CASC
6
YEARS
ANNIVERSARY

DIGITA1 OUTLET

THE CCET ACM TECH MAGAZINE

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JULY-AUGUST, 2021

acm CCET STUDENT CHAPTER

Chandigarh College of Engg. & Tech.
CCET

VISION

Chandigarh College of Engineering and Technology aims to be a center of excellence for imparting technical education and serving the society with self-motivated and highly competent technocrats.

MISSION

1. To provide high quality and value based technical education.
2. To establish a center of excellence in emerging and cutting edge technologies by encouraging research and consultancy in collaboration with industry and organizations of repute.
3. To foster a transformative learning environment for technocrats focused on inter-disciplinary knowledge; problem-solving; leadership, communication, and interpersonal skills.
4. To imbibe spirit of entrepreneurship and innovation for development of enterprising leaders for contributing to Nation progress and Humanity.

DEPARTMENT-VISION AND MISSION

VISION

To produce self-motivated and globally competent technocrats equipped with computing, innovation, and human values for ever changing world and shape them towards serving the society.

MISSION

M1. To make the department a smart centre for learning, innovation and research, creativity, and entrepreneurship for the stakeholders (students/scholars, faculty, and staff).
M2. To inculcate a strong background in mathematical, theoretical, analytical, and practical knowledge in computer science and engineering.
M3. To promote interaction with institutions, industries and research organizations to enable them to develop as technocrats, entrepreneurs, and business leaders of the future.
M4. To provide a friendly environment while developing interpersonal skills to bring out technocrat's inherent talents for their all-round growth

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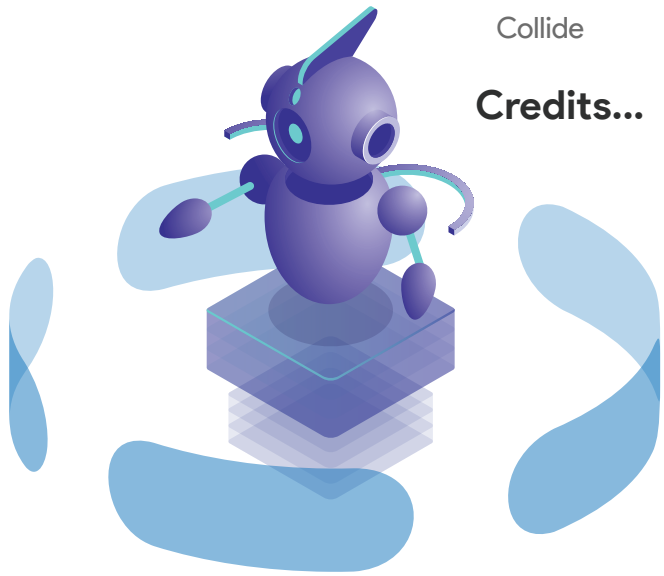
Advancing Computing as a Science & Profession



LOOK WHAT OUR MENTORS HAVE TO SAY

Our mission at ACM CCET is not only to produce engineering graduates but to produce engineering minds.

- **Dr. Manpreet Singh**

Principal CCET (Degree Wing) | Source of Inspiration

ACM CCET provides student a great opportunity to learn scientific and practical approach of computer science.

- **Dr. Sunil K. Singh**

Professor and HOD, CSE | Faculty Mentor

Every person should be provided with an opportunity to learn and explore the field of computer science.

- **Sudhakar Kumar**

Assistant Professor, CSE | Faculty Sponsor

CCET ACM Student Chapter focuses not only on the growth and development of technical skills but also on an individual as a whole.

- **Anshul Gupta**

UG Scholar, 6th Semester, CSE | Chairperson

CCET ACM STUDENT CHAPTER

Our Chapter was established on September 18, 2015 under the mentorship of Dr. Sunil K Singh and faculty sponsor Sudhakar Kumar and it will be completing its 6 years this September. From this year CCET ACM Student Chapter has decided to work on the following initiatives and the team is already working towards it.

Research and Development

Competitive Coding

Designing & Digital Art

Web Development

ABOUT CASC

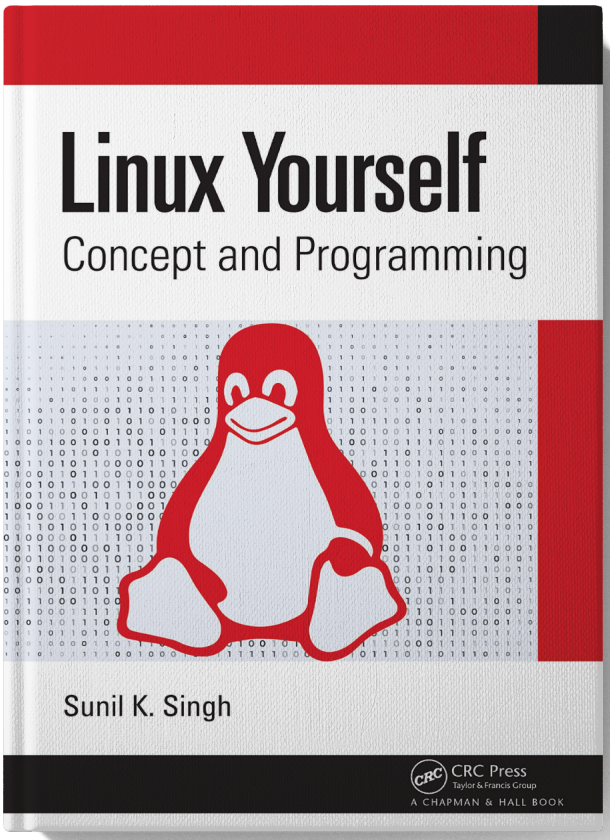
ACM boosts up the potential and talent, supporting the overall development needs of the students to facilitate a structured path from education to employment.

Our Chapter was established on September 18, 2015, and it will be completing its 6 years in the upcoming September. The total number of members presently stands close to 152. Over the years, CASC has been growing and involving more tech enthusiasts who share their experience and knowledge of their domain with other budding technocrats.

Overall, we at CCET ACM Student Chapter, through collaboration and engagement in a plethora of technical activities and projects, envision building a community of like-minded people who love to code, share their views, technical experiences, and have fun.

BENEFITS

- A vast network of nearly 100,000 highly dedicated student and professional peers.
- Become a member of computing community through one of hundreds of Professional and Student Chapters worldwide
- A full year subscription to ACM magazines and news letters.(Communications of the ACM, XRDS: Crossroads, MemberNet etc.)
- Participation in ACM Distinguished Speakers Program (DSP).Renowned International Thought Leaders Speaking on the Most Important Topics in Computing Today
- The option to subscribe to the full ACM Digital Library, which includes over 2 million pages of text.
- Unique volunteering opportunities to gain hands-on experience and knowledge of the marketplace



Linux Yourself : Concept & Programming.

Numerous people still believe that learning and acquiring expertise in Linux is not easy, and only a professional can understand that how a Linux system works. Nowadays, Linux has gained much popularity both at home and at the workplace. This book, **Linux Yourself: Concept and Programming,** aims to help and guide the people of all ages to offer a deep insight into the concept of Linux, its usage, programming, administration, and several other related topics in an easy approach. This book can also be used as a textbook for undergraduate/postgraduate engineering students and others who have a passion to gain expertise in the field of computer science/information technology as a Linux developer or administrator .

The book provides a deep conceptual learning of fundamental concepts, architecture, features regular expression, Stream Editor (SED), Awk (expressive programming language), shell scripting, Linux administration, Process, Inter-Process Communication (IPC), X Window System, and many more aspects through numerous useful examples. Articles on why so many Linux distribution and pen down on some famous Linux distribution as case studies.

E-book Link

Taylor & Francis Link
https://www.taylorfrancis.com/books/mono/10.1201/9780429446047/linux-sunil-singh

Amazon Link
https://www.amazon.in/Linux-Yourself-Programming-Sunil-Singh/dp/113833328X

Hope everyone will find it great and enjoyable learning from this book.

Dr. Sunil K. Singh
Faculty Mentor CASC

The CCET ACM Student Chapter express its sincere gratitude to our Chapter Mentor **Dr. Sunil K. Singh, Professor & Head,** Department of Computer Science & Engineering at Chandigarh College of Engineering and Technology (CCET) Degree Wing, Chandigarh, for writing a textbook on **Linux Yourself: Concept & Programming.** This book is published by Chapman and Hall/CRC (Taylor & Francies Group) at Boca Raton, Florida USA on 31st Aug, 2021.

CASC RECENT ACHIEVEMENTS

ACM Summer School 2021

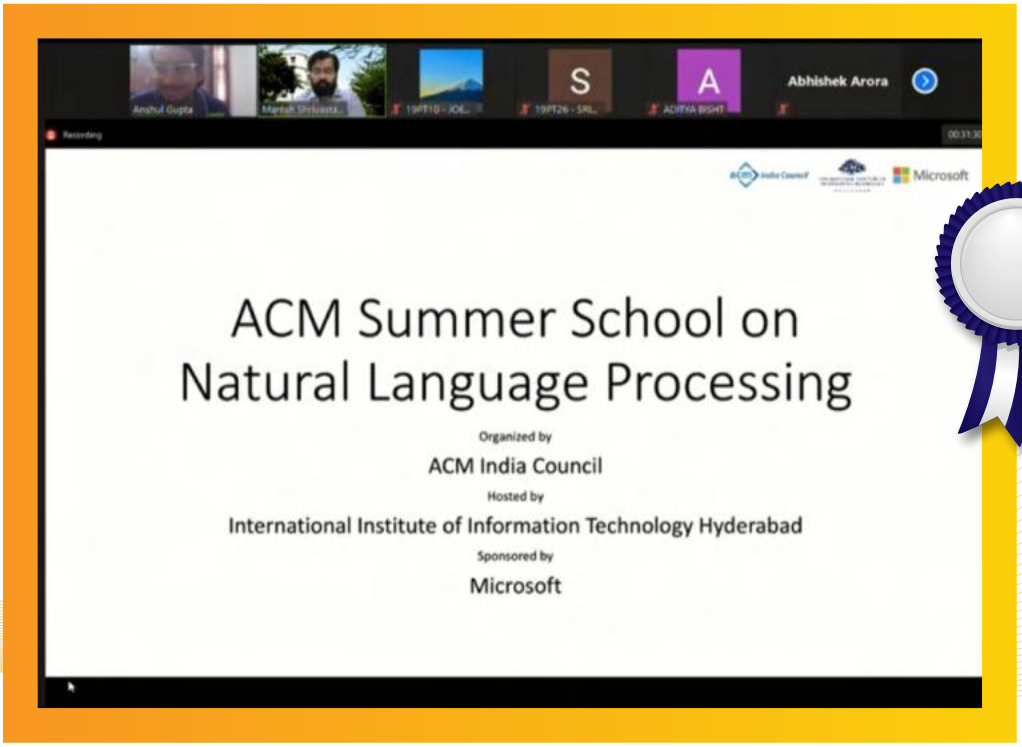
Compilers are pervasive and critical for any software application to execute on any Computer System. **Sudhakar Kumar was one of the top 50 students selected for summer school.** This summer school aims at providing you a foundation in the theory and practice of optimizing compilers. Dr. Sunil K. Singh, Professor and HOD, CSE Department and Faculty Mentor, CASC, played a crucial role in guiding the above achievement. Different Industry Persons from NVIDIA, Pune, IISc Bangalore, IIT Madras, IIT Hyderabad, and IIT Bombay showered their knowledge on different aspects including Compiler optimizations, Interfacing with program execution, and Program Analysis. Further, a study of essential components of program execution environments will provide you with an end-to-end understanding of the life of a program in a computer system.

CASC RECENT ACHIEVEMENTS

ACM SIGKDD India Chapter (IKDD) Student Ninja

To help the community grow among next-generation AI/ML/DS enthusiasts, ACM SIGKDD India Chapter (IKDD) selected Ninjas from the country to build a team of passionate students to take leadership roles in organizing activities for the interest of the community, as well as creating and running new periodic programs such as webinars, (virtual) meet-ups, Annual ML/Data Science Schools, etc. Under the guidance of **Dr. Sunil K. Singh**, Professor and HOD (CSE Department) and Faculty Mentor (CASC), **Muskaan Chopra, UG Scholar (CSE 2019-23), Membership Chair (2020-2021) was among the top 6 students selected from UG, PG, and Ph.D. courses in India as a part of the Inaugural Student Ninja Board.** IKDD, the professional chapter of SIGKDD in India, was established as a part of ACM India in 2011 to build and strengthen interest and expertise in the theory and applications of artificial intelligence, machine learning, data science, databases, data mining, and their related areas

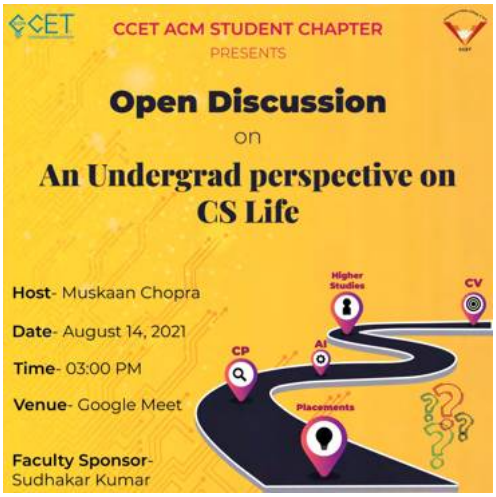
CASC RECENT ACHIEVEMENTS



ACM Summer School 2021

Anshul Gupta, Chair, CCET ACM Student Chapter 2021 was among the top 50 students who were selected for the ACM Summer School 2021. The school lasted for 12 days in virtual mode and focused on the broader aspect of Natural Language Processing. **Dr. Sunil K. Singh**, Professor and HOD, CSE Department and Faculty Mentor, CASC, played a key role in leading this achievement. Different Industry Persons from Microsoft Research, IIIT Hyderabad, IIT Gandhinagar, and IIT Bombay showered their knowledge on different aspects including Introduction to NLP, Python for NLP, ML for NLP, NLP tools, Language modeling, Shallow parsing, Advanced NLP, DL for NLP, Meaning representation, Global vectors, Contextual vectors, BERT and associated models, Application, Machine translation, Information extraction and question answering, Information retrieval, and Text summarization. The proposed school also aims to create awareness among undergraduate and postgraduate students in Natural Language Processing (NLP). It also discussed the current state-of-the-art research challenges and opportunities, and future trends. A salient aspect of this school is to emphasize hands-on sessions with suitable case studies which were carried on every day after the theoretical sessions.

OPEN DISCUSSION ON AN UNDERGRAD PERSPECTIVE ON CS LIFE



OPEN DISCUSSION ON AN UNDERGRAD PERSPECTIVE ON CS LIFE

Aug 14, 2021

YOUTUBE STREAM LINK

TOPICS COVERED

1. Different available domains
2. How UG work affects Future Plans
3. Overview of Research and Projects
4. Resume/CV building
5. Unlocking Opportunities
6. Resources for Learning and Updates
7. Doubt Session

SPEAKER

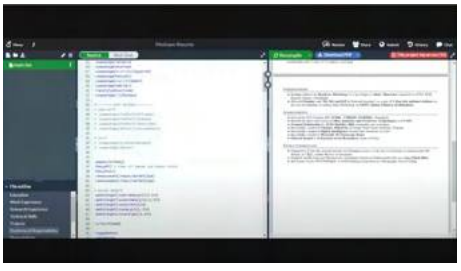
MUSKAAN CHOPRA

- ML and Data Science Researcher
- ACM IKDD Student Ninja
- Front-end Developer
- Graphic Designer

August 14, 2021

The event majorly focused on the various aspects in the life of CS undergraduates such as different available domains to work in, how UG work affects Future Plans, overview of Research and Projects, unlocking opportunities and how to build a CV/Resume. She also provided students with some resources for learning and updates.By the end of the session, participants were able to explore various CS Domains and think about their plans for the future from a broader outlook.

EVENT GALLERY



INSIGHTS INTO DATA ANALYSIS

INSIGHTS INTO DATA ANALYSIS

Aug 15, 2021

YOUTUBE STREAM LINK

TOPICS COVERED

1. Various aspects of data analysis
2. its present-day applications
3. Introduction to data analysis
4. Data visualization
5. Introduction to libraries for data analysis
6.Working on a dataset (hands-on exercise)
7. Doubt Session

SPEAKERS

Sukanya Verma
CO20360

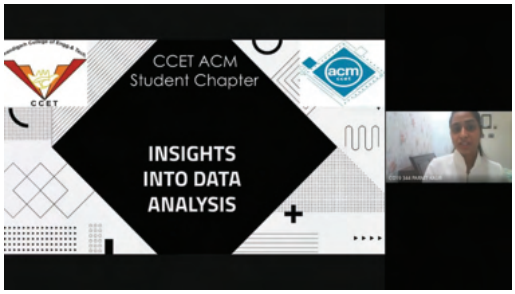
Parnit Kaur
CO19344

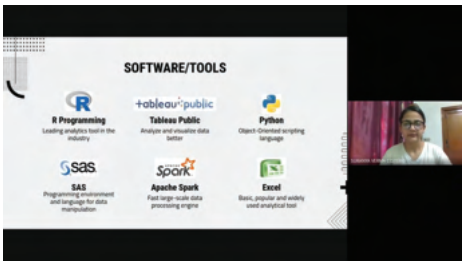
Soumya Sharma
CO20359

August 15, 2021

In this event, the audience was briefed about the concept of data analysis and its present-day application followed by a practical session on a data set, to understand the connection between the variables and to uncover the underlying structure, to extract the important variables with suitable Graphs and Visualizations.The event mainly focused on the various aspects of data analysis and tools available, introduction to data analysis and data visualization, major functions and libraries for data analysis, tools and applications, working on a dataset (hands-on exercise) followed by a doubt session.

EVENT GALLERY





SEWING CODE WITH PTHREADS

SEWING CODE WITH PTHREADS

Aug 15, 2021

YOUTUBE STREAM LINK

TOPICS COVERED

1. Introduction to threads and multithreading
2. Getting familiar with pthreads
3. Working with pthreads (Hands on exercise)
4. Project ideas
5. Doubt Session

SPEAKERS

Tarun
CO20363

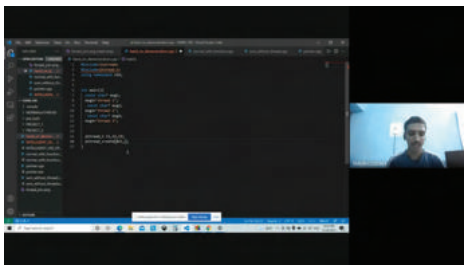
Kriti Aggarwal
CO19335

Sonali Mittal
CO20358

August 15, 2021

In this event, the audience was briefed about the concept of multithreading followed by a small hands-on session where they get a first hand experience on how pthreads can be used to decrease time in day to day programming. The event mainly focused on the various aspects of introduction to threads and multithreading, getting familiar with pthreads, working with pthreads (Hands on exercise), project ideas followed by a doubt session.

EVENT GALLERY



FUTURE PROSPECTS TO ENGINEERING GRADUATES FOR ENTREPRENEURSHIP AND STARTUPS.

FUTURE PROSPECTS TO ENGINEERING GRADUATES FOR ENTREPRENEURSHIP AND STARTUPS.

Aug 31, 2021

YOUTUBE STREAM LINK

TOPICS COVERED

1) Emerging technologies
2) Future Prospects of Startups
3) Efficient use of digital tools and softwares
4) Career guidance
5) Creative thinking and innovation

COORDINATORS

-Dr. Sunil K. Singh
Professor and HOD, CSE
Faculty Mentor, CASC
-Sudhakar Kumar
Assistant Professor, CSE
Faculty Sponsor, CASC

SPEAKER

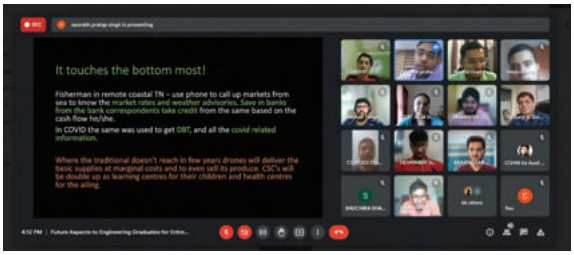
MR. SAURABH PRATAP SINGH

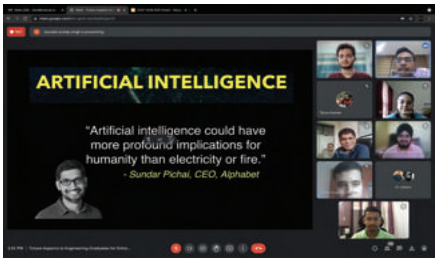
Assistant Commissioner of Income Tax, New Delhi
UPSC CSE 2018 (AIR Rank 381) | 2017 (AIR Rank 295)
UPSC IES 2015(AIR Rank 2) | 2014(AIR Rank 54)
GATE (ECE) 2014 AIR - 46
Work Experience:
- Texas Instruments
- Cadence design systems
- Hindustan Petroleum (Govt.)

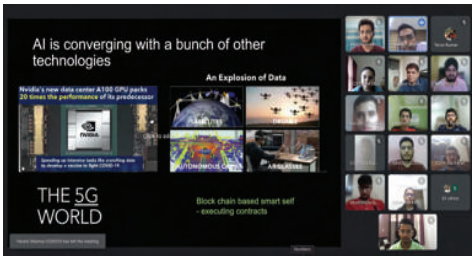
August 31, 2021

A one hour workshop was conducted by Mr. Saurabh Pratap Singh (UPSC CSE 2018 (AIR Rank 381)) to guide towards the convergence of various technologies and focused on how these emerging technologies will affect the world overall in future also, how this will impact and change our lives in future. This seminar provided insights on collaboration, independent thought, communication, creativity, and the competitive spirit of ideas. This session was distinctive and somewhat special in that as it was open to both students and upcoming aspirants

EVENT GALLERY







NETWORK PENETRATION - BYPASSING THE FINE NETWORK LINES

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KEYWORDS

N-Map| Netdiscover | Cyber Attack

Recently Uber suffered a huge Data Breach by a group of hackers who ended up stealing the names and driver's license numbers of 600,000 drivers, along with the personal information of 57 million app users, including names, email addresses, and phone numbers. The incident finally ended up with the company paying a $100,000 ransom to the hackers. Today when almost every service is available online it is difficult to protect the information online from every cyber attack.

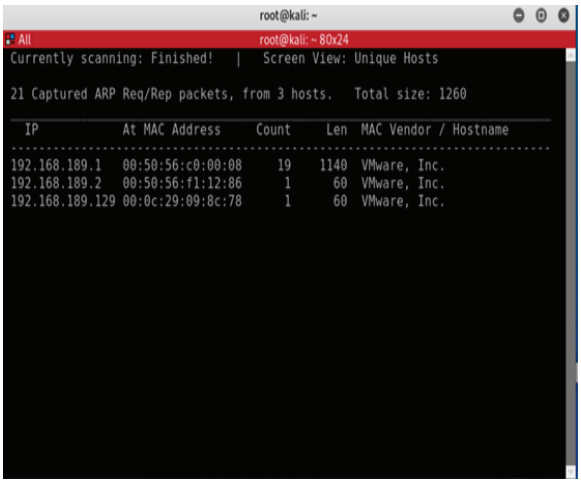
To prevent such attacks networks need to be constantly tested and monitored. Network Penetration is one such way that helps in detecting the system vulnerabilities of a network before someone else finds them.
To test the system vulnerabilities there are various phases of Network Penetration:
1.Information Gathering
2.Focused Penetration
3.Post-exploitation and privilege escalation
4.Documentation
In this first article we will explore the Information Gathering or Phase 1.

Information Gathering On a Network

To gain access in a device it is very important first to identify that device on the network. We generally use the Kali Linux as the operating system in our machine to test the network vulnerabilities .To scan and identify we can use tools such as Netdiscover and N-Map available in the Kali Linux machine.

NETDISCOVER

The following screenshot shows the devices scanned on a network. We can easily view their IP addresses and vendor names



N-MAP

Netdiscover only provides basic information about the devices connected to the network however to detect the real vulnerabilities of the system we use N-MAP. Nmap launches a much more detailed stealth scan on the network which provides us with possible vulnerable open ports on the target machine .The above scan shows us what operating system is this device running along with the possible open ports from where we can enter this device using backdoor entry.

NETWORK PENETRATION - BYPASSING THE FINE NETWORK LINES

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KEYWORDS

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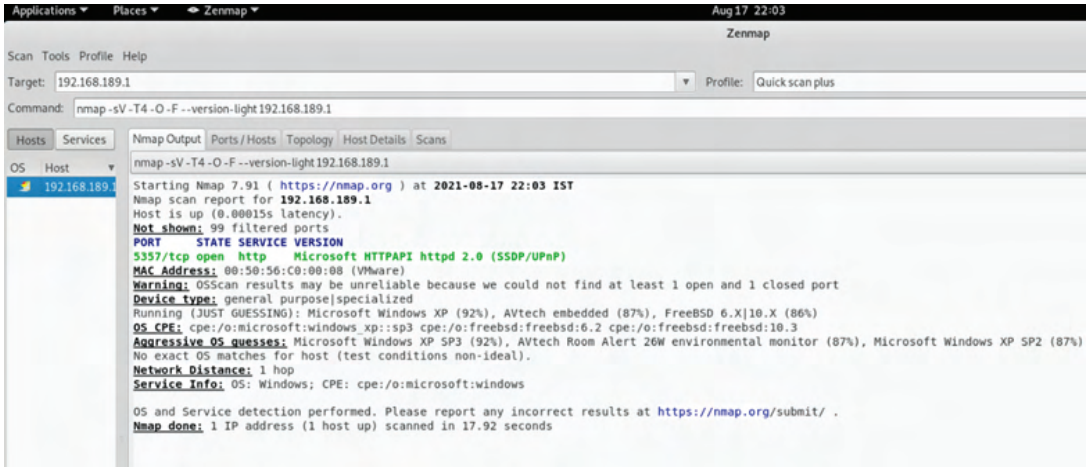

The following report shows the exact number of ports open in the target machine now by identifying the vulnerabilities of the given ports we can easily gain access to the machine

```
Scanning 192.168.189.1 [1000 ports]
Discovered open port 912/tcp on 192.168.189.1
Discovered open port 902/tcp on 192.168.189.1
Discovered open port 6881/tcp on 192.168.189.1
Discovered open port 5357/tcp on 192.168.189.1
Completed SYN Stealth Scan at 22:04, 9.32s elapsed (1000 total ports)
Initiating UDP Scan at 22:04
Scanning 192.168.189.1 [1000 ports]
Completed UDP Scan at 22:04, 4.00s elapsed (1000 total ports)
```

Information gathering is vital part of launching any kind of cyber attack and this article provides an insight of how we can get started with testing the network vulnerabilities and also finding solutions to possibly prevent such attacks. So next time you connect your device to a public network be aware of the risk that comes along with it and the damage it can cause!

VOL. 01 ISSUE 03 ARTICLE 01

INTERNET OF BEHAVIOR

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KEYWORDS

Internet of Things | Internet of Behavior

A bizarre obsession with acronyms is a fascinating feature of technology (besides progress, of course). Every year, a new phrase graces us, from Brain-Computer Interface (BCI) to Internet of Things (IoT), with much more to come!
In the year 2021, INTERNET OF BEHAVIOR, or IoB, became the newest member of the tech acronym family. IoB, as defined by Gartner, is a subset of IoT that focuses on capturing, processing, and monitoring the "digital dust" of people's daily life. IoB combines technologies that track people's location and recognize their faces, connects the data, and maps it to behavioral events.

Advantages of IoB

This developing technology will be advantageous in a variety of ways. There are various components of IoB, from positively engaging customers to understanding where a customer's interest in a product begins, their purchase path, and the methods they use to make their purchase. Furthermore, it gives real-time notifications, pinpointing and swiftly fixing issues in order to close purchases and keep consumers happy.

Individual Value, Company Gain

The Internet of Behaviors not only influences consumer choices, but it also changes the value chain. While most consumers are unhappy with handing their data away "for free," many are willing to do so if it provides them with additional value. This allows firms that we haven't always enjoyed dealing with, such as insurance providers and banks, to improve their reputation.

Smart Cameras drive the IoB

The Internet of Behaviors not only influences consumer choices, but it also changes the value chain. While most consumers are unhappy with handing their data away "for free," many are willing to do so if it provides them with additional value. This allows firms that we haven't always enjoyed dealing with, such as insurance providers and banks, to improve their reputation.

IoB and Cybersecurity

The IoT is not a problem. People sync their devices to take advantage of the benefits and convenience of personalization. The issue at hand is data collection, movement, and use. Nonetheless, the IoB strategy necessitates a shift in cultural and legal norms that existed before to the Internet and Big Data age. Cybercriminals would be able to obtain sensitive information based on user activity data. Those that demonstrate patterns of conduct, for example. They can acquire and sell this information, or they can take "phishing" to new heights. They will impersonate other persons in order to commit fraud or for other reasons.

IoB Evolution and its Potential

As IoB is an extension of IoT, they will grow and evolve in tandem. Gartner estimates that 40% of the world's population will be digitally tracked by 2023. This equates to more than 3 billion individuals. Behavioural data will keep evolving as long as humans do. Understanding behaviours with numbers will become an interesting component of every organisation with the rise of new IoT devices. Yes, the Internet of Behaviour raises data security and privacy concerns, but we will always find a solution to these issues and ensure that data is used responsibly.

BLOCKCHAIN FOR DATA SCIENCE

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KEYWORDS

Block Chain | Data Security | Data Science

Diversity of data is increasing day by day and analyzing the different types of data is getting difficult because data generated is big data requiring special methodologies to be analyzed effectively and efficiently. This increase in the diversity of data and the quantity of it caused rapid development in the data science industry too. However, data privacy and security is a huge concern. The Data Science industry is facing a huge threat to its data security and data privacy in all of its chains like Data collection, Data Production, Data analyzing, and data sharing, etc. In this scenario, Blockchain comes into a role named specially for its decentralized infrastructure, security. Blockchain technology can overcome many limitations of data science. With the help of data science we can extract data which is valuable and produce some kind of data product from it. But due to Privacy, Security, Data Sharing, Uneven Distribution and Uneven Demand of data causing trouble in development of Data Science. Features of Blockchain like transparency, security, auditability, privacy are complementary to data science.

Challenges in converging Blockchain in Data Science:

Blockchain is still at its very initial stage which is having a lot of benefits (which I've discussed in the next section) but at the same time it comes up with many challenges.

1.Data Acquisition: First and foremost challenge in converging both is data acquisition. Since if an organization gets some data it's still not sure that organization can rely fully on that and they might not surely extract some fruitful data from it. However having a huge amount of data is not having any threshold and companies can acquire as much data as they can but getting something out of it matters a lot.

2.Competition: These days different organizations want to collect as much information and data as possible to improve and take a step further from their competitors in this IT World Built up on the Base of Data. And in the DataIndustry Variety and type of data is also a concern when we want to get something out of that data

3.Scalability: In data science there is a need for data to be analyzed and processed at a high speed and at a huge scale. But Blockchain is having a scalability issue in real time trading. Since the size of blockchain is longer it takes a lot of time in copying data to new nodes on the network. And this problem can't be simply solved using algorithm's optimization, therefore leading blockchain providers adopt methods like sharding (Might cause Data Security Problems.

4.Rules Upgrade: Since the public blockchain does not rely on a central authority, the decentralized nodes need to reach an agreement on the validity of the transaction. This problem is called a Consensus Upgrade Problem. This Problem came up since we want multiple participants in the network to reach an agreement. This is defined in the Consensus Algorithm. This is the role of the consensus algorithm to ensure that all nodes comply with the protocol rules and that all transactions are conducted in a reliable way. Examples of consensus algorithms are POW and POS.

5.Effective analysis: As the scale of data is getting higher and higher using blockchain. The data effectiveness and beneficial analysis becomes an important task to Scale up data and enhance overall use in multiple domains.

BLOCKCHAIN FOR DATA SCIENCE

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KEYWORDS

Block Chain | Data Security | Data Science

Benefits of using Blockchain for Data science

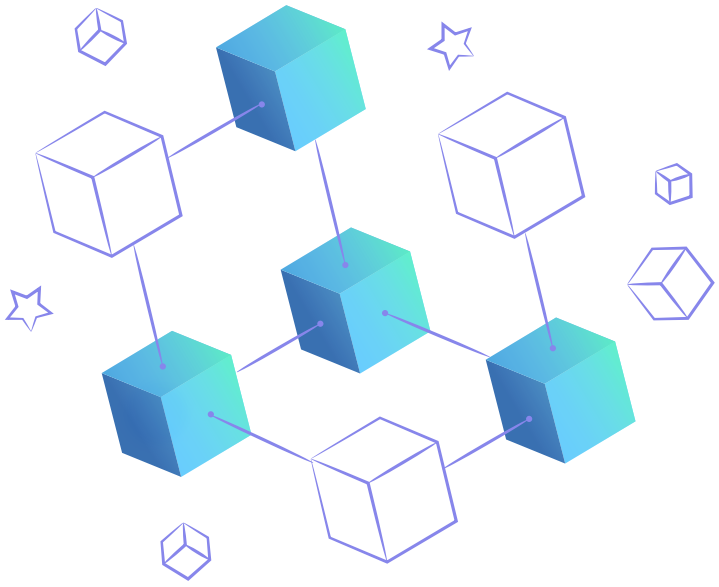
The main logic when blockchain was introduced is its Openness, transparency and decentralization and Security. By using Blockchain in startups and enterprises it becomes convenient to trust and rely on Blockchain for security in the Internet World and hence moving a step further with the Digital Economy.

1.Data Security and Data Privacy: Blockchain based models ensure data security and privacy through its decentralized system. Since data is stored in centralized servers, it leads to leakage and loss of data.Therefore they are often targeted by cyber attackers. Blockchains decentralize control over data, making it a daunting task for cybercriminals to access and manipulate data on a massive scale.

2.Transparency: Convergence of Blockchain and Data Science improves transparency of the industry.

3.Data Sharing: Blockchain is solving the problem of data sharing to a good extent.

4.Credibility: Blockchain credibility is in its security and data theft prevention. Causing Gigantic industries to trust on it unlike any other technology. As a combination of point-to-point transmission, consensus mechanism, distributed storage, and encryption algorithms, blockchain provides a solution for data sharing.



VOL. 01 ISSUE 03 ARTICLE 03

BATTLE AGAINST COVID-19 IN INDIA: FROM TECHNOLOGICAL PERSPECTIVE

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KEYWORDS

Data Mining | Data |

Even though the number of active cases have decreased since the second wave, India is likely to be hit by another wave of Covid infections in the coming months. The second wave exposed India's lack of medical infrastructure which struggled for hospital beds, oxygen supplies and medicines. Despite the restrictions imposed and aggressive response taken by the government, the country witnessed countless deaths amid the decline in its economy. India's expenditure on the public healthcare system is just 1.2% of the total GDP, which is much lower than other developing nations. The shortage and the uneven distribution of the health workforce, ranging from doctors and nurses to health specialists, imposes a great challenge in India's efforts to combat the virus. As per World Health Organization, a country must have a minimum of 44.5 skilled health professionals per 10000 population to deliver Universal Health Coverage but India does not even possess half of that. Researchers believe that there is a need for a technology-enabled community in primary care to get less dependent on doctor-driven models through the utilization of large amounts of data present with us.

This pandemic can be viewed as a big data problem. There has been an increase in the usage of new age technologies such as cloud computing, IoT, data mining and artificial intelligence to track and contain the virus by gaining more insights to the disease. The enormous amount of data currently flowing on the internet is too vast to be analysed by humans alone, but with the help of advanced analytical technologies this freely available data can be comprehended. In fact, BlueDot, an AI epidemiologist built by a Canadian startup was able to give an early warning sign of the outbreak by detecting the occurrences of unusual pneumonia cases being reported around a market in Wuhan, China. The integration of information from various hospitals and patient records are being used to understand the behaviour of the virus and even identify individuals who are more likely to get infected. Experimenting in biomedical research by molecular modelling and simulating the virus on virtual systems is being done to get insights into the mutating nature of the virus and to explain its structure.

The lack of general awareness and citizens' casual attitude also appears to be a major obstacle in India's battle against the coronavirus. Different analytical techniques are being used in understanding social media responses to the pandemic. The data available on social media might help the scientists to learn about the behaviour of people in dealing with the pandemic's burdens and stresses. Accordingly, the government can alert and instruct the public. Travel-related data can also be used to monitor and forecast the spread of diseases based on the types of social measures taken in various regions and determine the next hotspots even before it happens. Chatbots are being deployed so that people can have free access to authentic information related to health and travelling. One of the side effects of ease in global communication is the widespread misinformation. Natural Language Processing techniques can be deployed to curb the growth of fake news which also indirectly affects the health of the people. Of course for all of this to work, the social media platforms need to cooperate with the government for sharing information for good.

The concern for data-privacy has always been an issue in respect to data mining. However if a systematic ethical approach is taken from the start wherein the politicians and the public health officials have an open and transparent communication with the engineers and healthcare experts, then data analysis would be much more beneficial. To make real progress, we need to bring together people from all domains be it from computer science or from the medical field. This pandemic is an interdisciplinary issue and we would be needing both the data and the people to tackle it.

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PARALLEL COMPUTING

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KEYWORDS

Parallel Programming| Concurrent Programming | Parallelism Granularity

WHATS IS PARALLEL COMPUTING?

Parallel computing the type of computing in which many calculations are performed at the same time. The basic principle behind this type of computation is that a computation problem can be divided into smaller subproblems, each of which can be solved simultaneously. There is only one assumption which is that it assumes that we have parallel hardware disposal, which is capable of executing these computations in the parallel.

ORIGIN OF PARALLEL COMPUTING

Parallel computing was present since the early days computing. Charles Babbage invented the concept of programmable computers then an Italian general and mathematician Luigi Federico Menabrea envision the idea of speeding up the analytical engine by simultaneous computing. After a long time in 20th century IBM researchers built some if first commercial parallel computers. At this time, parallel computing was confined to the niche communities and used in high performance computing. Performance requirements were satisfied by increasing the clock speed.

Finally, at the beginning of 21st century it became obvious that the scaling the processor frequency is feasible only up to a certain point and then processor scaling hit the power wall. So, Processor vendors decided to provide multiple CPU cores on the same processor chip, each capable of executing separate instruction streams (Fig 1). Parallel computing provides computational power what sequential computing cannot do.

WHY PARALLEL COMPUTING?

Parallel programming is much harder than sequential programming.
-> Separating sequential computations into parallel sub computations can be challenging, or even not possible.
-> Ensuring the program correctness is more difficult, due to new types of errors.

Parallel programming is much harder than sequential programming.
-> Separating sequential computations into parallel sub computations can be challenging, or even not possible.
-> Ensuring the program correctness is more difficult, due to new types of errors. Speedup is the only reason why we bother paying for this complexity.

PARALLEL PROGRAMMING	CONCURRENT PROGRAMMING
→It uses the parallel hardware to execute computation more quickly.	→It may or may not execute multiple executions at the same time.
→Efficiency is its main concern.	→Improves modularity, responsiveness or maintainability.
→Answers questions like how to divide a computational problem into subproblem that can be executed in parallel? Optimal use of hardware?	→Answers questions like when does an execution start? When and how information exchange occurs? How to manage access to shares preferences like database handles.
→Mainly concerned with algorithmic problems, numerical computations and big data applications.	→Mainly concerned with synchronous applications
Example – Matrix multiplications, Rendering of graphics, data processing and simulations.	Example – Web servers, UI's and databases etc.

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PARALLEL COMPUTING

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PARALLEL VS CONCURRENT PROGRAMNG

Sometimes two discipline overlap, sometimes parallel programming may rely on insights of concurrent and vice versa. However, neither of the is super set of one another.

PARALLELISM GRANULARITY

Parallelism manifests itself at different granularity levels.

→Bit level parallelism – processing bits of data in parallel to sped up the calculations.

→Instruction level parallelism – executing different instructions from the same instruction stream in parallel.

→Task level parallelism – executing separate instruction streams in parallel.

Bit level and instruction level are exploited by underlined parallel hardware and they are in most cases implemented inside the processor itself but task level is usually achieved by software's support

Classes of Parallel Computing

I. **Multi core processors** which contains multiple cores on same chips.

II. **Symmetric multiprocessors** are a computer system with multiple identical processors which share memory and connect to it by a bus. A SMP itself can contain multicore processor.

III. **Graphics Processing Unit** is a form of co- processor originally intended for graphics processing, as a co-processor it does not execute all user programs but can execute the necessary ones.

IV. **Field Programmable gate arrays** – another form of co-processor which can rewire itself for a given task.

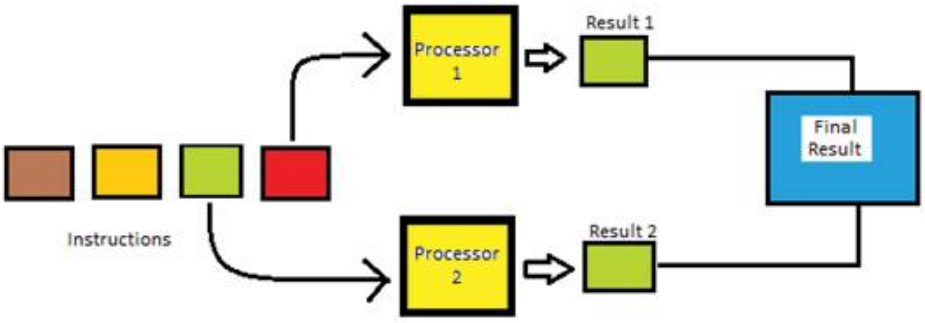

Fig 1 – This is how a normal parallel process will occur with 2 processors.

AI IN VIDEO GAMES

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NCP | FSM | Virtual Reality

There is a big hand of Artificial Intelligence in any game that has ever been developed. AI can be discovered in various elements depending on the type of game one is playing. AI usually controls the characters that revolve around the player in the storyline. These characters can be animals, pedestrians, enemies, and many more.

It is believed by the tech giants in real life that AI can teach itself to become better with every new bit of information that it is fed by humans. AI present in video games is meant to improve the overall gaming experience of human gamers. AI most commonly plays non-player characters in video games (NPCs). Often designers employ techniques to make these NPCs appear smart.

Becoming a smarter AI

In the 1990s, video game design was presented as one of the most common techniques, termed the Finite State Machine (FSM) algorithm. In an FSM the creator generalizes everything that an AI can face and then schedules a precise reaction to each circumstance. In principle, an FSM AI would quickly react with its pre-programmed behavior to the action of a human player. Such techniques made the NPC seem intelligent but what the AI lacked was the ability to learn itself and become better. However, self-learning AI has its own drawbacks. By incorporating the capability of learning in the game would lead to the developers losing their ability to control the gaming experience of the players. What this would lead to is that there is a big chance that the gaming experience of the players may be affected negatively.

Should AI be against or with the Player

In Real-Time Strategy games, the AI is coded in such a way that it gets lots of advantages over human players.These advantages can be countless. These advantages can be countless. Some examples can be reacting with inhuman speed, retreat when losing, track players through walls, and more. In fact, in some games, the developers may even have to reduce the AI's capabilities on purpose so as to improve the human players' experience.

Earlier, there were life-like cutscenes in the videogames so as to give a touch of realness to the said games. But now, the characters actually in-game have so many details, humanly movement, and humanly actions that it does immerse a person into the game. With this pace, the day is not far when one would not be able to distinguish whether an AI is controlling the other character or a real human.

Technology such as Virtual Reality (Throwing a person into a game world) and Augmented Reality (Bringing the game into the real world) has started to blur the boundary between a simulation and real life.

It is now believed that AI should not learn how to beat the player more effectively, but to improve the experience of the said player in a way that they feel like being in the real world rather than a simulation.

Earlier, there were life-like cutscenes in the videogames so as to give a touch of realness to the said games. But now, the characters actually in-game have so many details, humanly movement, and humanly actions that it does immerse a person into the game. With this pace, the day is not far when one would not be able to distinguish whether an AI is controlling the other character or a real human.

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EXTENDED REALITY: RISE OF NEW SOCIAL NORM

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Augmented reality | virtual reality

The interaction between humans and technology is developing radically. The way we interact with technology today is not too far from what we see in futuristic sci-fi movies and novels. One of those technology is Extended reality (XR).

XR is nothing but a digital network of always-on virtual environments of groups of people who interact with one another and digital objects through operating virtual image of oneself. The combination of virtual reality with multiplayer role player games saw a massive boost in the industry.

The concepts from scientific fictional movies that many people in the field of technology envision as the future toward today's internet. At this stage it's only a beginning of many new vision, but Tech-Giants companies like Facebook and Microsoft are focusing to break through the setting for many online activities, including work, play, studying and shopping.

As these companies want to advance and want to use it alongside every possible product they can get it working and as we live in a world where advanced touch and gesture-based interactions work together with wearables, sensors it becoming much more reachable to achieve augmented reality (AR), virtual reality (VR) and mixed reality (MR) for mass production. As XR creates an extremely immersive user experience and with the advancement of the newer technologies like Wifi-6, 5G and IOT the demand/use curve will be on rise. With the current world hit with COVID gave initial downfall of industries to a rise of digitalization of many businesses and work flow leading to faster advancement and development on newer technologies like 5G.

There is a report from Gartner predicts that the implementation of 5G and AR/VR will change not only how customers interact, but also the entire product management cycles of brands. In fact, according to Deloitte, it is expected that in 2024 in Germany with VR hardware and applications 530 million euros will be converted, in the best case even 820 million, if new applications or gadgets conquer the market.

As mentioned above with advancement of all the technologies like computer hardware and the methods of integrating necessary software and equipment together. With better integration and technology we can stimulate the real world more dynamically and it would help to grow XR industry while it will be helping many industries like sports, healthcare, engineering, education etc.

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BLOCKCHAIN TECHNOLOGY

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KEYWORDS

Blockchain | Cryptocurrency

What is blockchain?

Blockchain is a secured, anonymous and decentralized system of recording information that is very reliable and difficult to tamper with. It has a digital ledger and its records are accessible by anyone on the network, everyone on the network has a copy of the ledger which is then used to verify a transaction or change in data.

How does blockchain work?

As the name suggests, it is a sequence of blocks which are singly linked to each other like a chain. All the data in a blockchain network is stored in the form of a block, along with a hash and the hash of the previous block. A hash is a unique identifier of the block and used to identify the block and its contents. Although the data in the block is encrypted, in case the block is tampered with, its hash will automatically change. This makes the following chain invalid as the hash of the previous block does not match. You can add blocks to the chain but can not alter the existing ones.

What makes Blockchains secure?

A copy of the public ledger of the blockchain is available to everyone on the network who verifies any new block before adding it to the chain. In case the data in the block is tampered with, everyone on the network will flag the transaction preventing the block to be added into the chain. But nowadays computers are very fast and are capable of calculating hundreds of thousands hashes per second which makes it possible to change the hashes of the whole chain making it possible to tamper the chain. To overcome that issue blockchain has a security feature called the 'proof of work'. Proof of work gives a series of mathematical problems to the nodes before they can confirm a change of data. Which can take as long as 10 minutes to confirm change in one block. Only after the data and proof of work is verified the block will be digitally signed allowing it to be added to the blockchain.

The control and decision making in blockchains is given to everyone in the network instead of an individual. Hence, it is decentralized. Whenever a new block is created it is sent to everyone on the network for verification. The new blocks are added to the chain only after it is verified for tempering by each node. The tempered blocks are flagged and rejected by the network. Which makes hacking into the network next to impossible as in order to tamper the data successfully, the hacker will have to make sure that all the hashes in the chain match and every copy of the ledger with each node has that same data while giving proof of work for each change.

Uses

Cryptocurrency: cryptocurrency is a secure and anonymous currency. They incur low translation charges and are theoretically accessible to a wider range of people. It doesn't have any restrictions as neither government nor banks are included.

Digital Voting: As it is not possible to alter data in the blockchain framework.it is used in digital voting to prevent frauds and create a reliable environment for voters.

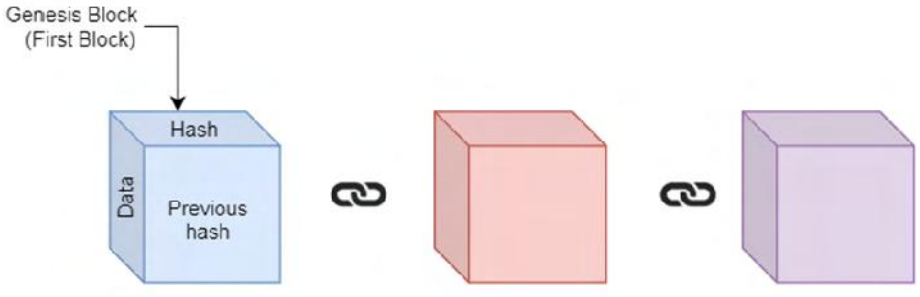
Medical Record Keeping:Blockchain Technology provides a safe and convenient way to store a patient's medical history while also maintaining privacy.

Disadvantages

It takes a lot of computing power, electricity, and money to use this system.

It can not be used for purposes which require frequent changing of data.

Each node has to verify each block while giving proof of work before adding it to the chain making it a very slow process.



VOL. 01 ISSUE 03 ARTICLE 08

WINDOWS 11 AND TPM?

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Trusted Platform Module | Windows 11 | Microsoft

Just after Microsoft unveiled its Windows 11 and released its system requirements, deep down its requirements was something that made everyone curious, the TPM. So what is TPM and why does Microsoft has it in its requirements.

TPM, the Trusted Platform Module, is simply a crypto-processor chip, a dedicated microcontroller designed to secure hardware by generating cryptographic keys and carry out cryptographic operations. It includes multiple security mechanism to make it tamper-resistant, so if any malicious software is installed, it is unable to tamper with the security functions. The TPM generates, stores and limits the use of cryptographic keys and performs authentication using unique RSA key which is burned in the hardware of TPM. It ensures that firmware and OS components haven't been tempered with. If your laptop is not that old, chances are that your laptop has a TPM chip pre-installed and can be enabled in bios. For PCs, a TPM chip can be bought and installed on motherboard separately.

But, do Windows 11 really need TPM? According to Microsoft, "TPMs are part and parcel of Microsoft's response to a growing level of cybercrimes and PCs with TPMs offer a greater level of protection form those attacks. Requiring the TPM 2.0 elevates the standard for hardware security by requiring that built-in root-of-trust". It's just a security add-on and still there are many ways to bypass the TPM check while installing Windows 11 and can be installed easily.

Other than TPM, one thing that shocked people was the minimum processor requirements.

Windows 11 requires Intel 8th Gen Coffee Lake CPUs and 2nd Gen Ryzen CPUs as minimum, this means that millions of PCs which still have a powerful hardware are left behind, various Intel processors of older generations are still powerful enough to get daily tasks done without any hassle so leaving behind those processors is a decision which people are questioning about to Microsoft. That doesn't mean systems with old processors can't run Windows 11. There are various tweaks to get Windows 11 running on these systems but officially those systems are not supported by Windows 11.

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DEEP LEARNING AN OVERVIEW

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KEYWORDS

Deep Learning | Machine Learning | Neaural Network

In the last few decades, there has been significant growth in the field of Deep Learning in every aspect of life to improve the quality of life although machine learning and artificial intelligence are also associated with deep learning and not only that but deep learning is a subset of machine learning only and are showing very intriguing results. When compared to other approaches, deep learning-based approaches produce more intriguing results in a variety of applications, including speech recognition, and as a result, it attracts a lot of research and study. In this blog, a review of recent developments in this field is offered, as well as a discussion of ongoing research projects that are focused on the issue.

Self Driving cars, detecting cancer cells, and analyzing MRIs and automated customer support. We all have been hearing about these things and in the present time, we all are witnessing these technologies which sounded impossible a few years ago. But has anyone wondered how these things are coming to life, it is all because of deep learning. Many of you have heard about this but what is it exactly deep learning how it works.

Machine learning is a subset of artificial intelligence, while deep learning is a subset of machine learning. Artificial intelligence is a technique that allows a machine to mimic human behaviour, while machine learning is a technique that uses algorithms and data to develop artificial intelligence. Machine learning and artificial intelligence allow a machine to analyze data to predict future happenings related to it. Deep learning is a sort of machine learning that is inspired by the human brain and involves training data for results with minimal human interaction. In deep learning, we create an artificial neural network that resembles the human brain.

For example: If we have to differentiate between cherries and tomatoes with the help of machine learning we have to provide the features of both the fruits like the sizes and stems etc. But in deep learning, these features are automatically picked up by the machine itself.

Neural Networks:

A neural network is a network of neurons that is used in deep learning to imitate a human brain. Deep neural networks are based on the approximation principle. This crucial feature has proven invaluable since it allows neural networks to be used to solve every significant difficulty in deep machine learning, particularly those involving the input and output regions. Deep neural networks not only provide a solution for comprehending the intricate systems that operate in the human brain, but they also provide a way to predict how the brain will behave in the future. This neural network is provided with data and is constantly adjusted for the desired outputs and this helps in training the neural network. First of all, there is an input layer of neurons in which every neuron is provided with a small bit of information/data. There is also an output layer of neurons that provides the final result and in between them there are many more layers of neurons that are connected by an intricate network called channels and each of these channels contains a piece of information and is the so-called weighted channel and each neuron has a unique number called bias, this bias added to the weighted sum of inputs reaching the neuron which is then applied to a function known as the activation function. The result of the activation function determines that the neuron gets activated. Every activated neuron passes information to the next layer of neuron, this continues till the second last layer and then in the output layer, the activated

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DEEP LEARNING AN OVERVIEW

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Deep Learning | Machine Learning | Neaural Network

neuron corresponds to the input digit. The weights and biases are continuously adjusted to produce a well-trained network.

Applications And Latest Trends

Throughout the last several decades, medical imaging techniques such as computed tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET), mammography, ultrasound, and X-ray have been used for early detection, diagnosis, and treatment of diseases. Medical image interpretation has traditionally been done in clinics by human professionals such as radiologists and physicians. Because of large differences in disease and the likely exhaustion of human competence, researchers and doctors have begun to profit from computer-assisted therapies. Although computational medical image processing has not progressed at the same rate as medical imaging technology, the situation is improving with the coming of machine learning techniques. Various deep learning models have been shown in recent studies to be capable of detecting and diagnosing various disorders affecting the posterior portion of the eye with great accuracy. The majority of the early research focused on detecting diabetic retinopathy, age-related macular degeneration, and glaucoma.

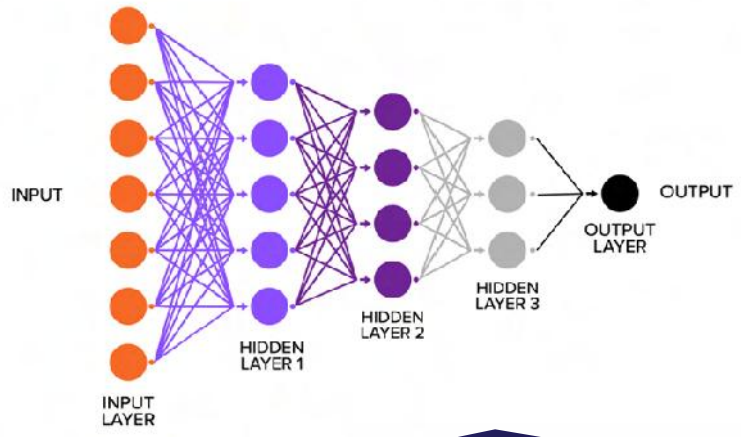
There are many ways in which machine learning and deep learning are changing the existing methods of how we analyze the data and also there is a significant improvement in the field of particle physics like we can use the HEPMASS dataset to train a neural network to identify particle-producing collisions. The researchers at CERN and Google have come up with techniques to make the neural networks fast for proton-proton collisions at the LHC (Large Hadron Collider) for further analysis.

Computational Limitations

Though deep learning is a very fascinating field and is growing rapidly but there are also some limitations to it like training the neural network which imitates the human brain, we require a very large amount of data, and to process this data we require very advanced hardware systems which include CPUs and GPUs with thousands of cores and also for training this network to predict accurate results the training time is very long.

Consider assembling a dataset containing hundreds of thousands—or perhaps millions—of English language descriptions of a software product's features, as written by a product manager, as well as the matching source code created by a team of engineers to meet these needs. Even with this information, a deep learning model could not be trained to simply read a product description and build the right codebase.

DEEP LEARNING WITH HIDDEN LAYERS



VOL. 01 ISSUE 03 ARTICLE 10

CYBER CRIME

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KEYWORDS

Cyber Crime | Cryptocurrency

Cyber crime may be defined as an unlawful act where in the computer is either a tool or a target or both.

cyber crimes are different from conventional crimes as in cyber crimes , the cyber crime is committed in an electronic medium.

Cyber crime has categorized into two types:

1. Inside Attacks — an attack to a network or the computer system by some person with authorized system access is known as inside attack.
2. External Attacks – when the attacker is either hired by an insider or an external entity to the organization , is known as external attack.

CLASSIFICATION OF CYBER CRIMES

The Information Technology Act deals with the following cyber crimes along with others:

1. Tampering with computer source documents
2. Child pornography
3. Hacking
4. Accessing protected system
5. Breach of confidentiality and privacy
6. Publishing of information , which is obscene in electronic form

Hierarchical Organizational Structure

They are targeting large financial organizations , defense and nuclear establishment and they are also into online drugs trading .

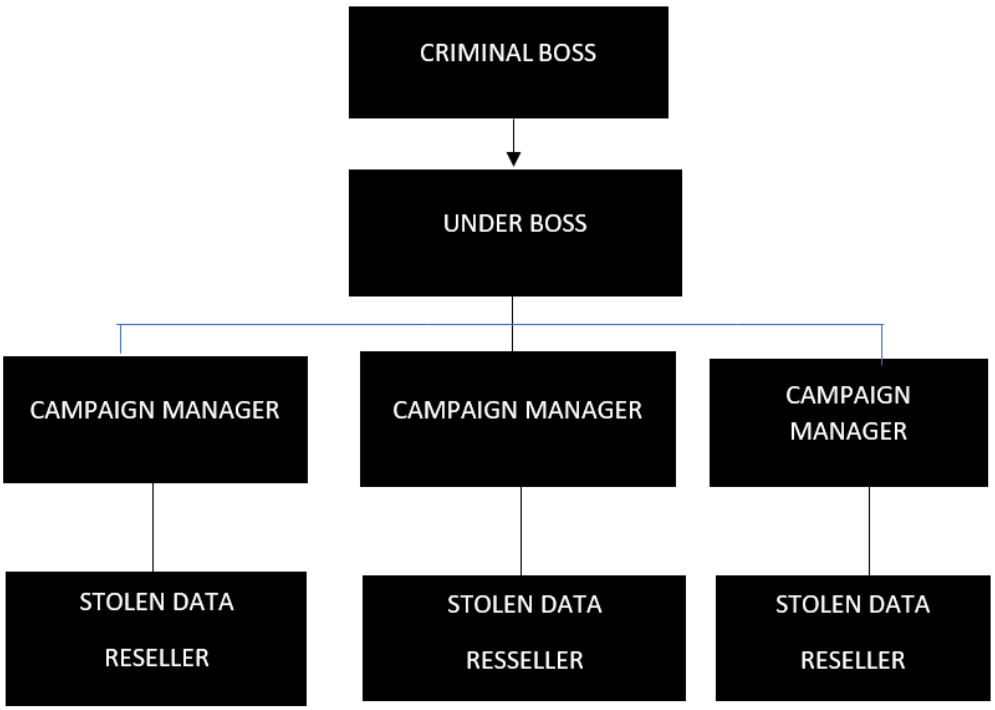
Protected Methods

There are many cyber security techniques to combat the cyber security threast.here are some popular techniques to protect from attacks.

AUTHENTICATION: authentication ensures that each entity involved in using a web -service the requestor , the provider , and the broker – is what actually they are requesting. authentication involves taking recommendation from the body and validating them against an authority.

AUTHORIZATION: authorization determines whether the service provider has granted access to the web service to the requestor . Authorization also known as password – protection term as the authorized user is asked to provide a valid password. If the user is able to provide a legal login – id , he/she considered an authorized user.

BIOMETRIC SYSTEMS: the biometric systems form the most secure level of authorization . It is having unique aspect of a person's body such as finger-prints , retinal patterns etc. to establish his/her identity.



VOL. 01 ISSUE 03 ARTICLE 11

ARTIFICIAL INTELLIGENCE: WHERE HUMANS AND MACHINES COLLIDE

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KEYWORDS

Artificial Intelligence | Machine | Human

In the pursuit for sophistication, humans have constantly developed and advanced many technologies. The purpose behind this is to assure that we can fabricate some products that have the potential to provide an ease with how we manage different routines. Mortals have gone a notch higher through the innovation and acceptance of Artificial Intelligence. The article intents to highlight numerous aids, threats and misbeliefs associated with Artificial Intelligence.

Elucidation of Artificial Intelligence:

Artificial Intelligence is the potential of a digital computer or computer-controlled robot to accomplish tasks related with alert and brainy minds. It was founded as an academic regulation in 1956 and with the pace of time, has gone through tremendous waves of enthusiasm, followed by discouragement along with new techniques and victory. Siri, Alexa and other smart assistants, self-driving cars, conversational bots, Email spam filters and Netflix's recommendations are some of its examples. The supreme attribution of AI is its capability to justify and take necessary actions that have the best probability of fulfilling a particular purpose.

Types of Artificial Intelligence:

Types of AI includes "Narrow AI" which is evident in the speech and language recognition of the Siri virtual assistant on the Apple iPhone, or in the vision identification systems on self-driving cars. In contrast to human beings, these machines can only learn or to be taught how to accomplish given tasks, which is the reason why they are called narrow Artificial Intelligence. Another is "General AI". It is the kind of adjustable wits found in human beings which is capable of determining how to perform different tasks. It is more frequently seen in movies like Skynet in the Terminator. Another field of AI research is "Evolutionary Computation".

How do Machines think?

Artificial Intelligence needs a premise of exclusive hardware and software for writing and training machine learning algorithms. Chiefly, AI systems work by absorbing considerable quantity of labeled training data, examining the data for correlations and patterns, and using them to make prognostications regarding future. In the similar fashion, the algorithm-based behind Google search engine works on AI. Chat boxes are now utilized with AI to solve basic customer queries. It doesn't deal with politics. AI programming targets on three subjective skills: learning, reasoning and self-correction.

Boon and Bane of AI:

Artificial Intelligence has been found to have enormous advantages that can reform any professional sector. The phrase "Human Error" has born considering human beings to make mistakes from time to time. However, computers don't exhibit such properties if they are programmed properly. In weather forecasting using AI has reduced most of the human errors.

Every coin has two faces. Similarly, AI has both pros and cons. Some of its disadvantages comprises its high costs of creation. It is gradually resulting in unemployment, making humans lazy. It lacks emotions and out of box thinking. Every new innovation or breakthrough will have both, but we humans are responsible to take care of that and use the positive side of the discovery to build an ameliorate world.

Myths about Artificial Intelligence:

A fascinating and interesting conversation is taking place regarding the future of AI and what it means for humanity. There are captivating controversies whereas world's prominent experts disagree like AI's future impact on the job market, whether this is something we should welcome or not. There are many examples of boring, false controversies due to people misunderstanding and talking past each other. Myths and facts are always on the opposite sides. To help ourselves focus on the true or actual controversies and open questions and not on the myths, we have to build logic and clear up some of the most common of them such as AI and Machine Learning (ML) are the same and interchangeable, intelligent machines learn on their own, AI can be 100% objective and superintelligence by 2100 is inevitable, etc. Some people also say that AI can destroy human civilization if it goes into wrong hands. But still none of the Artificial Intelligence applications made at that scale that they can destroy or enslave humanity.

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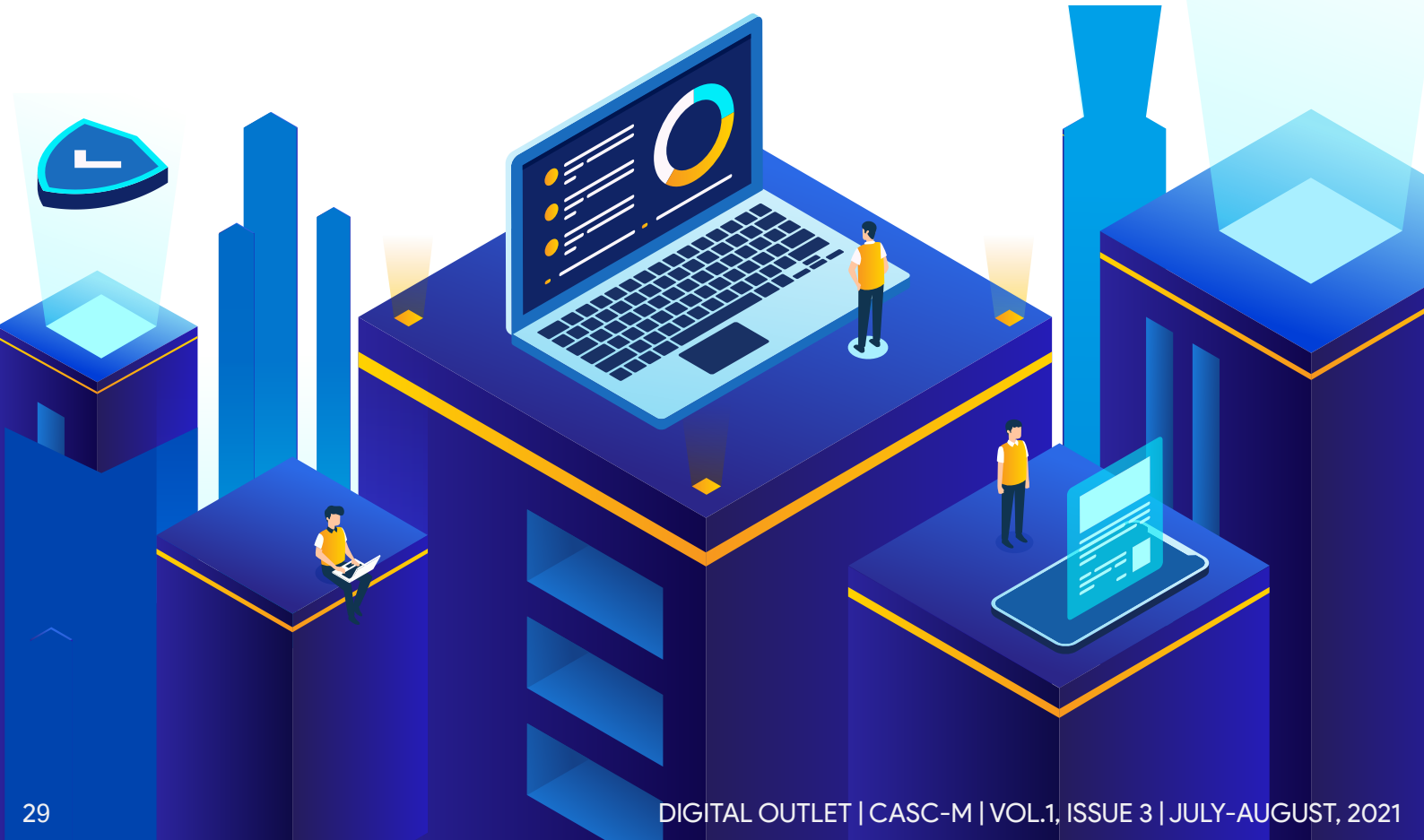
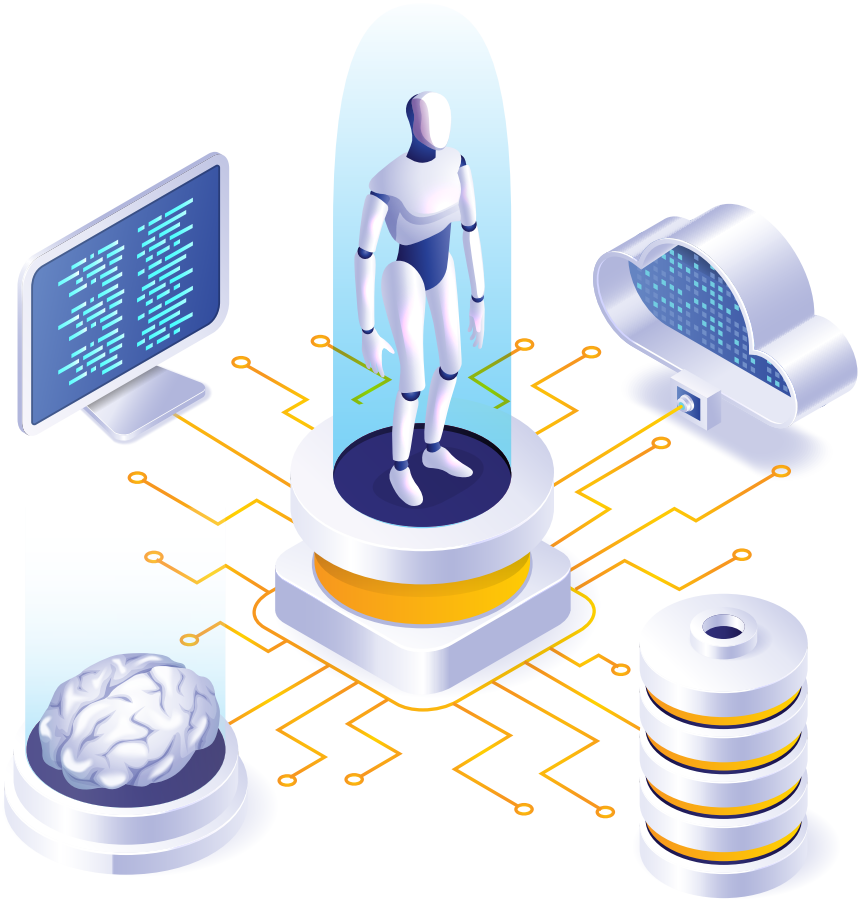


"The best way to predict the future is to create it"

– Alan Kay



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