



Madanapalle Institute of Technology & Science

# SPARK

MAGAZINE



**DEPARTMENT OF**  
**CST**

**2020**

[www.mits.ac.in](http://www.mits.ac.in)

## About MITS



**Madanapalle Institute of Technology & Science is established in 1998 in the picturesque and pleasant environs of Madanapalle and is ideally located on a sprawling 26.17 acre campus on Madanapalle - Anantapur Highway (NH-205) near Angallu, about 10km away from Madanapalle.**

**MIT'S, originated under the auspices of Ratakonda Ranga Reddy Educational Academy under the proactive leadership of Late Sri. N. Krishna Kumar M.S. (U.S.A), the then President and Dr. N. Vijaya Bhaskar Choudary, Ph.D., Secretary & Correspondent of the Academy.**

**MIT'S is governed by a progressive management that never rests on laurels and has been striving conscientiously to develop it as one of the best centers of Academic Excellence in India. The Institution's profile is firmly based on strategies and action plans that match changing demands of the nation and the students fraternity. MIT'S enjoys constant support and patronage of NRI's with distinguished academic traditions and vast experience in Engineering & Technology.**

### **Institute Vision**

**To become a globally recognized research and academic institution and thereby contribute to technological and socio-economic development of the nation.**

### **Institute Mission**

**To foster a culture of excellence in research, innovation, entrepreneurship, rational thinking, and civility by providing necessary resources for generation, dissemination and utilization of knowledge and in the process create an ambience for practice-based learning to the youth for success in their careers.**

## About us



**The Department of Computer Science & Technology (CST) was established in the year 2018 and plays a vital role in producing value-based professionals to cater to the ever-challenging needs of technical excellence in the emerging areas of CST. The department offers one UG program with an intake of 60 students and the intake was enhanced to 180 seats in the year 2019. Department has adequate infrastructural facilities required for imparting high-quality education and the department is fully structured to meet the contemporary needs of the industry. Imparting high quality education is supported by well qualified and experienced faculty members with rich academic and industry exposure, who have pursued Masters/Ph.D degree from prestigious institutions like NITs, IITs, and Central Universities within India and abroad. Seminars, Workshops, and Technical Symposia are conducted in the department to keep faculty and students updated with latest developments in various technologies.**

### Department Vision

**To bring forth globally competent engineers with societal consciousness, who thrive in academics and research in Computer Science and Technology.**

### Department Mission

**M1: To deliver technical education of the highest quality by improving the curriculum and using effective pedagogical techniques by qualified faculty.**

**M2: To foster interaction between Industry and academia, to improve students' abilities in research, innovation, and entrepreneurship.**

**M3: To prepare the students to become professionally competent and intellectually adept by imparting required Skills to mitigate the societal problems.**

## **Program Outcomes (POs)**

**PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.**

**PO2: Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences**

**PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.**

**PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.**

**PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.**

**PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.**

**PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.**

**PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.**

**PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.**

**PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.**

**PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.**

**PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.**

## **Program Educational Objectives (PEOs)**

**PEO1: Graduates will have successful career by contributing for innovation of new technologies and systems in the key domains of Computer Science & Technology.**

**PEO2: Graduates will be able to perform technical/ administrative roles in information technology industry / R&D sectors and pursue higher education in reputed institutions.**

**PEO3: Graduates will be ethically and socially responsible towards the societal development and opting a career as an entrepreneur with moral values in various domains of Computer Science & Technology.**

## MESSAGE FROM THE CORRESPONDENT



**Dear Readers,**

**I feel exhilarated that the Department of Computer Science & Technology of MITS is bringing out a magazine called SPARK from the year 2020. This Magazine brings out the intellectual brilliance in various new techniques introduced in Information Technology industry.**

**``HARD WORK, SINCERITY, DEDICATION AND ENTHUSIASTIC DEVOTION TO WORK WILL FETCH YOU UNBOUND SUCCESS, MAY THE LORD SHOWER HIS BLESSINGS ON YOU``**

**I heartily congratulate the students and the staffs of CST Department and Wish them a grand success.**

**Dr. N. VijayaBhaskarChoudary  
Correspondent**

## PRINCIPAL'S DESK



### **"Be Interested, Committed and Repeated"**

**Dear Readers,**

**I feel delighted to see the dynamics of faculty and students of computer engineering department for giving a new level to SPARK. This technical magazine will be the source of motivation for faculty and students to remain interested and committed for the growth of the department and the institute. I would like to congratulate the editorial team for their effort in this regard. I wish all the best to the entire team for the future.**

**Principal  
Dr. C. Yuvaraj**

## **MESSAGE FROM THE HEAD OF THE DEPARTMENT**



**Dear Readers,**

**I feel delighted to see the dynamics of faculty and students of Computer Science & Technology Department for giving new level to SPARK. This technical magazine will be the source of motivation for faculty and students to remain interested and committed for the growth of the department and the institute. I would like to congratulate the editorial team for their effort in this regard.**

**I wish all the best to the entire team for future endeavors.**

**Prof. Dr. M.Sreedevi HoD,  
Dept of CST  
MITS**

# REGULARIZATION IN DEEP LEARNING

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In Deep learning or ML, we face the problem like overfitting. This issue occurs when our model hasn't trained well or maybe our model is extremely trained well so it doesn't give accurate result on test data (i.e new inputs). Thus the main reason behind is bias and variance. In training dataset if the model doesn't give error and it classifies very well but in validation set it fails to generalize and classifies so then this overfitting will occur. Thus the data used for validation set will be different from training set. If the error on training set is 1% and validation set is 11% then it is said to be high variance as model is able to do well on trained set but fails to do well in validation set. On other hand if the trained set error is 14% and validation set error is 32% this means this model has high bias and high variance, it doesn't perform well on trained set neither on validation set. Thus to overcome this, we will use regularization. Regularization helps to eliminate certain parameters or neurons in neural network to obtain smooth curve as overfitting is caused by having too complex curve or a linear curve. In regularization we will deeply study about its two techniques i.e l2 regularization and dropout regularization.

## 1. REGULARIZATION

The subset of Artificial Intelligence is Machine Learning and Deep Learning. In this the models are trained, validated and tested. When the model is extremely trained or doesn't give good result in validation test or gives good result on trained set but fails to give results on test dataset so this is called as overfitting and underfitting and to solve this, Regularization is used. Since Deep Learning (DL) is a subset of AI and ML (as shown in fig1) so Deep Learning is used to correct the small errors as well as to train the model perfectly constellation to consist of approximately 4,000 cross-linked satellites, more than twice the number of operational satellites in orbit at the time. According to documents filed with the US Federal Communications Commission, the satellites will use optical inter-satellite links, phased array beam-forming, and digital processing technologies in the Ku- and Ka bands (FCC). Early satellites did not have laser links. In late 2020, the inter-satellite laser links were successfully tested. The satellites will be mass-produced at a significantly lower cost per unit of capability than previous satellites. We're going to try to do for satellites what we've done for rockets, smaller satellites are critical to lowering the cost of space-based Internet and communications. Because SpaceX is a new entrant in the satellite communications market, SpaceX asked the FCC in February 2015 to consider future innovative uses of the Ka-band spectrum before committing to 5G communications regulations that would create barriers to entry. SpaceX's non-geostationary orbit



communications satellite constellation will operate in high-frequency bands above 24 GHz, where steerable Earth station transmit antennas would have a wider geographic impact, and significantly lower satellite altitudes magnify the impact of aggregate interference from terrestrial transmissions. The minimum theoretical round-trip latency for Internet traffic via a geostationary satellite is 477 milliseconds (ms between user and ground gateway), but current satellites have latencies of 600ms or more. Star link satellites are orbiting at 1/105 to 1/30 of the height of geostationary orbits, and thus offer more practical Earth-to-sat latencies of around 25 to 35ms, comparable to existing cable and fiber networks. The system will employ a peer-to-peer protocol that is said to be "simpler than IPv6," as well as native end-to-end encryption. For orbit raising and station keeping, Star link satellites use Hall-effect thrusters with krypton gas as the reaction mass. When compared to a similar electric propulsion system operated with xenon, krypton Hall thrusters exhibit significantly higher flow channel erosion, but krypton is much more abundant and has a lower market price.

## **TYPES OF REGULARIZATION**

### **1. L2 REGULARIZATION**

The L2 regularization is the most common type and is also commonly known as weight decay or Ridge Regression. This regularization strategy makes the weights closer to the origin by adding a regularization term  $\Omega(\theta) = \frac{1}{2} \|w\|^2$

### **2. L1 REGULARIZATION**

The L1 regularize introduces sparsity within the weights by forcing more weights to be zero rather than reducing the typical magnitude of all weights (because the L2 regularize does). That is, L1 suggests that some features should be discarded from the training process.  $\Omega(\theta) = \sum |w|$

### **3. DROPOUT REGULARIZATION**

This technique is used in deep learning to overcome overfitting. In neural networks there are many hidden layers and every input and output has connected weight. Sometimes the neurons can be bias due to specific feature. So due to dropout the neurons are randomly eliminated and maybe those neurons are also eliminated on which the output neuron is dependent on. So this gives an solution for overfitting.

### **4. EARLY STOPPING**

In this method, we can control or stop training phase on several condition. In early stopping when the model tries to overfit after a certain point or epochs then it stops fitting the data. The process of stopping training when we have increase in validation loss this is known as early stopping.

## **CONCLUSION**

The overview of this paper is to study and know about regularization and how it actually happens. The main thing to focus is on bias and variance. The L2 or Ridge Regression is for predicting values through weight. In both techniques we have to introduce little bias as introducing this little bias can give error in training set but can overcome through error in testing set. Thus, the regularization gives us additional information about to use the smaller weights, the parameters sharing is useful. To prevent the overfitting limit the model capacity get more data to avoid high variance issues. We can also use regularization on random forest or decision trees. Also, Data Augmentation is a part of regularization. It is used for imaging tasks where the images can be rotated, mirrored, translated, scaling, added random noise etc. It is also useful in speech recognition too. Cyberwarfare is not a future threat—it's a clear and present danger. While the concept of cyber terrorism might sound like something from a fictional movie, our interconnected world is riddled with security flaws that make it an unfortunate reality

# LOAD BALANCING IN CLOUD



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III Year CST

**L**oad balancing is the method of distributing network traffic equally across a pool of resources that support an application. Modern applications must process millions of users simultaneously and return the correct text, videos, images, and other data to each user in a fast and reliable manner. To handle such high volumes of traffic, most applications have many resource servers with duplicate data between them. A load balancer is a device that sits between the user and the server group and acts as an invisible facilitator, ensuring that all resource servers are used equally. It directs and controls internet traffic between the application servers and their visitors or clients. As a result, it improves an application's availability, scalability, security, and performance. Server failure or maintenance can increase application downtime, making your application unavailable to visitors. Load balancers increase the fault tolerance of your systems by automatically detecting server problems and redirecting client traffic to available servers.

Load balancers also come with built-in security features to add another layer of security to your internet applications. They are a useful tool to deal with distributed denial of service attacks, in which attackers flood an application server with millions of concurrent requests that cause server failure. They improve application performance by decreasing response time and reducing network latency. Different Load balancing Algorithms exists which direct the requests to different datacenters which allocates the tasks to the virtual machines in such a way that the processing capability of the machines is not wasted. User requests to the application first go to the load balancer. The load balancer then routes each request to a single server in the server farm best suited to handle the request. It is like the work done by a manager in a restaurant. Consider a restaurant with five waiters. If customers were allowed to choose their waiters, one or two waiters could be overloaded with work while the others are idle. To avoid this scenario, the restaurant manager assigns customers to the specific waiters who are best suited to serve them. In general, there can be hardware and software-based load balancers.

A hardware-based load balancer is a hardware appliance that can securely process and redirect gigabytes of traffic to hundreds of different servers. You can store it in your data centers and use virtualization to create multiple digital or virtual load balancers that you can centrally manage. Software-based load balancers are applications that perform all load balancing functions. You can install them on any server or access them as a fully managed third-party service. Hardware load balancers require an initial investment, configuration, and ongoing maintenance. You might also not use them to full capacity, especially if you purchase one only to handle peak-time traffic spikes. If traffic volume increases suddenly beyond its current capacity, this will affect users until you can purchase and set up another load balancer. In contrast, software-based load balancers are much more flexible. They can scale up or down easily and are more compatible with modern cloud computing environments.

## DATA PRIVACY



Bhaskar. T (19691A2817)  
II Year CST

**D**ata privacy, sometimes also referred to as information privacy, is an area of data protection that concerns the proper handling of sensitive data such as certain financial data and intellectual property data, to meet regulatory requirements as well as protecting the confidentiality and immutability of the data. Roughly speaking, data protection spans three broad categories, namely, traditional data protection (such as backup and restore copies), data security, and data privacy . Ensuring the privacy of sensitive and personal data can be considered an outcome of best practice in data protection and security with the overall goal of achieving the continual availability and immutability of critical business data. What are some of the most important technologies for data privacy? Encryption is a way to conceal information by scrambling it so that it appears to be random data. Only parties with the encryption key can unscramble the information.

With the increase in dependency on electronic devices, it becomes important to teach people the proper 'netiquettes'. Parents have an important role to play in monitoring their child's behaviour and activity on the internet. It is also important for Access control ensures that only authorized parties access systems and data. Access control can be combined with data loss prevention (DLP) to stop sensitive data from leaving the network. Two-factor authentication is one of the most important technologies for regular users, as it makes it far harder for attackers to gain unauthorized access to personal accounts. These are just some of the technologies available today that can protect user privacy and keep data more secure. However, technology alone is not sufficient to protect data privacy. What are the laws that govern data privacy? As technological advances have improved data collection and surveillance capabilities, governments around the world have started passing laws regulating what kind of data can be collected about users, how that data can be used, and how data should be stored and protected. Some of the most important regulatory privacy frameworks to know include: General Data Protection Regulation (GDPR): Regulates how the personal data of European Union (EU) data subjects, meaning individuals, can be collected, stored, and processed, and gives data subjects rights to control their personal data (including a right to be forgotten). National data protection laws: Many countries, such as Canada, Japan, Australia, Singapore, and others, have comprehensive data protection laws in some form. Some, like Brazil's General Law for the Protection of Personal Data and the UK's Data Protection Act, are quite similar to the GDPR.

**California Consumer Privacy Act (CCPA):** Requires that consumers be made aware of what personal data is collected and gives consumers control over their personal data, including a right to tell organizations not to sell their personal data. There are also industry-specific privacy guidelines in some countries: for instance, in the United States, the Health Insurance Portability and Accountability Act (HIPAA) governs how personal healthcare data should be handled. However, many privacy advocates argue that individuals still do not have sufficient control over what happens to their personal data. Governments around the world may pass additional data privacy laws in the future. **What are some of the challenges users face when protecting their online privacy?** **Online tracking:** User behavior is regularly tracked online. Cookies often record a user's activities, and while most countries require websites to alert users of cookie usage, users may not be aware of to what degree cookies are recording their activities. **Losing control of data:** With so many online services in common use, individuals may not be aware of how their data is being shared beyond the websites with which they interact online, and they may not have a say over what happens to their data. **Lack of transparency:** To use web applications, users often have to provide personal data like their name, email, phone number, or location; meanwhile, the privacy policies associated with those applications may be dense and difficult to understand. **Social media:** Social media posts may reveal more personal information than users realize.

**Cyber-crime:** Many attackers try to steal user data in order to commit fraud, compromise secure systems, or sell it on underground markets to parties who will use the data for malicious purposes. Some attackers use phishing attacks. **What are some of the challenges businesses face when protecting user privacy?** **Communication:** Organizations sometimes struggle to communicate clearly to their users what personal data they are collecting and how they use it.

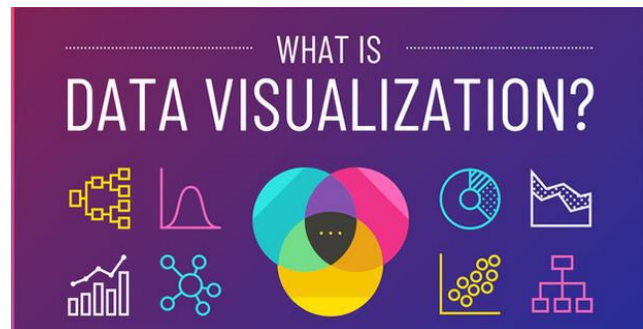
**Cyber-crime:** Attackers target both individual users and organizations that collect and store data about those users. In addition, as more aspects of a business become Internet-connected, the attack surface increases. **Data breaches:** A data breach can lead to a massive violation of user privacy if personal details are leaked, and attackers continue to refine the techniques they use to cause these breaches. **Insider threats:** Internal employees or contractors might inappropriately access data if it is not adequately protected. **Why is Data Privacy important?** In many jurisdictions, privacy is considered a fundamental human right, and data protection laws exist to guard that right. Data privacy is also important because in order for individuals to be willing to engage online, they have to trust that their personal data will be handled with care. Organizations use data protection practices to demonstrate to their customers and users that they can be trusted with their personal data. **Business Asset Management:** Data is perhaps the most important asset a business owns. We live in a data economy where companies find enormous value in collecting, sharing and using data about customers or users, especially from social media.

**Regulatory Compliance:** Managing data to ensure regulatory compliance is arguably even more important. A business may have to meet legal responsibilities about how they collect, store, and process personal data, and non-compliance could lead to a huge fine. If the business becomes the victim to a hack or ransomware, the consequences in terms of lost revenue and lost customer trust could be even worse. Personal data can be misused in a number of ways if it is not kept private or if people don't have the ability to control how their information is used: Entities may sell personal data to advertisers or other outside parties without user consent, which can result in users receiving unwanted marketing or advertising. When a person's activities are tracked and monitored, this may restrict their ability to express themselves freely, especially under repressive governments. For individuals, any of these outcomes can be harmful. For a business, these outcomes can irreparably

harm their reputation, as well as resulting in fines, sanctions, and other legal consequences. In addition to the real-world implications of privacy infringements, many people and countries hold that privacy has intrinsic value: that privacy is a human right fundamental to a free society, like the right to free speech.

## DATA VISUALIZATION AND POWER BUSINESS INTELLIGENCE

**NAGA PAVAN KUMAR REDDY. K (1969 1A2872)**  
II YEAR CST



Every day a huge amount of data is generated. This data can even vary in nature and structure. A business, for example, can have data on sales revenue, marketing performance, customer interactions, inventory levels, production metrics, staffing levels, costs, etc. But with so much data to sift through, it can be difficult for people to see the story it tells. Data visualization helps you turn all that granular data into easily understood, visually compelling—and useful—business information. Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data. In the world of Big Data, data visualization tools and technologies are essential to analyse massive amounts of information and make data-driven decisions. Hidden within your data lie important insights that can help drive the business forward. But the challenge is that you can't always connect the dots by looking at raw numbers alone. When you look at your data presented in a visual format, patterns, connections, and other insights emerge that would otherwise remain out of sight.

Our eyes are drawn to colours and patterns. We can quickly identify red from blue, and a square from a circle. Our culture is visual, including everything from art and advertisements to TV and movies. Data visualization is another form of visual art that grabs our interest and keeps our eyes on the message. When we see a chart, we quickly see trends and outliers. If we can see something, we internalize it quickly. It's storytelling with a purpose. If you've ever stared at a massive spreadsheet of data and couldn't see a trend, you know how much more effective a visualization can be. It's hard to think of a professional industry that doesn't benefit from making data more understandable. Every STEM field benefits from understanding data—and so do fields in government, finance, marketing, history, consumer goods, service industries, education, sports, and so on. While we always increasing talk about data visualization there are practical, real-life applications that are undeniable. And, since visualization is so prolific, it's also one of the most useful professional skills to develop. The better you can convey your points visually, whether in a dashboard or a slide deck, the better you can leverage that information. Skill sets are changing to accommodate a data-driven world. It is increasingly valuable for professionals to be able to use data to make decisions and use visuals to tell stories of when data informs the who, what, when, where, and how. While traditional education typically draws a distinct line between creative storytelling and technical analysis, the modern professional world also values those who can cross between the two.

Today, data visualization tools run the gamut from free versions you can access with a browser to feature-rich platforms that integrate with a wide variety of mainstream business applications. One such tool is Power BI, an interactive data visualization software product developed by Microsoft with a primary focus on business intelligence (BI). Power BI offers cloud-based services for interactive visualizations with a simple interface for end-users to create their own reports and dashboards.

Power BI was first conceptualized by Ruler and Dhers Netz of the SQL server coverage services team at Microsoft. It was further designed by West Chadic George in the year 2010 and named Project Crescent. In 2011, It was bundled with SQL Server Codenamed Mount McKinley. Microsoft unveiled the first preview to Power BI in September 2014. And finally, the first version of Power BI was released on 24 July 2015. It was based on Excel Based Add-ins like Power Query, Pivot, view, and Map.

# ETHICAL HACKING



Unnathi. M (19691A28G7)  
II Year CST

**The term 'hacking' has a very negative connotation attached to it. It refers to gaining unauthorized access to data in a computer or system. It is the unlawful use of another's resources. However, hacking when done with permission is not only legal but has several advantages to organizations and companies. What kind of vulnerabilities does a hacker see? What information might be targeted by a hacker? What will the attacker do with the information and how many people notice the attempt? What can be done to fix the vulnerabilities in the system? All these questions can be answered by an ethical hacker. Ethical hacking is the act of identifying vulnerabilities in an application, system, or organization's infrastructure that can be exploited by an attacker. By lawfully hacking into networks and looking for weak places, ethical hackers (also known as the white hats) try to avoid cyberattacks and security breaches.**

**Ethical hacking has great importance in today's times. Finding vulnerabilities from the perspective of an attacker, addressing weak areas in a system and putting in place a secure network to avoid security breaches are some such examples. Ethical hacking can also be necessary to earn the trust of customers and investors by assuring the security of the products and data. It prevents people with malicious intentions to gain access to sensitive or confidential information. One major use of ethical hacking is to protect the national security of a country. Any breach or loophole in the information or defence databases of the country can put the safety of its citizens at great risk. Thus, impenetrable defences need to be forged and erected so that no enemy nation or terrorist organisation can obtain official, classified government data. Using ethical hackers is one such way to ensure cybersecurity.**

**They can identify the vulnerabilities and help protect data from cyberattacks and breaches. For example, in the United States of America, the "Hack the Pentagon" event, led by the Defense Digital Service, kick-started the partnership between the Department Of Defense and the white hat community. In addition to finding 138 vulnerabilities, they also uncovered the need to have an enduring open door for hackers to report the vulnerabilities they find. Later, they also started the 'Vulnerability Disclosure Policy' which has become one of the largest disclosure programmes in the world. Ethical hacking has five major phases. Reconnaissance is the preparatory phase where the hacker collects preliminary information about the target prior to the attack. Through scanning, the hacker identifies a quick way to gain access to the network by exploiting the vulnerabilities of the system. After gaining access to the network, the user privileges are escalated to control the systems connected to it. Having gained the access, the hacker tries to maintain it by securing access to the organization's Rootkits and Trojans. These are used to launch additional attacks on the network.**

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