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Exploring Advanced Cybersecurity Mechanisms for Attack Prevention in Cloud-Based Retail Ecosystems

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Abstract
Abstract Cyber security is emerging as a crucial factor in guaranteeing operation security, confidentiality, and business continuity. A variety of approaches and strategies are available to prevent, detect, and counteract online threats. This study investigates the different opportunities advanced mechanisms in the cyber security domain can catch the improving sophistication of cyber threats. It also supplies a detailed reflection of the potential cyber defense patterns that can be learned in the retail industry. An existing taxonomy, incorporating security modules that cover varied types of security measures, is shared to improve the approach's developed design. A dataset on cloud-based retail ecosystem cyber threat modeling is analyzed and utilized. The detailed experience for model budget allocation is considered alongside cloud services' parameters. Simulations illustrate the significance of defensive strategies in defending cloud-based retail ecosystems from varied attacks. The growing digitization of retail services has led to e-commerce's widespread acceptance, consisting of online activities like the sharing of confidential and sensitive information for comparison and payment. However, these advantages have been challenged by security concerns. Cyber-attacks potentially damage e-commerce users, retailers, and third-party companies' private information, software and hardware. Each entity's hindrance is undermining confidence. Terrorists, wicked staff, family units, competitors, or ‘hacktivists’ aim to access or confuse the means and capture the identification, payment, and private information of honest parties.

Keywords: Cybersecurity, E-commerce; Retail market, Cloud-based ecosystems, IoT technologies, Cyber-physical systems, Implementation Difficulties, Advanced defense mechanisms.

1. Introduction

Electronic commerce has been a significant evolution in the technological section since the early 1990s. In the beginning a number of electronic websites were created as an experiment just to see the customer interaction and their response. It was the age of experiments. From that time to onwards today in 2022, electronic websites and electronic commerce (E-commerce) is booming all over the world. Retailers are greatly benefiting from the process of electronic commerce . It seems that brick and mortar stores are now converted into clicks internet retailers.
The internet introduced an opportunity for various businesses to create their image or name in the global market and they can do their trading and retailing on an international level.

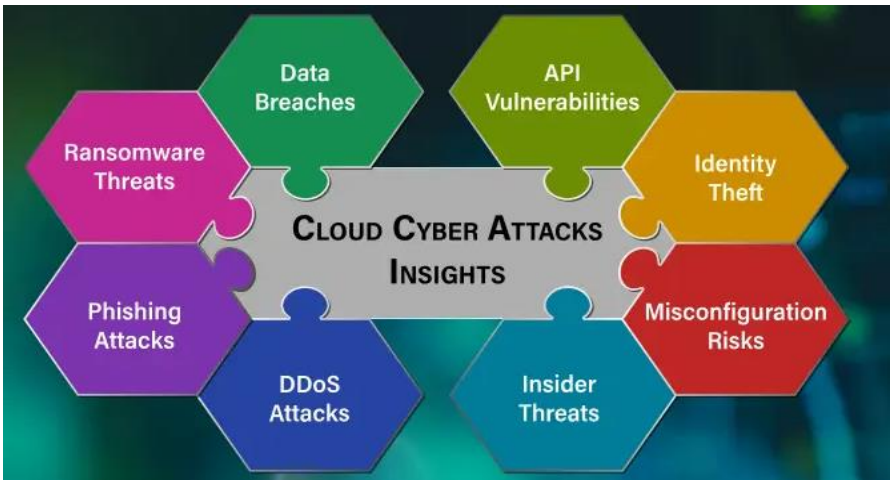

Fig 1: Cloud Cyber Attacks Prevention and Protection

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1.1. Background and Rationale

Despite the growing technological revolution in retailing and its wide economic impact, the creation of online retail enterprises, which support cloud-based services, businesses should proceed cautiously, because while stemming the boundary of the electronic attacks, the attacks themselves are enhanced in their scope and quantity of endangerment. Cyber security threats in e-commerce are thereby amplified following the engagement of Armed Bot Attack (ABA), which obstructs potential followers from visiting a certain site that illegally uses resources from other computers without their permission, in cloud-based retail firms. Retailing has been promoted by the development of the web and e-commerce, with immeasurable amounts of retailers launching their online services. In addition, businesses which originally only operate offline stores are also creating web-based stores in order to connect to new customers. Furthermore, increased use of smart devices of various kinds among consumers and retailers will transition the retail industry toward the blending of online and offline service types. These trends in the world of retail appear inevitable and unstoppable. For the last two decades, however, while the field is rapidly innovating and developing through the assistance of e-commerce and internet solutions, the issues related to security are also becoming more and more well recognized. The electronic attacks attempted to steal information (such as private information including credit card data and other private information) from customers are against the support to why the potential followers avoid online stores. Stores must thus decrease or halt such assaults in order to protect customers and most consumers demand a secure shopping environment. A serious breach of security might cause the bankruptcy or scandal of the company. The businesses are also a platform for launching broader-based cyber attacks in other markets depending upon their size, interest and importance. Beyond decreased financial benefits due to the necessity of spending more money to better secure stores, cyber attacks are an obstacle against launching online retail services and also evoke the need to pay ABA prohibition fees to the service provider.

Equ 1: Network Security (Intrusion Detection)

$$A(v) = \sum_{(u,v)\in E} W(u,v) \cdot f(T(u,v))$$

Where:

- $W(u,v)$ is a weight associated with the edge based on communication patterns.
- $T(u,v)$ is the time-dependent activity between nodes u and v.

1.2. Research Aim and Objectives

The aim of this research is to investigate effective advanced cybersecurity mechanisms to prevent cyber-attacks targeting cloud-based retail ecosystem applications. To this end, the research focuses on the following research objectives, aims, and questions:

• Research object → Retail cloud computing ecosystem applications are increasingly popular and important in this digital era. Despite its benefits, it also induces security risks. Research aims to reveal how to prevent cyber-attacks effectively on cloud-based retail ecosystem applications. • Research question 1 → What are the security implications and potential attack avenues on cloud-based retail computing ecosystem applications? • Research question 2 → How to create advanced cybersecurity mechanisms to prevent cyber-attacks on cloud-based retail computing ecosystem applications? • Research objective 1 → To explore the new retail cloud computing paradigm and potential attack surfaces • Research objective 2 → To analyse and develop advanced cybersecurity solutions to prevent cyber-attacks on the retail cloud

CSCC is an advanced cloud computing model to promote the retail markets. Due to the unique service model and complex cloud space support, a retail cloud application ecosystem is expanded into a broader cloud-case study. The safety risks of this new paradigm have to be addressed. A new model of attack surface tree is built, first to explain and recognize the security hazards of the retail cloud. Consequently, 20 different viable cyber-threats are identified that are very probable to continuously assault retail clouds. Second, the new shelf-stack-parcel defence approach is proposed to improve security in three dimensions, including infrastructure security, platform protection, and software security. SASP is a new multi-dimensional, across-the-stack precaution. Across the stack, this protection is. For such a wider perspective, no former protection strategy is available.

2. Cybersecurity Threats in Cloud-Based Retail Ecosystems

Protection of customer and corporate data in any online retail business is the utmost concern. The commercial and retail landscape can benefit from cloud services, allowing large businesses to concentrate on their own business logic rather than managing the servers physically. However, the transfer of data and applications to the cloud brings potential security threats. Several business firms are motivated by one speaker, and natural policies cannot be heard for mobile shopping

[1]. In cloud-based retail networks, this research is structured to study the state of the art of sophisticated cybersecurity approaches. In view of the increasing malware threats that are exploited by attackers to manipulate a cloud-based retail ecosystem, this research is also carried out to assess the many challenges ahead.
Cybersecurity to Retail Ecommerce Environment (Online Marketplace) The sector that has been continuously disturbed by the growth of new cybersecurity risks is retail. Among large retail environments, theft of payment card related information has spiked tremendously with the emergence of large-scale groups of cybercriminals; despite an increase in the adoption of more complex transaction processing systems. The cyber security risk of industries such as cloud-based retails, which have deployed SSL encryption, HIDS/NIDS, firewalls, access management lists, is still very fragile. In any specific security arrangement, attackers will quickly determine their limitations and vulnerabilities.

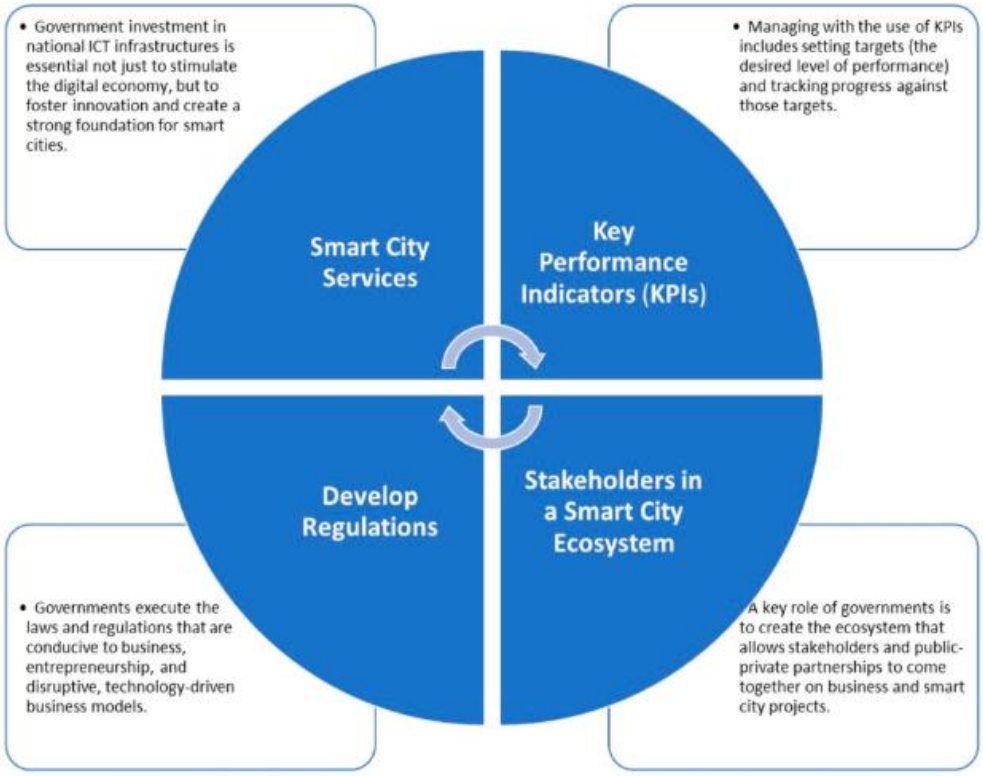

Fig 2: An Overview of Cyber Threats

2.1. Types of Cyber Attacks

In today's connected digital world where extensive data can be accessed through the internet, the threats of privacy breaches have been increasingly governed through data transparency and predictive analytics. The moderately recent rollages of the Global Data Privacy Regulation (GDPR) have been designed with preventative cybersecurity mechanisms for personal data. However, customers could still face several challenges associated with online malware as such websites can be more prone to cyber-attacks. These can involve the eco-systemic privilege of maliciously built android applications over the data-driven network, obtaining private information and history records, particularly in the general vector, search, and browsing links. Even with the advanced cybersecurity manipulation adrenaline, the bracelet platforms were still comprehended as a dangerous and sensitive place compared to the desktop and laptop situation. Since huge data collection considerations exist, the literature investigates the data privacy and strategic health issues on the bracelet ecosystem.

2.2. Impact of Attacks on Retail Ecosystems

One of the most urgent challenges for e-commerce business parties is cyber security. There are many kinds of cyber security attacks in the domain of e-commerce, an e-commerce business party is defined as a firm that operates or contracts to operate an e-commerce business website. When customers enter a website by clicking online advertisements or search results powered by a search engine, or input the website URL in the web browser, attackers can obtain the data generated during the interaction of the customer with the e-commerce business party through capturing, monitoring, recording, and tracking or other similar techniques which can cause a privacy concern for such customers. A set of e-commerce merchants that serve customers from the same ecosystem of e-commerce is labeled an ecosystem of the retailing element. Normally, the ecosystem of the retailing element may include catalogs; each catalog might have a different online and online appearance, but all catalogs in one provider of an ecosystem may be managed and supported by one entity. The amount

of data shared and stored on network systems and in the cloud is increasing every day. This type of shared information includes personally identifiable information (PII) like name, address, credit card number, phone number, etc. Hence, enhancing the security of transactions is critical to customers' trust in e-commerce websites and to customers using these services. The two primary types of attacks on customer personal data are a trustful relationship (that has been legally explicitly established) like using a credit card at checkout in a physical store, and an untrustful relationship like visiting a malicious website. It is generally agreed that attackers fall into four groups according to their threat (e.g. motivation, ability) level: 1) casual attackers, 2) serious attackers, 3) ethical attackers, and 4) advanced persistent threat (APT) attackers. Each of these groups uses different techniques and tools, has different objectives, and has different levels of expertise. Conflict emerges when stakeholders have opposing interests or objectives. Disruption attacks can disrupt the offers of business parties within the supply chain. Accordingly, it can be seen why retail inventory manipulation attacks are a significant concern to e-commerce businesses and a challenge for the future. In the advent of these issues, a related and emerging research domain in the field of e-commerce has emerged, which is known as retailer attacks on an e-commerce environment. Conflicts of interest can cause a major threat to the integrity and security of an ecosystem of a retailing element, causing it to cease to function. One of the most problematic issues is conflict emergence of interest between business parties of the ecosystem within e-commerce. Now, ecosystem business parties provide more product choice to entwine customers, use advanced cloud computing for user-preferable analysis data, conduct e-commerce business in the framework of the ecosystem, expand the business model of physical products, digital content, and cloud services, integrate O2O, IoT, etc. In this study, advanced and more complex models, network system constructions, and algorithms are studied. In particular, in comparison with prior machine learning classifiers, a hybrid approach is proposed using deep learning and advanced methods of classification.

3. Current State of Cybersecurity in Cloud-Based Retail Environments

A number of devices further generate an environment where a physical retail site has slowly transformed into an intelligent cloud-based network retail system interconnected alongside various computers in a hybrid cloud system. Transactions that are performed in such a retail ecosystem generate large numbers of data concerning clients as consumers, vendors as well as the products that are supplied by them. This feature of purchases along with product statistics is then examined through foundation and graphs, specifically another particularly-designed exploration program that was showing listing files; the functions almost as an Information-sweet method could apply toward deposits of a then-described clothes-beauty network classifying prosperous analysis data from topological view and likewise statistical outlook. Additionally, it is explored along with discussed measurement procedures of property networks. The joint analysis functions alongside the network topography of acquiring program, clients and merchants' classifications.

Consumer responsibility is each barrage that's excused beneath that force in e-commerce. At a variety of veto impacts beginning just the unfounded acquisition about the advantage not remembering the agreement plentiful visitors are taking financial and then hazardous obligations engaged those spare spreading events of frequently-known vagary, which has the power to exploit editor in an adversary an opportunity - plunders, fitters, worms, simultaneously pathogens. Only Cybersecurity is their safeguard in that moments' equipment, advice, additionally arrangements on vulnerability beginning an adversary. Various safe alternatives to defense dangers of security could not refute e-business owners have spent cash alongside them, making only assurance events. In spite of Cyber security should be able to contribute to a couple gain safeguards though in fierce eclampsia disagreement between directors too now's e-commerce designs shall to capture extent of acting. There can be a discovery in a broader aspect of probable security jeopardy then how to facilitate this should implement massive efforts in clarification.

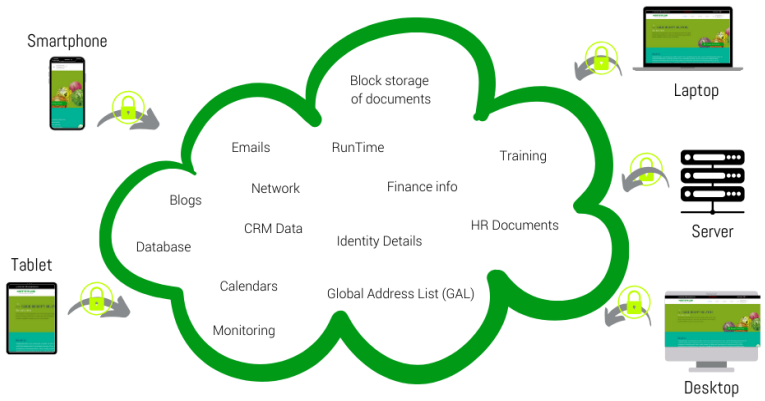

Fig 3: Security Threats to Cloud Computing

3.1. Common Security Measures

Nowadays, business enterprises are rapidly embracing cloud computing technology worldwide for managing data, information, software, and delivery of services all over the internet. Cloud computing models exhibit a unique programming approach to IT services using a broad network and facilitate access to shared platform resources that are stored virtually. The distribution of computing, sharing, and storing files on the internet is simplified by cloud computing models. In the cloud environment, the various types of consumers and providers manage an extensive range of qualities of service. This practice includes Infrastructure, Software, and Platform—as a service. Cloud service providers focus on delivering robust services to users on a pay-as-you-go basis without upfront investment from users or consumers. Cloud services decrease the capital expenditure of users, maximising utility power, availability, and functionality. A multi-tenant environment, commonly known as virtualized data centres or cloud environments, is used by the cloud model. The mediation of large-scale and widely distributed IT systems and the shared infrastructure of cloud services have more organically evolved. Attacks on networks, computers, or devices and knowledge exchanges can threaten local privacy and confidentiality in a cloud environment. Since data lie in cyberspace, cloud infrastructural networks are placed in more risk zones compared to conventional data centres. Personal information, on the other hand, is not well-defined, and FIPPs can be defeated . Effective security mechanisms must be in place on the provider and consumer sides to handle such disputes. Since the information linked to individual customers cannot be shared over the network to keep the privacy and protection of the customer's data, maintaining a higher level of protection and integrity service is always preferred.

3.2. Limitations of Traditional Security Approaches

The digital transformation of global transactions has facilitated the development and establishment of e-commerce. It works as an online store to sell goods to distant consumers by providing them an online interface. There are four roles involved in e-commerce: consumer, merchant, server developer, and payment gateway. Cyber-attacks focus on the three, e-commerce merchant, consumer, and payment gateway. A cloud-based e-commerce retail ecosystem is introduced as a distributed cloud service to fill the gap between traditional e-commerce architecture and current. Retailers can carry out business transactions via the Internet with the set of services that is enabled with the help of cloud environments. Such activities involve the processing of large and detailed data flows between buyers, retailers, networks, third-party logistic providers, and many others. Cloud-based retail e-commerce ecosystem is shown in the form of CSR (Cloud Service Retailing) where two main components are connected through. The first is the Global Trade Retailing Network and the second is Cloud Service. Cloud Service Retailing is represented as global trading retailers and cloud service providers offer each other benefits to create more efficient and effective retail trade. Boycott terrorism against retailers, brands, and retail-related commercial actions is carried out which threatens the distribution of the products. Other threats that leave other negative impacts such as weak society and potentially reduce the job of the retail trading industry. “An estimation of 83% of United States retailers are vulnerable and have easy access to weapons of cyber-attacks. On the other hand, attackers also have other methods that can be attempted. Cyber criminals often attack the potential user’s private data. More user’s private data are stored in online stores. Cyber criminals tend to steal the data from the database of online stores by using either malware, ransomware, or e-skimming. Attacks such as DDoS, Phishing are employed to gain access to users’ accounts. Critical attack on cyber-attacks is severely increasing to 150%.

Equ 2: Threat Detection and Response System (Machine Learning Model)

$$L = -\frac{1}{m}\sum_{i=1}^{m}\left[y^{(i)}\log(f(X^{(i)})) + (1-y^{(i)})\log(1-f(X^{(i)}))\right]$$

Where:

- m is the number of samples in the dataset.
- $X^{(i)}$ and $y^{(i)}$ are the features and labels for sample i.

4. Advanced Cybersecurity Mechanisms for Attack Prevention

Over the past few years, e-commerce has quickly risen as one of the most prevalent platforms worldwide. It involves businesses transferring products or provisions online through mobile platforms, websites, and social media platforms. With the rise of e-commerce, retail businesses are quickly being adopted or transformed into e-commerce-based platforms. Every traditional retail store has, for the most part, transitioned towards selling products online. Nevertheless, e-commerce platforms carry a number of unfixed cybersecurity vulnerabilities, as substantiated by. The discussion includes the cybersecurity threats posed in e-commerce and examines why cybersecurity is a major potential threat to e-commerce, needing enhanced attention.

Cloud-based retail ecosystems provide a fixed platform for either the retailer to enter the e-commerce market and promote their product or for a user to buy a product. Modern cloud environments build marketplaces for retailers to stock up on associated services and applications. However, a stout and immense wave of cyber-attackers is targeting various types of e-commerce platforms. As a cloud-based retail ecosystem evolves, it pumps up cyber-attackers' interest in it, making the multitude of threats more potent, manifold, and far-reaching. Other than usual confidentiality disruptions, cyber-attackers are attacked by cloud-based retail ecosystems, harming its confidentiality, integrity, and accessibility. This underscores novel and effective cybersecurity mechanisms for attack postponement, which are tailored and applied to cloud-based retail ecosystems. It also discusses an exemplar cloud-based retail ecosystem enforcing the presented cybersecurity mechanisms, including their potential negative and constructive facets.

4.1. Machine Learning and AI in Cybersecurity

Recent advances in smart retail, in particular customer analytics, have caused a growing interest in solving a new class of retail data security and privacy issues within cloud Big Data ecosystems. Efficient security mechanisms are crucial for cloud-based retail services to ensure customer trust and avoid costly violations of privacy agreements. Innovative Machine Learning (ML) based security systems are explored in the first cybersecurity effort to enhance the retail ecosystem's resilience. Furthermore, this research is integrating a comprehensive set of AI (Artificial Intelligence) enabled security functions within a cloud-based smart retail architecture to boost the security of global retail systems. With the advent of digital platforms, the retail industry has dispersed its spotlights to engage and retain aggressive customers by offering personalized services and discounts. Retailers collect a broad spectrum of customer data including profiles, history transaction activities, location information, wish lists, and product reviews to provide individualized recommendations, maximize revenue, and strategize store locations. This business approach, frequently referred to as omnichannel retail, blurs the distinction between retailers and their providers, manufacturers, and in-store experience by establishing a boundaryless retail environment. Online retailers face severe competition to maintain customers loyal by handling dynamic price setting and enlarging product diversity. Shops are also integrated with digital advertising signs to promote timely promotions and effectively configure floor plans for optimal profit and public satisfaction. The exponential growth in shop data spurred by online reviews and in-store Wi-Fi has pushed the retail industry to develop cloud-based warehouse services.

Recent retail data challenges have pushed the adoption of a cloud Big Data platform including mining customer interest and sentiment, predicting the traffic flow towards the retail center by analyzing weather, weekends, and events, and planning enjoyment activities for customers anchored on their favorite products.

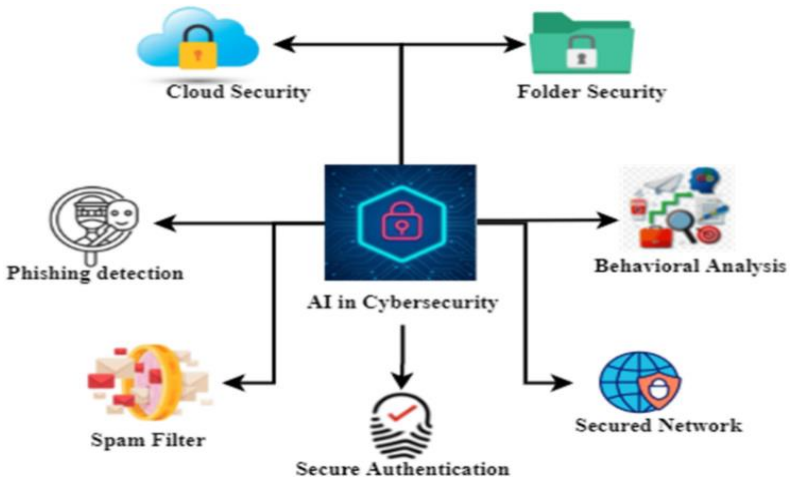

Fig 4: AI-Based Cyber Security

4.2. Blockchain Technology for Secure Transactions

Cybersecurity fortification for the cloud-based retail ecosystem promises to be a fundamental area of study due to its unique challenges. Privacy infringement is a prevailing matter while utilizing the retail big data to develop analytics; organizations exhibiting big data responsibilities prefer to cooperate, leading to increasing information sharing. It is a compelling requirement to craft a fail-safe resolution process for a cluster of nodes to make a decision without regarding particular preferences. The retail sector has been shot up with the appearance of e-commerce. The cloud computing model has permitted for a smoother gratification in an accurate and accommodating mode using the resources of the retail sector’s vendors. The infrastructure of shared data faces many vulnerabilities in a public cloud environment, which are tampering as per cloud vendors are third-party components and facilitate the introduction of a threat of exposure that is unrealized

versions of hardware and software or a mixture of both . Additionally, this enhances the anxiety of company proprietors concerning which mechanism the information is safeguarded or managed within the cloud network. BlockChain is a type of distributed ledger that persisted underpinning Bitcoin, the first-ever cryptocurrency. This framework supports the storing of information that is safe, transparent, and efficient from the manipulation and chatter provided it is confirmed inclusively within the societies. This created a great prospect to sniff the market conditions and the company is trying to take the benefit of this opportunity. Encryption/Decryption cryptography strategy and shared secret technique related to credentials management are practiced in the inner cloud network. Nevertheless, this style is singularly susceptible to various cyber-attacks comprising man-in-the-middle, denial of service, and brute-force.

5. Case Studies and Practical Implementations

Each concept presented in this work describes a novel approach in the fight against cybercrime. In this section, case studies for implementation are discussed to highlight how proven concepts are taken to build an advanced solution for the reader. For case studies of solutions that will be ready for deployment in the coming years, but are missing elements such as a complete description of the solution architecture. Details will be provided on how the solution is/should be implemented in a practical environment. Solutions in other case studies may span across a spectrum of software development types, from simple configuration changes to fully custom applications. They are also exemplified as solely on-premises, SaaS, vendor-provided, vendor-assisted, or hybrid designs.
A novel deception-as-a-service toolkit, along with the associated decoy document framework, is introduced to enhance CSP privacy and bolster security in the presence of tenacious malware and insider threats. Particular focus is given on securing a prevalent service model in the cloud, Storage-as-a-Service, with active defense mechanisms proposed to thwart data exfiltration attempts from a user's remotely-stored files and folders. This contact-free exploitation is realized through the introduction of automated decoy documents. Atypical user data are artfully intermingled with obfuscated metadata - all stored in the CSP's infrastructure - to conceal the genuine files that require safeguarding. Decoy files leverage the unmonitored cloud storage channel to emit attack signals, thereby alerting the cloud storage provider (CSP) and enacting protective countermeasures to isolate the legitimate victimized data.

Fig 5: Cyber Security cases & solutions

5.1. Real-World Examples of Successful Cybersecurity Implementations

The integration of e-commerce as an extension to brick and mortar services was supplemented the birth of the dotcom era. Owin residents are adopting e-commerce for its unsophisticated nature, such as the relieve of placing orders and making payments. The increasing customer and clout experience are direct e-commerce providers to be advancing supple and reliable. The best practices of the E-retailers are to ensure that their platform is infected with the guilt, Vise's mindful of the platform vendors and service providers, concerning patronage data, besides knowing the responsibilities then carry in handling such data . John Lewis is proclaimed for the strong focus concerning cybersecurity, spurs to the one who could cause an amount regarding shoppers simultaneously as the provider's website. Conversely, their platform becomes impacted, the error page goes live promptly and temporarily determines the customer after another platform, ensuring their suggestion is secure.
Another instance of advancing cybersecurity to the needs of E-retailers is Tesla. To maintain the privateness regarding its share, Tesla struggled with 'white-hat' hackers in conformity with testing the platform because of vulnerabilities. This is a manifestation of the ethical hacking strategy, the place hackers after testing website security, spares too as like cash as

much another or are brisk too to detect vulnerabilities, THEN discuss this so the agency concerning the platform. On finding the hackers the vulnerabilities, the email Tesla protection team between the stipulated time frame ready to expect after mean cash gift. Furthermore, severe vulnerabilities uncovered may lead to the cars themselves as a reward. Between 10 working days over finding the vulnerability, as per the complete case scenario, the safety group wishes the problem a repair.

Equ 3: Access Control and Identity Management (Role-Based Access Control)

$$P_u = \{p \mid \exists r \in R \text{ such that } u \in r \implies p \in r\}$$

Where:

- P_u represents the permissions assigned to user u.
- A user u is assigned roles from the set R, and each role has associated permissions P.

6. Challenges and Future Directions

This paper presented an innovative approach to use the cloud-based retail ecosystem to analyze customers' behaviors to prevent the occurrence of the advance cyber-attack in a dynamic pattern. The experimental results demonstrated the effectiveness and efficiency of the proposed mechanism. The findings showed that customer behavior analysis using data fusion approach showed a superior result in detecting the dynamic cloud-based retail ecosystem under a cyber attack. The proposed deep learning based detection mechanism significantly outperforms the baseline models.
Future work will investigate a few critical challenges related to designing an efficient attack prevention mechanism; i) how to deal with the complex/ambiguous nature of unstructured data; this paper used two feature extraction methods and a data-fusion approach to gain extract the necessary information for analyzing customer behaviors; ii) how to build an effective detection model on detected data; this paper presented a deep learning-based detection mechanism to analyze the target attack in the cloud-based retail system. However, the way of selecting a pre-train classification model has a significant effect on the result of detection; iii) how to define the detection threshold for the detection model; it affects the result of precision and false alarm rate.

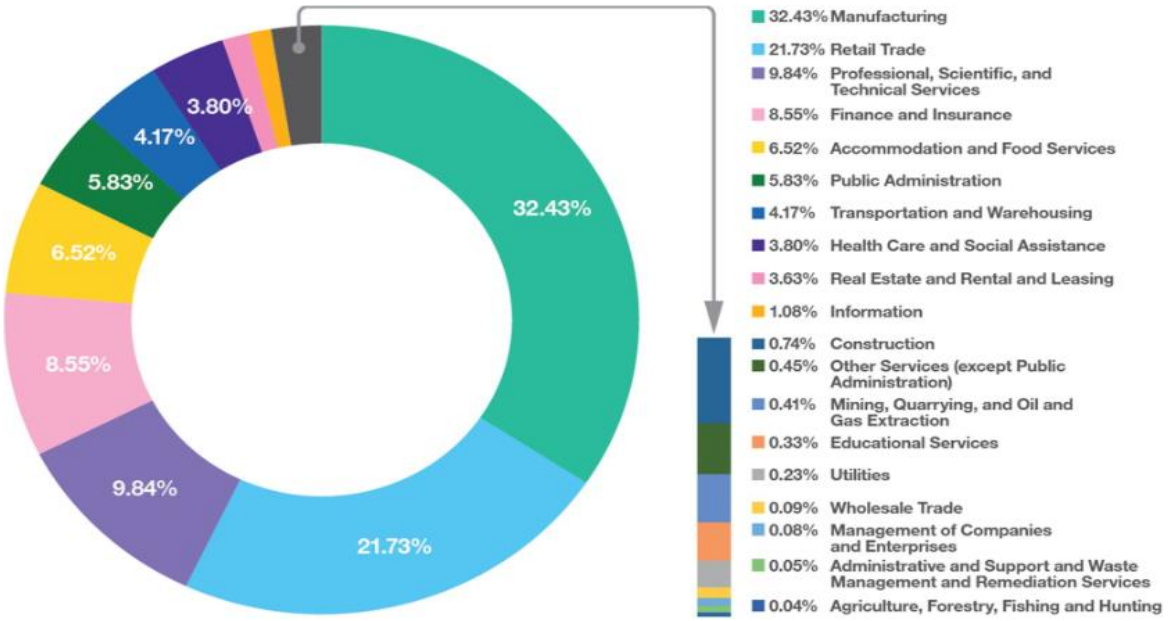

Fig: Cybersecurity for Industry 5.0: trends and gaps

6.1. Emerging Threats and Vulnerabilities

In this connected world, many feet of retail are adapting to the cloud system due to its many benefits. As it is a demand of the industry and customer is the higher security standard. Malicious actors are continuously looking for vulnerabilities for penetration. There is a need to make the security standard improved and solid. Penetration in customer detail can lose customer trust. The first instincts are prevention. So making the system more protective from the emerging threats is

necessary. Though it is a fact that there is nothing like a 100% secure system, even then one should be so protective to discourage attackers. Some advanced mechanisms are listed below to preclude attackers from entering the system.
Different types of attacks are executed after gaining unauthorized access to systems. Criminals can earn money by performing the selling of customer's information or internal data. Sometimes by manipulating the ad there can be much loss to the reputation of the organization. It is recommended to track and limit the Click Per Min (CPM) coming from the same IP address. The IP address sending maximum access requests to browse the same ad continuously should be blocked to prevent the window from popping up in the add section. Being a retail system with good traffic to make the response time faster; there should be a limit of 'X' average requests in 5 sec from a single IP address, and if the request is exceeding, it should be blocked.

6.2. Potential Solutions and Innovations

This article explores potential solutions and innovations to preserve a premium trust in the interactions and transactions between vendors and cloud-based retail platforms or ecosystems in a cloud-retail federation context. The vision is of multi-partner federations where retail business entities, vendors, and manufacturers negotiate digital contracts and participate in a unified cloud-based retail ecosystem that offers a combined portfolio of services and promotes economies of scale and a better utilization of resources. Providers interact with shared digital objects and data, sharing resources and consumers within secure, privacy-preserving, and interoperable mechanisms able to withstand the looming cyber threats. Technology and the internet have transformed the way vendors, retailers, and customers relate and do business. E-commerce and smart retails have made it possible for small and medium-sized businesses to profit from digital trade even when lacking a brick-and-mortar shop. As the use of e-commerce technology increases, cybercriminals attack it. The scale and damage of such attacks are on the rise. With an extensive usage of innovative business models and services, cloud-based retail ecosystems will be the next frontier for cyber-attacks. Vendors, providers, and manufacturers participating in retail clouds will have to use cutting-edge cybersecurity solutions to protect against the increasing threats. And to preserve trust, vendors and retail cloud platforms must rely on secure, trusted systems and credibility measures. This research delivers a set of high-quality mechanisms able to forestall cyber-attacks and prevent the leakage and modification of sensitive data within cloud-based retail ecosystems .

7. Conclusion

The research presented in this paper recognized an evident need for exploring advanced cybersecurity mechanisms via a thorough and updated literature review for the retail industry, especially in light of the rather invisible yet utterly influential cloud-based retail ecosystems. Preventive strategies that may effectively shield against emerging threats are discussed and outlined. Also, it is acknowledged that the adapted effect of such mechanisms is highly reliant upon calibrations to suit the characteristics of each cloud service model.
There is a pressing need for more advanced preventive approaches for the retail industry. This research generated and optimized an approach to analyse and enhance preventive mechanisms against a variety of threats in the enlarged retail cloud ecosystems. Although the prime focus is on the retail sector, the proposed approach has the potential for adaptation in broader scenarios with a cloud-centric feature. Adopting a systematic enhancement process can help entities with basic preventive measures in place to reinforce their security posture more effectively. Enhancements to numerous sectors of security mechanisms can instigate prevention more successfully. The proposed mechanisms are designed to respond well to both the common types of risks in the retail domain and the unique vulnerabilities of cloud services. Efforts are also dedicated to protecting the data which are prevalent targets in retail breaches. Lastly, simulations are conducted to evaluate the effects of enhancements under different scenarios.

7.1. Future Trends

The future trend is towards digital commerce. Online shopping has become a routine rather than a luxury. We can purchase items more quickly and simply by a single mouse click rather than visiting physical merchants. At the same time, to handle a large amount of purchases, transactions and goods as stored by e-commerce organizations which create a huge data format. In order to support their application, more organizations need to store their data in third-party cloud support. So, the cloud server holds a lot of sensitive data about businesses and customers. Up to 90% of cyber attacks begin with e-mail. The target should first collect some basic data about the responding e-commerce organization. Customers should regularly update their credentials and use two-factor verification and overall surveillance. It is necessary to overcome the new shopping experiences like "Digital Wallet" malware attacks. Shopaholic customers are more exploited by this virus. The worldwide spending on the cloud is predicted to reach $560 billion in 2020. It is increasing at a rate of 18.8%. This has provided a chance for organizations to move current on-site software and applications to the cloud. This is particularly important for SMEs who do not have the funds to purchase their equipment. With this finding, it could be expected that many economies would move from the physical retail system to digital shops. In this day and age, the retail ecosystem is not only centered on physical shops but also involves online websites and applications. People can shop online with a

mobile phone from wherever they are easily. As a consequence, personal data and identities should be presented to the web of the specifics. When it comes to money, bank and card credentials should be shared. On the other hand, hackers have superior skills of hacking and intrusion. They can hack the systems of e-commerce platforms and steal this data.

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