network security, improved communication reliability, and protection against resource misuse and cyberattacks. Future research may focus on integrating deep learning architectures, federated learning frameworks, edge computing technologies, and real-time threat intelligence systems to further strengthen spam detection capabilities and support secure large-scale IoT deployments.

## REFERENCES

[1] Z.-K. Zhang, M. C. Y. Cho, C.-W. Wang, C.-W. Hsu, C.-K. Chen, and S. Shieh, "Iot security: ongoing challenges and research opportunities," in 2014 IEEE 7th international conference on service-oriented computing and applications. IEEE, 2014, pp. 230–234.

[2] A. Dorri, S. S. Kanhere, R. Jurdak, and P. Gauravaram, "Blockchain for iot security and privacy: The case study of a smart home," in 2017 IEEE international conference on pervasive computing and communications workshops (PerCom workshops). IEEE, 2017, pp. 618–623.

[3] E. Bertino and N. Islam, "Botnets and internet of things security," Computer, no. 2, pp. 76–79, 2017.

International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
Peer Reviewed, Referred & Indexed Journal
ISSN: 3068-272X www.ijdim.com Original Research Paper

[4] C. Zhang and R. Green, "Communication security in internet of thing: preventive measure and avoid ddos attack over iot network," in Proceedings of the 18th Symposium on Communications & Networking. Society for Computer Simulation International, 2015, pp. 8–15.

[5] W. Kim, O.-R. Jeong, C. Kim, and J. So, "The dark side of the internet: Attacks, costs and responses," Information systems, vol. 36, no. 3, pp. 675–705, 2011.

[6] H. Eun, H. Lee, and H. Oh, "Conditional privacy preserving security protocol for nfc applications," IEEE Transactions on Consumer Electronics, vol. 59, no. 1, pp. 153–160, 2013.

[7] R. V. Kulkarni and G. K. Venayagamoorthy, "Neural network based secure media access control protocol for wireless sensor networks," in 2009 International Joint Conference on Neural Networks. IEEE, 2009, pp. 1680–1687.

[8] M. A. Alsheikh, S. Lin, D. Niyato, and H.-P. Tan, "Machine learning in wireless sensor networks: Algorithms, strategies, and applications," IEEE Communications Surveys & Tutorials, vol. 16, no. 4, pp. 1996– 2018, 2014.

[9] A. L. Buczak and E. Guven, "A survey of data mining and machine learning methods for cyber security intrusion detection," IEEE Communications Surveys & Tutorials, vol. 18, no. 2, pp. 1153–1176, 2015.

[10] F. A. Narudin, A. Feizollah, N. B. Anuar, and A. Gani, "Evaluation of machine learning classifiers for mobile malware detection," Soft Computing, vol. 20, no. 1, pp. 343–357, 2016.

[11] Z. Tan, A. Jamdagni, X. He, P. Nanda, and R. P. Liu, "A system for denial-of-service attack detection based on multivariate correlation analysis," IEEE transactions on parallel and distributed systems, vol. 25, no. 2, pp. 447–456, 2013.

[12] Y. Li, D. E. Quevedo, S. Dey, and L. Shi, "Sinr-based dos attack on remote state estimation: A game-theoretic approach," IEEE Transactions on Control of Network Systems, vol. 4, no. 3, pp. 632–642, 2016.

[13] L. Xiao, Y. Li, X. Huang, and X. Du, "Cloud-based malware detection game for mobile devices with offloading," IEEE Transactions on Mobile Computing, vol. 16, no. 10, pp. 2742–2750, 2017.

[14] J. W. Branch, C. Giannella, B. Szymanski, R. Wolff, and H. Kargupta, "In-network outlier detection in wireless sensor networks," Knowledge and information systems, vol. 34, no. 1, pp. 23–54, 2013.

[15] I. Jolliffe, Principal component analysis. Springer, 2011.

[16] I. Guyon and A. Elisseeff, "An introduction to variable and feature selection," Journal of machine learning research, vol. 3, no. Mar, pp. 1157–1182, 2003.

[17] L. Yu and H. Liu, "Feature selection for high-dimensional data: A fast correlation-based filter solution," in Proceedings of the 20th international conference on machine learning (ICML-03), 2003, pp. 856–863.

[18] A. H. Sodhro, S. Pirbhulal, and V. H. C. de Albuquerque, "Artificial intelligence driven mechanism for edge computing based industrial applications," IEEE Transactions on Industrial Informatics, 2019.

[19] A. H. Sodhro, Z. Luo, G. H. Sodhro, M. Muzamal, J. J. Rodrigues, and V. H. C. de Albuquerque, "Artificial intelligence based qos optimization for multimedia communication in iov systems," Future Generation Computer Systems, vol. 95, pp. 667–680, 2019.

[20] L. University, "Refit smart home dataset," https://repository.lboro.ac.uk/ articles/REFIT Smart Home dataset/2070091, 2019 (accessed April 26, 2019).

[21] R, "Rstudio," 2019 (accessed October 23, 2019).