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Research Proposal · October 2022

DOI: 10.46632/jemm/8/2/6

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REST Journal on Emerging trends in Modelling and Manufacturing
Vol: 8(2), 2022
REST Publisher; ISSN: 2455-4537
Website: http://restpublisher.com/journals/jemm/

Artificial Intelligence in Cyber Security

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Abstract. Now days due to huge application of IOT, cyber attack is tremendously affecting all over the world under. Hence designing of cyber security approach in order to avoid cyber attack is today's basic need. Cyber security is the application of technologies, processes and controls to protect systems, networks, programs, devices and data from cyber attacks. It aims to reduce the risk of cyber attacks and protect against the unauthorized exploitation of systems, networks and technologies. Traditional security methods are not adequate to prevent data breaches in case of cyber attacks. Cybercriminals have learned how to use new techniques and robust tools to hack, attack, and breach data. Fortunately, Artificial Intelligence (AI) technologies have been introduced into cyberspace to construct smart models for defending systems from attacks. There is rapid development of technology; Artificial intelligence has shown the promising results in cyber security analyzing the data through its decision making. This paper represents AI technique which is being used in various applications in the battle against the Cyber attack.
Keywords: cyber security, artificial intelligence.

1. Introduction

Cyber security is important because it encompasses everything that relates to protecting our data from cyber attackers who want to steal this information and use it to cause harm[71][72][73][74][75]. This can be sensitive data, governmental and industry information, personal information, personally identifiable information (PII), intellectual property, and protected health information (PHI). Therefore, they are obviously vulnerable to cyber attacks. A cyber attack is an attack launched from one or more computers against cyber attacks is either to disable the target computer, or take the services offline, or get access to the target computer's data[77-80]. In response to the issues, artificial intelligence tools are commonly implemented to deal with cyber threats. Artificial intelligence (AI) has helped more organizations to improve the security posture effectively and reduce the breach risks. Machine learning and artificial intelligence are the essential tools in technology for information security as it helps companies and individuals to check and analyze the threats posed to the organization [80-85]

2. Types of Web Based Cyber Security Threats

These are the attacks which occur on a website or web applications. While the types of cyber threats continue to grow, there are some of the most common and prevalent cyber threats are as follows:

- Malware: It is malicious software, including spyware, ransomware, viruses, and worms, which gets installed into the system when the user clicks a dangerous link or email. Once inside the system, malware can block access to critical components of the network, damage the system, and gather confidential information, among others[[86-91].
- Phishing: 80% Cybercriminals send malicious emails that seem to come from legitimate resources. The user is then tricked into clicking the malicious link in the email, leading to malware installation or disclosure of sensitive information like credit card details and login credentials.
- Spare Phishing: 71% Spear phishing is a more sophisticated form of a phishing attack in which cybercriminals target only privileged users such as system administrators and C-suite executives.
- Man in the Middle Attack: 95% Man in the Middle (MitM) attack occurs when cyber criminals place themselves between a two-party communications. Once the attacker interprets the communication, they may filter and steal sensitive data and return different responses to the user [90-96].
- Denial of Service Attack 8.4 million: Denial of Service attacks aims at flooding systems, networks, or servers with massive traffic, thereby making the system unable to fulfill legitimate requests. Attacks can also use several infected devices to launch an attack on the target system. This is known as a Distributed Denial of Service (DDoS) attack.
- SQL Injection: 65.1% A Structured Query Language (SQL) injection attack occurs when cybercriminals attempt to access the database by uploading malicious SQL scripts. Once successful, the malicious actor can view, change, or delete data stored in the SQL database.
- Zero-day Exploit: A zero-day attack occurs when software or hardware vulnerability is announced, and the cybercriminals exploit the vulnerability before a patch or solution is implemented.
- Advanced Persistent Threats (APT): An advanced persistent threat occurs when a malicious actor gains unauthorized access to a system or network and remains undetected for an extended time.

- Ransom ware: Ransom ware is a type of malware attack in which the attacker locks or encrypts the victim's data and threatens to publish or block access to data unless a ransom is paid. Learning more about ransom ware threats can help companies prevent and cope with them better.
- DNS Attack: A DNS attack is a cyber attack in which cybercriminals exploit vulnerabilities in the Domain Name System (DNS)[1][2][3][4][5][6][7][8][9][10]. The attackers leverage the DNS vulnerabilities to divert site visitors to malicious pages (DNS Hijacking) and remove data from compromised systems (DNS Tunneling).

3. Types of Web Based Cyber Security Threats

These are the attacks which are intended to compromise a computer or a computer network. Some of the important system-based attacks are as follows-

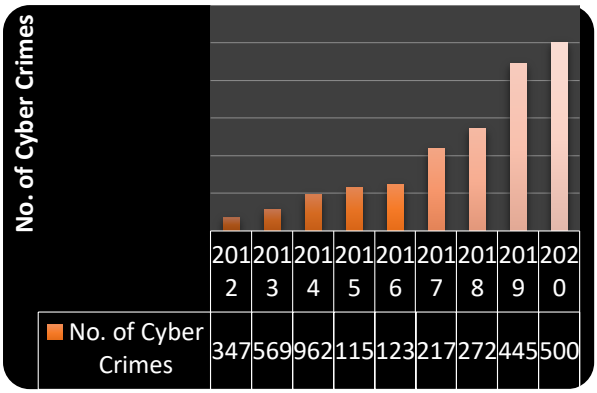
- Virus: It is a type of malicious software program that spread throughout the computer files without the knowledge of a user. It is a self-replicating malicious computer program that replicates by inserting copies of it into other computer programs when executed. It can also execute instructions that cause harm to the system[11][12][13][14][15][16][17][18]19][20].
- Worm: It is a type of malware whose primary function is to replicate itself to spread to uninfected computers. It works same as the computer virus. Worms often originate from email attachments that appear to be from trusted senders.
- Trojan horse: It is a malicious program that occurs unexpected changes to computer setting and unusual activity, even when the computer should be idle. It misleads the user of its true intent. It appears to be a normal application but when opened/executed some malicious code will run in the background.
- Backdoors: It is a method that bypasses the normal authentication process. A developer may create a backdoor so that an application or operating system can be accessed for troubleshooting or other purposes.
- Bots: A bot (short for "robot") is an automated process that interacts with other network services. Some bots program run automatically, while others only execute commands when they receive specific input. Common examples of bots program are the crawler, chartroom bots, and malicious bots.

4. Types of Cyber Attackers

In order to respond effectively to a cyber attack, it's imperative to know the threat actors and understand their tactics, techniques, and procedures.

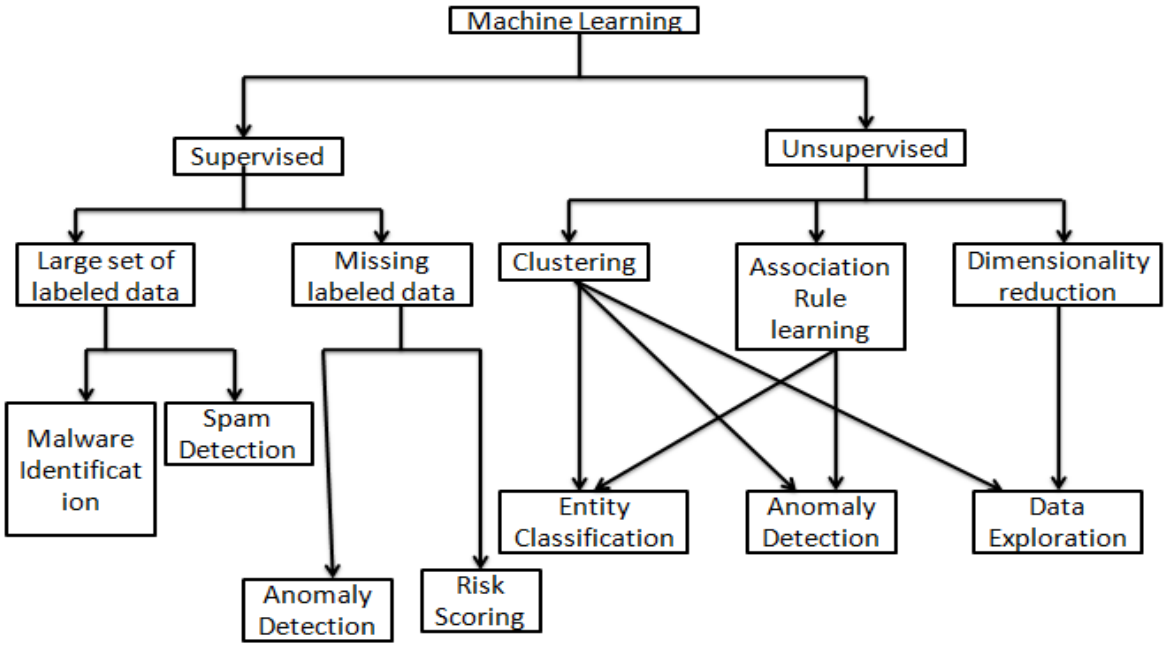
- Nation States: Cyber attacks by a nation can inflict detrimental impact by disrupting communications, military activities, and everyday life.
- Criminal Groups: Criminal groups aim to infiltrate systems or networks for financial gain. These groups use phishing, spam, spyware, and malware to conduct identity theft, online fraud, and system extortion.
- Hackers: Hackers explore various cyber techniques to breach defenses and exploit vulnerabilities in a computer system or network. They are motivated by personal gain, revenge, stalking, financial gain, and political activism. Hackers develop new types of threats for the thrill of challenge or bragging rights in the hacker community.
- Terrorist Groups: Terrorists conduct cyber attacks to destroy, infiltrate, or exploit critical infrastructure to threaten national security, compromise military equipment, disrupt the economy, and cause mass casualties.
- Activists: Activists carry out cyber attacks in support of political causes rather than for financial gain. They target industries, organizations, or individuals who don't align with their political ideas and agenda.
- Malicious Insiders: 97% of surveyed IT leaders expressed concerns about insider threats in cyber security. Insiders can include employees, third-party vendors, contractors, or other business associates who have legitimate access to enterprise assets but misuse that access to steal or destroy information for financial or personal gain.
- Corporate Spies: Corporate spies conduct industrial or business espionage to either make a profit or disrupt a competitor's business by attacking critical infrastructure, stealing trade secrets, and gaining access.

5. Number of cyber crimes reported across India from 2012 to 2020



6. Machine Learning Applications in Cyber Security

As cyber security threats are changing and developing constantly, immediate response is required and an automatic. Therefore, machine learning techniques, specifically deep learning that does not generally require prior experience or dependence on previous expert classifications may be particularly important as an implementation of cyber security AI approaches. The study [71-77] analysis to the effectiveness for cyber security purposes of machine learning approaches. This research included the implementation of methods of machine learning to identify intrusions, spam and malware.



Focus was put on the effectiveness and significant drawbacks of computer-based technologies that prevent the direct implementation of cyber security of machine learning approaches

7. Advantages of AI in Cyber Security

AI systems are being trained to identify malware, execute pattern recognition, and detect even the tiniest characteristics of malware or ransom ware assaults before they reach the system using complex algorithms. With natural language processing, AI can provide greater predictive intelligence by skimming through articles, news, and research on cyber risks and curating material on its own. Every day, a mid-sized firm receives warnings for around 200,000 cyber incidents, according to Tech Republic. An ordinary company's security staff would be overwhelmed by this amount of attacks. As a result, some of these threats will go undiscovered and inflict significant network damage. To operate effectively and protect their organizations from cyber threats, security professionals require significant help from intelligent machines and modern technology such as AI.

AI Is Capable of Handling Large Amounts of Data: There is a lot of activity on a company's network. There is a lot of traffic in a normal mid-sized firm. That implies a lot of data is exchanged between customers and the company on a daily basis. This information must be safeguarded from harmful persons and software[21][22][23][24][25]26]6][27][28][29][30][31][32]. However, cyber security experts are unable to inspect all data for potential threats. AI is the greatest option for detecting threats that are disguised as routine activities. Because of its automated nature, it can sift through large amounts of data and traffic. AI-based technology, such as a personal proxy, can assist you in data transfer. It can also detect and identify any hazards that may be lurking in the midst of the chaos[33][34][35].

Duplicative Processes Reduce*:* As previously stated, attackers frequently modify their methods. The fundamental security practices, on the other hand, do not change. If you employ someone to do these duties, they may become bored and endanger your network in the process [36][37][38[39[40][41][42][42][43][44][45]. AI takes care of redundant cyber security operations that might wear your cyber security worker while imitating the best of human traits and leaving out the flaws. It aids in the detection and prevention of fundamental security risks on a regular basis[46][47][48][49][50][51][52][53][54][55][56][57][58]. It also does a thorough analysis of your network to check if there are any security flaws that might be harmful to your network.

Detection and response times are boosted: The first step in securing your company's network is to detect threats. It would be ideal if you could immediately recognize issues like untrustworthy data. It will protect your network from permanent harm. Integrating AI with cyber security is the greatest method to detect and respond to attacks in real-time. Artificial

intelligence (AI) examines your whole system for risks. Unlike humans, AI will detect risks early and make your security operations easier[59][60][61]62][63][64][65][66][67][68][69][70].

Authenticity Protection: The majority of websites offer a user account function that allows users to log in and access services or make purchases. Some websites include contact forms that visitors must complete with personal information. Because such a site contains private information and sensitive material, you'll need an extra degree of protection as a business. Your guests will be safe while accessing your network thanks to the enhanced security layer. When a user wishes to connect to their account, AI secures authentication. For identification, AI uses a variety of techniques like face recognition, CAPTCHA, and fingerprint recognition, among others. These characteristics' data can be used to determine if a log-in attempt is legitimate or not. To gain access to business networks, hackers utilize credential stuffing and brute force assaults.

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