INSIGHT

TECHBYTE 2022

JIMS
Sector-5, Rohini, Delhi

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JAGAN INSTITUTE OF MANAGEMENT STUDIES

SECTOR-5,ROHINI

Jagan Institute of Management Studies (JIMS) imparts professional education at postgraduate and graduate levels in the fields of Management and Information Technology. The Institute has been working for the attainment of a mission: to develop highly skilled and professional human resources for industry and business for the past 27 years. Established in 1993, it has now acquired a commendable position as one of the premier institutes of the country. Our PGDM, PGDM (IB), PGDM (RM) Programme are approved by the All India Council for Technical Education. PGDM, PGDM (IB) & PGDM (RM) Programmes are accredited from National Board of Accreditation (NBA) for excellence in quality education and have also been granted equivalence to MBA degree by Association of Indian Universities (AIU). Our GGSIP University affiliated programs are MCA, BBA, BCA and BA (Eco). The MCA programme is accredited by National Board of Accreditation (NBA). The National Assessment and Accreditation council (NAAC) has accredited JIMS at 'A' grade.

The institute has earned appreciations and accreditations from various Govt. Bodies, industry associations and leading newspapers and channels. These include NBA, AIU, NAAC, National Institutional Ranking Framework (NIRF), FICCI, ASSOCHAM, Times of India, Competition Success Review, Business Standard, Business Today, etc.

JIMS Rohini has now moved beyond National Recognitions and has got South Asian Quality Standards (SAQS) accreditation for quality assurance standards. This gives an advantage for increasing international visibility among the South Asian Countries.

Apart from a leading teaching institution, JIMS is well recognised for its empirical and topical research work, which benefits the industry, corporate and startups directly. JIMS Conducts an AICTE approved Doctoral program in management named Fellowship Program in Management (FPM) which is equivalent to Ph.D degree.

In the first ever NIRF ranking (2016) of teaching plus research management institutes, JIMS Rohini was placed on 43rd spot in a list of top 50 on all India basis. Since then, JIMS Rohini continues to remain in the list of elite B schools of India (Top 75) in 2017, 2018, 2019 and 2020.

Apart from providing gainful and decent placement, JIMS also encourages the spirit of entrepreneurship and acts as an incubation centre for aspiring entrepreneurs and young startups.

JIMS thus proves to be an ideal place for those wishing to engage in academic pursuits and seek intellectual fulfilment.

TECHBYTE 2022

19TH Annual IT Symposium

"Recent Innovations in Computing and Communications"

Department of Information Technology
Jagan Institute of Management Studies,
Sector-5 Rohini,
New Delhi-110085

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Editor's Desk

As once stated by Swami Vivekanand, "The world is the great gymnasium where we come to make ourselves strong." In this world of emerging tech and digital transformation, we must be capable of accepting the change brought about. And in order to do so, we must understand the change itself. We at JIMS believe that we should not provide the opportunity to students just to achieve academic excellence but propose the benefits of developing the skills and attributes which are important for their own development.

Techbyte is a magical portal where students step in, to gain INSIGHT into the current and upcoming technologies and keep themselves up to date with industry standards. Through Techbyte, the students are not only polished into industry-ready individuals, but they also get a hand-in-hand experience with event management as they volunteer to help conduct this grand symposium. We would like to manifest our gratefulness to the management of JIMS and faculty members for their incredible endowment. The dedicated hard work and efforts of our students are highly appreciated.

CHAIRMAN'S MESSAGE

Over the years, technology has revolutionized our world and made drastic changes in the way we lead our life. Undoubtedly, we are living in a splendid digital era. We have amazingly powerful computers, full-featured programming languages, lightning-speed internet connections, and operating systems/software to do almost everything we want. Innovations have led to the development of new breakthroughs on the computing frontiers like, DNA data storage, optimal computing, neuromorphic technology and many more.

Although innovative technologies are developed and being implemented to bring further revolution in IT industry it is equally important that the next generation students should be trained in these innovations to understand its pros and cons so that they can form favourable future.

Technologies, especially in IT industry move way faster than our speed. To maintain the pace with the Industry and to prepare students for it, we at JIMS, help to impart this knowledge and nurture creative thinking. In this direction annual IT symposium Techbyte is a platform for fresh talented minds to interact with experts from the industry and take inspiration from their experiences.

I congratulate the Techbyte team and wish Techbyte 2022 to be a great success.

Manish Gupta

DIRECTOR'S MESSAGE

Shaping the future in order to realise economic and social goals is one of the fundamental challenges of human society. Technology has proved to be a key enabler in meeting this challenge. Technology nowadays is changing at a rapid pace, enabling change in the way organization and individual live their lives. The role of IT professionals will not stay the same in the contactless world tomorrow. They need to constantly learn, unlearn, and relearn in order to stay relevant.

Innovation is Communication. Without the power of communication, any innovation that improves our lives and livelihoods would not proceed beyond the idea.

As director of the institute, I'm extremely happy that JIMS also encourages, inspires and nurtures young students by supporting them to work with new ideas and transform them into prototypes while in their informative years. It promotes innovation in the Institution through multitudinous modes leading to an innovation driven ecosystem in the campus. Also every year an annual IT magazine is published which provides a platform for IT professionals and academic experts to discuss the various advances in computing and communications.

Wishing Techbyte a great success !

Dr. Pooja Jain

Over the years, technology has developed our world and daily lives. Additionally, technology has created amazing tools like solar rechargeable hearing aid, mobile water safety checks etc., for the common man and resources, putting useful information at our fingertips. Modern technology has flagged the way for multi-functional devices like the smartwatch and the smartphone. The convergence of these technologies is making amazing things possible. It has brought revolutions in various fields of modern-day society, be it transportation, education, healthcare, infrastructure, connectivity, and many more.

One cannot think of living life without continuous learning. There is always a change in our career, in our personal life, in the organization, or even in society and the most effective way to withstand this change is lifelong learning.

Insight magazine is one of the examples of continuous learning process for the students where they can get the opportunity to showcase their creative thinking and teamwork as a part of editorial board by writing and compiling this magazine under the guidance of faculty mentors.

This year the magazine focuses on the theme "Recent Innovations in Computing Communication" where key elements of the technologies such as 5G, IoT and future Internet architecture, Next-Generation Secure Computing Base, Datafication, personal data protection, etc. are covered.

I wish TechByte 2022 a great success.

Dr. Praveen Arora
Dean – IPU Affiliated Programme

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DISCLAIMER

Great care has been taken in the compilation of information and every effort has been made to ensure that all Information is up-to-date at the time of going to press. The responsibility of the authenticity of articles lies with student writers. The institute or the editorial team is not responsible for error, if any, and their consequences.

Evolution of Individual in Technological Era

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INTRODUCTION

The characteristics and dynamics of innovation and technological change, as well as their interactions and interrelations across a variety of technical fields that lead to organizational changes and systemic socio-economic changes, are all covered in this article's analysis of the evolution of technology. It offers a succinct summary of the numerous theoretical perspectives that have looked at technological evolution at various levels of analysis. The information and communication technology (ICT) revolution is currently characterized by the emergence of the interconnected technological systems known as Big Data, the Internet of Things, robotics, online platforms, and artificial intelligence. This ultra-dynamic digital era is part of this ICT revolution.

HISTORY OF TECHNOLOGY

We all recognize that necessity is the mother of invention; so all invented technology came into existence to fulfill the requirement of individuals. Technology comes from the Greek word Techne and logia where Techne means "Art, Craft, and Skills" and logia mean "The Study of" but here we should also consider Knowledge as we can't have skills without knowledge.

Three Main Time Periods
1. *Stone Age:*
   In early Stone Age humans used Oldowans and Acheulean for their survival and for hunting.

2. *Bronze Age:*
   In Bronze Age the Wheel, The Loom and basic government were introduced.

3. *Iron Age:*
   Iron Age was much better for weapons and armors, better militaries.

1. *Industrial Revolution (1750-1850) -* Large-scale automation come into existence, also there were advancements in transportation In 1765 James Watt invented Steam Engine. Previously long-distance communications were done by drums, smoke, even water. In 1876 there was a great revolution in communication when Alexander Graham Bell invented Telephone which was quick and solved the long-distance communication problem.

2. *Technological Revolution (1870-1920) -* A **technological revolution** is a period in which one or more technologies were replaced by another better technology in a short amount of time. It was the period of accelerated technological progress by new innovations whose rapid application and typically cause change in society.

3. *Scientific Technical Revolution (1940-1970) -* In 1937 the first digital electronic computer was build. It uses binary numbers having base 2 and numbers expressed with 0's and 1's, and its data would be stored in capacitors.

4. *Digital Revolution (1975-Till now) -* In 1974 the biggest revolution of all the time Internet was invented, the TCP/IP (Transmission Control Protocol/Internet Protocol), that describes how data can be partitioned into smaller pieces called packets and how these packets can be transferred to the correct destination. TCP/IP became the basis on how data is transmitted over the Internet. In 2017 Artificial intelligence come into existence, which will enable people to rethink how we integrate information, analyze data, and use the resulting insights to improve decision making and already it is transforming every walk of life.

Mental and other Biological factor of technology

For the first time in ages, one species, Homo sapiens could purposely control its fortune on this earth. Humans have been shaping itself, the terrain and other species for

thousands of times. Soon, we'll be suitable to completely control our own biology too, transcending our natural limitations.

From Biological to Digital Evolution

By controlling the inheritable genes of race, we can more directly control nature for our benefit. This is formerly passing. Just last time, gene editing saved a girl dying from leukemia for the first time, pressing the eventuality for inheritable engineering to enhance medical treatment. According to Arthur Georges from the University of Canberra, "New machines which can yield terabytes of inheritable information will make it possible for anyone to have their entire DNA sequenced in less than a week. Theoretically, this information could be used to prognosticate conditions, cancer and rotundity times ahead of when they actually develop. " Masterminds from around the world are developing prosthetics that can perform complex tasks, and numerous performances are controlled solely by the person's mind.

We've also seen the development of prosthetic technology that can allow druggies to feel their artificial branches by feeding into the brain's sensitive systems. While there's plenitude of room for enhancement in cost and overall technology, experts are auspicious about the manner in which technology is incorporating with biology.

A Double- Edged Sword

The implicit benefits of modifying biology are revolutionary. Doctors would gain access to a important tool to fight against diseases, allowing us to live healthier lives. We might extend our lifetime and modify our brain's structure blocks to come more intelligent and able. Like any other technology, the future of similar natural and technological tools depends on how we use them. Evolution has long been a blindness process, guided by pressures from the terrain and arbitrary inheritable mutations. For the first time in the history of our earth, one species — ours — has the power to suppose through what traits it wishes to elect for.

Beneficial effects of technology

The greatest beneficiaries of technological advancement are not people in a specific field but the masses in general. The changes brought by technical amelioration that humankind has experienced in the last century have impacted are daily lives as well as the crucial decision that we make. The conception and evolution of devices like smartphones and personal computers have changed the singular life in such a way that it will be hard to imagine our life without them. Whether you want to go to some place or find information about it or learn anything, the first thing that comes to mind is the powerhouse of information that is internet through which we can learn so much about anything that we desire. This information not only saves time but helps in making a well-informed decision as well. These technological improvements have changed so many things in our life from transportation to medical help that these advancements have chiseled their place into the daily life of most people. It is not only the small mundane things in our lives that technology has changed but it also influences the major pivotal decisions for many people as well. Important career decisions of many people like choosing right jobs for them or networking with people in their respective fields are possible because of websites like LinkedIn and Indeed etc. People also consults many Education websites that are available to us through internet when choosing the institute, they want to enroll into. Needless to say, that technology we use has become a crucial part of our lives and has changed our lives for the better.

Impact of Information and Communication Technologies (ICT) on our daily life.

Positive Impact of ICT
1. *Managing Daily Life:*

Information for Everyday Life can be stored and managed on ICT devices. Online banking, online payment, and online commerce are also available for purchasing daily necessities.

2. *Information Sharing:*

Information is now at your fingertips. We have access to any information anytime, anywhere. Information, news, and opinions can be shared with people around the world through e-mail, Google Groups, Yahoo!, and other Internet discussion groups.

3. *Parenting:*

ICT enables new ways of learning, e-learning, interactive multimedia, etc. Virtual classrooms become e-learning when students and teachers log in at the same time at the same pace. This is a smart investment in your children's future.

4. *Autonomy:*

ICT gadgets help you do your job easier. You can create your own business shop without high overhead, buy goods and sales in the marketplace, and run advertising campaigns using multimedia applications.

5. *Develop health literacy:*

Get immediate feedback from your doctor for faster recovery. Health literacy addresses people's need to access and use quality information about diseases and medicines through internet health services available on ICT devices.

Negative effects of ICT

1. *Less face-to-face interaction:*

People today prefer online communication to face-to-face conversations, which makes them more individualistic and introverted.

2. *Social Separation:*

Although the internet has reduced the physical distance between people, it doesn't mean that everyone has become closer, it doesn't mean that in some aspects the emotional distance has increased. Children are also spending more time in virtual worlds, adopting erroneous ideas and increasing cybercrime and adultery through the use of ICT devices.

3. *Reduced physical activity/health issues:*

Users can embrace a more sedentary lifestyle with the use of ICT devices. Continued use may lead to health problems such as headache, obesity, heart disease, diabetes, excessive repetitive motion and eye strain, incorrect posture/posture, neck pain, and physical/mental stress.

4. *Loss of security/privacy:*

Each ICT device is integrated by specific technology and uses Internet connection. Data must be kept secure to protect against virus attacks and other forms of malware released daily. When using SNS, there is a risk that personal information may be leaked. Using online banking puts you at risk of losing money to scammers.

We can transfer our money to your account.

Conclusion

From the day internet was developed till now it has brought tremendous changes to the world and will continue to do so. Not only the internet has evolved over time but along with it individuals have also evolved in this technological era. In today's era there is hardly any sector which is not impacted by the internet. But like all other things the changes introduced by the internet are not positive only there are many negative impacts too.

On one hand internet introduced ease in doing and accessing many things like enhanced communication by means of video calling and instant messaging, improved education and learning process, instant banking, advanced agriculture, developed health care system and made information easy to access etc.

While on the other hand it impacted the society in some negative ways too. Because of internet face-to-face interaction has reduced to a great deal, it has created social separation and rather created the world of social media where people are becoming more and more artificial by getting in the race of likes, views and all. Although internet opened doors of opportunities it also created the concept of cyber-crime and such which threatens our privacy and sensitive data.

Conclusively it can be said that although internet has many disadvantages, the advantages of internet are far greater than its cons. Many cons of internet are totally on individual level which can be avoided by means of precaution and care.

REFERENCES:

1) https://www.britannica.com/story/history-of-technology-timeline

2) https://www.timetoast.com/timelines/technology-project-cc69cbe0-2380-4be6-92b7-e4303ecec446

3) https://www.geeksforgeeks.org/impact-of-technology-on-society/

4) https://singularityhub.com/2016/12/20/what-happens-when-tech-takes-control-of-evolution/

"It's not that we use technology, we live technology" -Godfrey Reggio

Latest Trends and Future Directions of Cyber Security

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Cybersecurity is important for the constantly changing digital world. Whether you own a business or you are a consumer, you should know and must be prepared for the new rules, technologies and strategies to create a safer and more secure online space.

Without strengthening your cybersecurity protocols, it is impossible to progress in modern digital world. It is more challenging to build an advance security system which ensure the integrity of user, businesses and government because the complexity of security requirements is increasing for several reasons. Therefore, our continuous defence against hackers and cyber criminals should influence the future of cybersecurity with enhanced monitoring technologies of data.

Introduction

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Without strengthening your cybersecurity protocols, it is impossible to progress in modern digital world. It is more challenging to build an advance security system which ensure the integrity of user, businesses and government because the complexity of security requirements is increasing for several reasons. Therefore, our continuous defence against hackers and cyber criminals should influence the future of cybersecurity with enhanced monitoring technologies of data.

There is also an ongoing shortage of cybersecurity professionals, it will also drive changes to cybersecurity strategies and policies in upcoming years: -

1. By 2025, 60% of the organizations will use cybersecurity risk as a primary factor to manage the third-party transactions and business activities.
2. By 2025, 80% of the companies will adopt a strategy to unify web, cloud services and private access from a single vendor's security service platform.
3. By 2026, 50% of executives on C-level will have performance requirements related to risk built into their employment contracts.

1. *Importance of cybersecurity*

Cybersecurity is crucial because it safeguards all types of data against theft and loss. Personal information, government and business information systems and all included. Sensitive information like social security numbers, credit card information and bank account details are now stored in cloud storage like google drive or drop box.

The fact that whether you are an individual, small business, or large multinational, you rely on computer systems every day. This increases the rise in cloud services, poor cloud services security, smartphones and the Internet of Things (IoT) and we have potential security vulnerabilities and didn't exist a few decades ago.

2. *What is the Impact of Cybercrime?*

There are many factors that contributes to the cybercrimes. Each of these factors can damage your business in a range of ways including: -

- *Economical Costs*

Damage and theft of intellectual property, corporate information, disruption in trading, and the cost of repairing damaged systems.

- *Reputational Cost*

Loss of current and future customers to competitors, loss of consumer trust, and poor media coverage.

- *Regulatory Cost*

Organizations could suffer from regulatory fines or sanctions as a result of cybercrimes.

3. *Applications of Cybersecurity*

In technology industry threats are dynamic in nature and organizations deals with them. Intruders finds way to erode protection and develop more attacks time to time on the system. To save organization systems and data we need

some cyber security. There are some applications of cyber security –

- **DDoS security** – Distributed Denial for Service attack is when an attacker makes some fake traffic on web server, to prevent it we have DDoS mitigation service which diverts the traffic to another server until the problem is resolved.
- **Web Firewall** – It is an auto traffic monitoring which is used to monitor any malicious websites. It works on the large area network basically as the name suggest it acts as a wall to traffic incoming and outgoing and judge it by added trackers or untrusted files.
- **Bots** – Today while in advancement in the machine learning we uses bot to automate our work, so attackers also have used this advantage to crash your server by sending heavy traffic, so cyber security helps to prevent fake users by analyzing behavior like session time and unusual incoming request on server.
- **Antivirus and Antimalware** - As the name suggest it prevents form virus or malware to enter our system, it helps to prevent data breaching, un-authorizing attacks and digital attacks from hackers. It also helps in monitoring network security and firewall system.
- **Threat management system** – It has ability to point out weak points and bugs in the computer system that can be useful to the hackers, also helps to quickly overcome a digital attack and provide control over the vulnerability issues about the user.
- **Critical System -** Attacks are also done on some large servers connected to wide area network, critical systems maintain some standard high security protocols for the protection of system. It monitors applications on real time and checks the safety of servers regularly, the network used by it and the users themselves.

4. *Emerging Technologies in cyber security*

Ever questioned whether it's a coincidence that Halloween and the awareness-raising campaign for cybersecurity both come in the same month, October? If Halloween's ghosts aren't frightful enough, statistics showing the rise in sophisticated and deadly cyber threats will undoubtedly do the trick.

Data has evolved into the essential resource of an intelligent organization, used for everything from daily operations to developing long-term plans. The difficulties in securing data get more severe as its value and commercial importance rise. Data Security and Cyber Security must be discussed simultaneously when discussing cyber protection.

If we analyse some statistics, we can see that data breaches caused by cybercrime cost businesses worldwide an average of $3.9 million each year. As Cyber criminals develop new business models, cybercrime is getting simpler for attackers to scale globally. It's one of the reasons why 55% of businesses collaborate with outside parties to reduce security threats.

- *Hardware Authentication*

The future of cybersecurity is hardware authentication. This kind of user authentication uses a hardware system owned by an authorised user, such as a smartphone, laptop, or other device. To provide access to the gadget, either a simple password or fingerprints could be used. A more secure method of authentication is required due to the well-known scarcity of usernames and passwords. When a network needs to be sure that the device attempting to access it is one that should have access to it, hardware authentication is a key component of the Internet of Things (IoT).

One drawback of hardware authentication devices is that they might be stolen or misplaced, which could cause users login problems.

- **Artificial Intelligence & Machine Learning**

When compared to human performance, artificial intelligence (AI) is likened to technology that learns, draws conclusions, analyses complicated information, converses naturally with humans, improves human cognitive performance, and, most importantly, replaces people in the execution of non-routine jobs.

Data may be protected by AI technology against dangerous and more complex malware, ransomware, and social engineering assaults. Although AI is not yet conscious, there is probably a future for cognitive autonomy in AI when it comes to anticipating and preventing cyberattacks.

If we take a different perspective, AI and ML are completely interconnected. In essence, it makes a computer act without a lot of code. It integrates with AI and is a quick predictive analytics automation method.

The quickest approach to discover new cyber-attacks, make statistical judgments, and send that information to endpoint protection systems is using machine learning (ML). One of the unique situations in which AI and ML might be useful for cybersecurity is in threat intelligence. By cross-checking the accuracy of data across several scattered databases, AI and ML might aid with identity management. Thus, it is clear that ML and AI represent the future of cybersecurity.

- *Automated and Adaptive Networks*

Automated networks may alter how cybersecurity develops in the future. Automated scanning and monitoring of linked networks enables real-time reporting of deviations and abnormalities. Network, endpoint, firewall, payload, and anti-virus layer updates that are carried out automatically, as well as forensics and diagnostic testing for cybersecurity. AI and ML can be important components and supporting parts of these networks.

- *Blockchain Cybersecurity*

It is one of the potentially effective cybersecurity technologies that is growing rapidly. This sort of security is based on peer-to-peer principles as the blockchain technology relies on identification between the two participants to a transaction. At the same time, it provides authentication and eliminates a single point of vulnerability.

A distributed public key infrastructure may be utilized by a security system in a corporation to authenticate people and devices with the use of blockchain technology. A strong verified verification system may be put up using Blockchain technology and AI to fend off any cyber-attacks. The future of cybersecurity lies in it.

- *Zero-Trust Model*

A breakdown in conventional security concepts prompted the development of the zero-trust model. The zero-trust security model is predicated on the idea that everyone should be treated with suspicion, including those who are already inside the network perimeter.

Conclusion

Cybersecurity technologies are growing rapidly. In order to avoid needlessly burdening the user, it is important to employ authentication sparingly and thoughtfully throughout the course to reinforce security. Knowing whether a re-authentication is genuinely required due to a malicious or merely abnormal event occurring is the key. This is how identification technology combined with application and API protection technology is put to use. In this paper, we have presented a summary of upcoming fields/application areas of cyber security.

References

1. Choo, K.K.R. (2011). "The cyber threat landscape: Challenges and future research directions". Computers & Security, 30(8), pp.719-731.
2. Daya, B. (2013). "Network security: History, importance, and future". University of Florida Department of Electrical and Computer Engineering.
3. Dhillon, G. (2007). "Principles of Information Systems Security: text and cases". (pp. 97-129). New York, NY: Wiley.
4. Graham, J., Olson, R. and Howard, R. eds. (2016). "Cyber security essentials". CRC Press.
5 Jouini, M., Rabai, L.B.A. and Aissa, A.B. (2014). "Classification of security threats in information systems". Procedia Computer Science, 32, pp.489-496.
6. Kaplan, J.M., Bailey, T., O'Halloran, D., Marcus, A. and Rezek, C. (2015). "Beyond Cybersecurity: Protecting Your Digital Business". John Wiley & Sons.
7. Koch, R., Stelte, B. and Golling, M. (2012, June). "Attack trends in present computer networks". In 2012 4th International Conference on Cyber Conflict (CYCON 2012) (pp. 1-12). IEEE.
8. Maughan, D. (2009). "A roadmap for cybersecurity research". US Department of Homeland Security November,2009.
9. National Institute of Standards and Technology (NIST) and United States of America. (2014). "Framework for Improving Critical Infrastructure Cybersecurity".

"No technology that's connected to the internet is unhackable"-Abhijit Naska

Role of the Computers in Digital Forensics

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INTRODUCTION

This article is about the role of computers in digital forensics. This world is growing so fast towards digitalization that all the industries are implementing the benefits of digitalization in their working process. With the help of digitalization, the working procedures are becoming very fast and effective. To use digitalization, we just need a laptop, computer or a system. There are some forensics software that has to be installed on the computers so the tasks can be performed. This gives the benefit of fast operations.
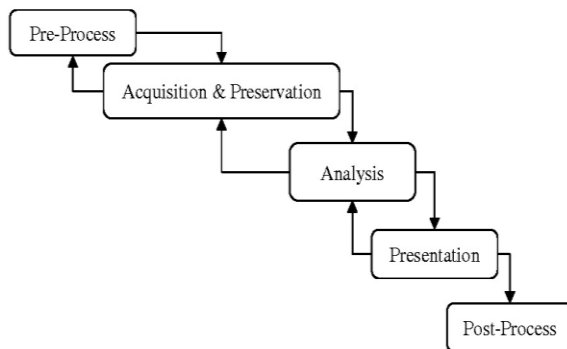
Investigation Process

Fig. I Investigation Process

Pre-Process/Identification: The first phase involves identifying the objectives of the investigation and the resources required. Analysts also identify the evidence, the type of data they are working with, and the devices on which the data is stored. Digital forensics specialists work with all kinds of electronic storage devices, including: Hard drives, tablets, mobile phones, personal computers, laptops etc.

Acquisition and Preservation: At this point, analysts ensure that data is preserved and isolated. This usually means that no one can use the device until the investigation is over, so the evidence remains safe.

Analysis: The analysis phase involves a deep and systematic search for any relevant evidence. Specialists work with system and user files and data objects. Based on the evidence found, analysts draw conclusions.

Presentation/Documentation: At this stage, all relevant evidence found is documented. It helps to magnify crime scenes and speed up investigations. All digital evidence is documented with photos, sketches and maps of the crime scene.

Post-Process/Reporting: In the final stage, all evidence and conclusions are reported according to forensic protocols. This includes methodology and analytical methods and their descriptions.

Types of Digital Forensics

Digital forensics is a rapidly expanding scientific field. It also evolves in response to rapid advances in technology. At this point, digital forensics has focused sectors.

Fig. III.I Types of Digital Forensics

Computer Forensics: Computer forensics is the process of identifying, collecting, storing and analyzing data from personal computers, tablets, laptops and other computing storage devices. Its specialists are usually engaged in computer crime investigations. Their skills in civil litigation and data recovery processes are also needed.

Mobile Device Forensics: These professionals may collect information from various devices such as SIM cards, mobile phones and smartphones. GPS devices, PCs, tablets, game consoles, and other electronic devices, this type of analysis is necessary to obtain audios and videos data, as well as calls and call records, from devices made in court as evidence.

Network Forensics: The purpose of network forensics is to monitor, analyze and record all network activities. That's why, in the event of a security breach, cyber-attack or incident in cyberspace, network experts evaluate activity and traffic.

Database Forensics: A Database forensic expert evaluates all databases access and reports any data changes. It may be used to verify business contracts and detect large-scale financial frauds.

Live Forensics: It often competes with research and case studies related to live scenarios. It helps to maintain verification of changes.

Email Forensics: Email forensics analysts extract valuable data from emails. This information may include sender and receiver names, communication content, source, timestamp, and metadata. Email forensics techniques are often used when a company is accused of email spoofing.

Memory Forensics: Memory forensics is also known as "live acquisition". Loading data from RAM. Also, with recent advances in cybercrime technology, hackers may leave no traces on your hard drive. In such situations, memory forensics can help track down the attacker. This type of investigation is important when computer crimes or cyber-attacks are carried out by compromising the security mechanisms of the wireless network.

Furthermore

However, the concept of digital forensics is pretty well known among the professionals working in intelligence agencies, military, law enforcement and research and development departments of various equipment manufacturers, but it doesn't mean that a civilian who isn't a geek has no connection with it. As we are talking about the role of computers in digital forensics, it is worth mentioning that the concept should have been non-existent if there were no computers. In digital forensics, we basically use computers to understand and extract various types of information from other computers.

Have you ever wondered why companies mostly don't return any replaced parts like hard drives, solid state drives etc. to you? And why there is a separate recycling method for E-waste?

But why do they need broken or dead devices that are of no use? Due to many reasons, but mainly to perform a full autopsy to know the potential reasons for the failure so that it can be prevented in next generation devices.

Fun fact: There is a tool called Autopsy in DEFT (Digital Evidence and Forensics Toolkit).

However, Military and Intelligence agencies have other uses for it. They have no concern for why and how a legally seized device stopped working. All they want is the information that is or was present in the device which may be of use.

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It is believed in the industry that fire is the biggest nightmare. It is hard or impossible in most cases to extract information from a burnt device; that's why most of the storage media are made up of material that is fireproof so that they cannot be misused.

But if I have deleted my data and it is not present, then how can it be extracted? Well, computer science is well progressed and widely practised in the world and everyday there is one new technology being invented and there was one lucky day for some research team on which they invented tools and techniques to reverse the formatting of a storage media and deletion of files.

And all of this investigation cannot be done using a pen or paper. For this, we need computers and dedicated devices to perform these operations on digital media. With that being said, now we understand how computers play a keen role in the concept of Digital Forensics. We are here mentioning a case study so that you can learn how these operations are actually performed in the real world.

Case study

Today, as we are growing in computers in digital forensics the risks and frauds are also increasing day by day. Some of these are here.

Brief: This case is about an illegal money transfer. Which is done by a person who is a common man and worked in a BPO company, Birla Strom Media and Global Pvt. Ltd. This case happened in Maharashtra. He is handling the business of a multinational bank. And He records the information from the data so he had used some confidential information of the bank's customers and transferred huge sums of money from the accounts.

Investigation: During the investigation of the case, as per the complaint received from the firm, they analyzed and studied the systems of the firm to determine the source of data theft. During the investigation, the system server logs of BPO were collected, and they found that the illegal transfer was made by tracing the IP address to the internet service provider and it is ultimately through cyber café and they also found that they made illegal transfers by using swift codes. Almost exclusively, the registrations made in the cyber café assisted in identifying the accused in the case. Almost 17 accused were arrested.

Conclusion: Based on the evidence collected from the use of IP address and desktop computer charge sheet has been filed against accused and case is currently pending trial.

Computer Role in Digital Forensics

Due to the fact that the need to help recover data that can be used as evidence is becoming increasingly difficult for law enforcement, the work of PC forensics in the field of fraud is increasingly in demand. Currently, this developing field of research requires IT professionals who are best suited to retrieve this type of information for law enforcement. As Forbes magazine shows, the main recruitment for 2015 is for IT professionals, which is only known for a variety of IT spots. IT jurisdiction in law enforcement is not a simple situation, it is also a situation that is exemplary and changes the nature of legal authorization through full penetration and control.

Computer Forensics Tool

Various types of software tools are used in the field of computer forensics. A person who works in this profession is known as an investigator. The operations that were required to be performed included searching the encrypted files. This term is known as a "living box" and other new tools are also used for research purposes. That's why they are the best in the industry. In most cases, common operations such as file deletion recovery, deleted password recovery, and even recovery from raw data are performed. Evidence gathered through the investigative process is sent as evidence to lawyers, judges and police for further investigation. The main job of a computer forensics is not only to recover information, but also to solve cases. Computer forensics tools enable investigators to process all of this data to find solutions and solve cases.

Digital Forensics Challenges

There are many ultimatums facing digital
The forensic medicine in these cases is as follows -

Evidence is out of control for a single host:
It is spread across various virtual or physical locations, such as storage units associated with cloud resources, social networks, and personal networks. Therefore, more expertise, time and tools are needed to reconstruct the evidence correctly and completely.

High volume and speed:

Problems related to retrieving, storing and processing large amounts of information for forensic purposes have repeatedly caused problems also driven based on availability.

Extensive marketing of digital information.

Arise of anti-forensics techniques:

Precautionary measures include encryption, juggling, and methods of concealment, including data smuggling.

In any case, cooperation between world powers

Investigating cybercrimes and gathering evidence is essential in building a closed case that meets legal requirements. That's why security professionals need the best tools to investigate.

Legitimacy:

Foundations today are alarmingly virtualized, regularly relegating their multifaceted nature to the countryside (e.g., in haze figuring) and outsourcing some tasks to outsiders (e.g., as administration system on stage).

Improvement of standards:

Frontline cybercrime investigations the need to process or use data in a shared manner redistributed computing and capacity. Therefore, one of the main advances of computer forensics networks is to improve the arrangements and appropriate standard consultations.

Privacy investigations:

These days, people spend a lot of time on the Internet. Basically, on the Internet and sharing different memories of life. Finding and collecting all the data through informal online organisations or web-based living destinations and calculating attacks to compromise the customer's security adds various problems.

References

[1] S. Perumal, Digital forensic model based on investigation process. International Journal of Computer Science and Network Security (2018).

[2] SM. Mohammad, Security and Privacy Concerns of the 'Internet of Things' (IoT) in IT. Available at SSRN: https://ssrn.com/abstract=3630513 (April 4, 2020).

[3] F. B. Cohen, Digital forensic evidence examination. Livermore: Fred Cohen & Associates. (2016).

[4] S. R. Selamat, R. Yusof and S. Sahib, Mapping process of digital forensic investigation framework. International Journal of Computer Science and Network Security (2008).

[5] B. Carrier, defining digital forensic examination and analysis tools using abstraction layers. International Journal of digital evidence (2016).

[6] SM. Mohammad, Artificial Intelligence in Information Technology Available at SSRN: https://ssrn.com/abstract=3625444

[7] S. C. Gupta, (2017). Systematic digital forensic investigation model. International Journal of Computer Science and Security (IJCSS)

[8] B. Carrier and E. Spafford, An event-based digital forensic investigation framework. Digital Investigation. (2015).

[9] B. Martini, An integrated conceptual digital forensic framework for cloud computing. Digital Investigation (2016).

[10] N. Beebe, Digital forensic research: The good, the bad and the unaddressed. In IFIP International Conference on Digital Forensics Springer, Berlin, Heidelberg. (2019).

[11] M. Reith, C. Carr and G. Gunsch, An examination of digital forensic models. International Journal of Digital Evidence (2016).

[12] M. D. Kohn, M. M. Eloff and J. H. Eloff, Integrated digital forensic process model. Computers & Security, 38, 103-115. (2016).

[13] SM. Mohammad, Risk Management in Information Technology Available at SSRN: http://dx.doi.org/10.2139/ssrn.3625242 (June 9, 20

"Digital Forensics is an exact science –not the procedures but the results" -Edewede Oriwoh

Computational Biology and Machine Learning

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What is Computational Biology

Computational biology is a generic way to use data analysis, mathematical modeling, and computational simulations to understand biological systems and their relationships. This is a well-known and extensively used method for analysing large collections of biological data, such as genetic sequences.

Applications of Computational Biology

In the beginning, computational biology's primary goal was to study the sequence and structure of biological molecules. In the early 90s, however, it extended increasingly to the analysis of function. Functional prediction involves analysing the order and structural similarity between an unknown and known protein and analysing the proteins' interactions with other molecules. Such analyses may be extensive, and thus computational biology has become closely aligned with systems biology, which attempts to analyse the workings of large interacting networks of biological components. Biochemical, regulatory, and genetic pathways are highly branched as well as dynamic, calling for knowledgeable computational tools for their modelling and analysis. Moreover, modern technology platforms for the rapid generation of biological data have allowed for an extension from traditional hypothesis-driven experimentation to data-driven analysis, by which computational experiments can be performed on genome-wide databases of unprecedented scale. As a result, many aspects of the study of biology have become unthinkable without the power of computers and similar computer-based technology.

Differentiation of Computational Biology

How computational biology can be differentiated from another related field, bioinformatics. Computational biology can also be distinguished from theoretical biology.

Theoretical biology usually focuses on mathematical consideration and speculative analysis of biological systems that may or may not be of practical use in analysis. Computational biology generally is associated with practical application, and indeed, journals and annual meetings in the field often actively encourage the presentation of biological analyses using real data along with theory. On the other hand, important contributions to computational biology have arisen through aspects of theoretical biology adapted from information theory and network theory. As an example, advances in the mathematical study of complex networks have increased scientists' understanding of naturally occurring interactions among genes and gene products, providing insight into how characteristic network architectures may have arisen in the course of evolution.

What is Machine Learning

Machine learning is the ability of machines to improve performance based on previous results. Machine learning techniques allow computers to learn without being explicitly programmed and can be used for a wide range of applications, such as improving data mining algorithms.

Artificial intelligence is a subset of it. It is the study of making robots behave and make decisions more like humans by giving them the ability to learn and design their own programs. This is accomplished with minimal human intervention, i.e., without explicit programming. The machine learning method is automated and refined based on the machines' experiences during the process.

Good-quality data is provided to the computers, and various methods are employed to develop ML models to train the machines on this data. The method chosen is determined by the type of data and the action that has to be automated.

Applications of Machine Learning

Machine learning techniques are utilised in situations where the solution must continue to improve after deployment. The flexible nature of machine learning solutions is one of the primary selling points for their adoption by businesses and organizations across industries.

Machine learning algorithms and solutions are adaptable and, under the correct circumstances, can be used to replace medium-skilled human work. Customer support representatives in large B2C organizations, for example, are now being replaced by natural language processing machine learning algorithms known as chatbots. These chatbots may assess client inquiries and aid human customer care personnel, or they may engage directly with consumers.

Machine learning algorithms also aid in the enhancement of user experience and customization on online platforms. Facebook, Netflix, Google, and Amazon all employ recommendation systems to avoid material overload and give personalized content to individual users based on their preferences.

A REAL-WORLD MACHINE LEARNING SYSTEMS ARCHITECTURE

1. *Collector of Ground Truth*

In the actual world, the ability to continuously obtain new data for the machine to learn from is critical. One form of data is especially critical: ground-truth data. This corresponds to what you want your ML models to predict, such as the sale price of a piece of real estate, a customer-related event (such as churn), or a label to attach to input objects (such as "spam" on incoming communications).

2. *Data Labeler*

Sometimes you'll have a lot of input data, but you'll have to manually construct the corresponding ground-truth data. When creating a spam detector or an object detector from photos, this is the situation.

3. *Evaluator*

Before building any ML models, explain how to evaluate the planned ML system once you have an initial dataset for the machine to learn from. In addition to measuring forecast accuracy, it is desirable to evaluate short-term and long-term impact using application-specific performance metrics and system metrics such as lag and throughput.

4. *Performance Monitor*

The next step towards deciding if a baseline model can be integrated into an application is to use it on the inputs encountered in production (called "production data") in a production-like setting and monitor its performance over time.

5. *Featurizer*

When creating a prediction API, a choice must be made about what the API will accept as input. For example, when making predictions about customers, should the whole feature representation of the client or only the customer ID be used as input?

6. *Orchestrator*

The orchestrator is important to the ML system and interacts with numerous other components. The following are the steps in its workflow/pipeline:

Extract-Transform-Load (raw) data and divide it into training, validation, and test sets. Send training/validation/test sets for feature enhancement (if any). Create specialized training/validation/test sets. Send URIs of prepared train/validation sets to model, apply it to the test set, then send predictions to the evaluator. Determine the performance value and whether or not to submit the model to the server (for canary testing on production data, for instance).

7. *Model Builder*

The model builder is in charge of creating the best model possible. It does this by training several models on the training set and evaluating them on the validation set using the supplied metric to determine optimality.

8. *Model Server*

A model server's role is to process API requests for predictions against a particular model. It does this by loading a model representation saved in a file and applying it to the inputs obtained in the API request using a model interpreter; predictions are then returned in the API response. The server should support numerous API queries in parallel as well as model modifications.

COMPUTATIONAL BIOLOGY AND MACHINE LEARNING TOGETHER

How machine learning can be used with computational biology?

Machine learning has become the primary tool for many projects in computational biology, bioinformatics, and health informatics.

One of the most common problems today is the problem of unbalanced data, and machine learning with computational biology is helping to solve this problem extensively. Nowadays, there are many effective techniques to solve the problem of unbalanced data. The best way to solve this problem is always to collect more data. but sometimes this is not possible. A common and effective strategy for dealing with unbalanced data sets is data class weighting, in which data instances are assigned different weights based on whether they belong to a majority class or a minority class. Weighting data classes is a standard technique to combat the imbalanced data problem in machine learning.

Second, what algorithm should we choose, and where should we start first…?

Once you have an idea of what kind of biological problem you are trying to solve and which category of methods might fit your situation, you need to choose a machine learning algorithm to start your

project. Although it is always desirable to use multiple techniques and compare their results, it is impossible to choose which one is best, and this situation is very tricky. In addition, a simple algorithm will provide better optimised skills, less chance of overshoot, and more efficient learning properties than complex methods. Examples of simple algorithms are k-means clustering for unsupervised learning and k-nearest neighbors for supervised learning.

So, we can say that computational biology and machine learning play a vital role in the biological lineage in solving big problems effectively.

REFERENCES

1. Wikipedia
2. Friends, Mentors and Book
3. Machine Learning: A Practitioner's Approach by Vinod Chandra and Anand Harendra S.
4. Introduction to Computational Biology: An Evolutionary Approach By Bernhard Haubold.

"Biology and computer science – life and computation – are related." – Leonard Adleman

Emerging applications of Deep Learning

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INTRODUCTION

Deep learning is a quickly evolving area in data science domain. Deep learning is a combination of machine learning and artificial intelligence. It is quite versatile, inspired by human brain schema, and makes models with higher accuracy than machine learning. Yet, due to myriad of reasons, designing and conducting experiments becomes difficult, which are important. Deep learning technology play an important role in automating systems, coming within the domain of artificial intelligence. Deep learning techniques are deployed in IOT applications such as computer vision, pattern recognition, natural language processing, object detection, bioinformatics etc. Neural networks are deployed for decision support systems in machine learning and deep learning, but the deep learning ecosystem here is quite different, using multiple nonlinear layers that generate relatively complex results to get higher precision, whereas a machine learning system is implemented linearly. In the present article, some of those technologies are discussed in order to provide insight.

Deep Learning in Autonomous Vehicles:

The software system of an autonomous vehicle is like a system where the user has a finite number of moves and tries to find the best move to move in the right direction safely.

The sensor based self-driving cars do tasks like image classification, object detection, segmentation, and localization. With various forms of data representation and processing, the user can make predictions of the objects around it.

A deep learning algorithm does the modeling and information processing (images and cloud data points from IOT devices. The model is trained. The model is then tested and helps the car to prepare for all the possible moves which involve moving, slowing, halting, braking, changing lanes, and so on. CNN is the primary algorithm used for this purpose. Tesla is one example which deploys CNN for the said purpose.

Deep learning plays very important role in interpreting complex scenarios and tasks, localize itself in the environment, enhances perception, and actuate kinematic maneuvers in self-driving cars. This ensures higher safety on road and also makes commuting easy as well.

But the decision making is tricky and choosing the correct action out of a finite number of actions within the temporal constraints is a challenge. This is an interesting emerging area.

Deep Learning and Super Computers:

Supercomputing performance metrics, represented by speedup, throughput and scalability. The performance in such systems has dual meaning. The first is predictive accuracy of the deep learning based model. The second is computational speed of process.

Supercomputing uses may use model parallelism or data parallelism. This parallelism will help the GPU based HPC Deep Learning models learn faster. One example of this is CTE-POWER cluster based computing (CTE-POWER has 54 high end nodes for parallel HPC)

For this, we can use Tensorflow API, Keras and appropriate strategy, to achieve the objectives. We can expect useful results when we apply deep learning techniques in supercomputing environment.

Deep Learning and Natural Language Processing(NLP):

One of the most popular application of deep learning is NLP. Almost all the political parties across the world are using it to sense the voter sentiment. Most of the corporates are using it to find patterns for promoting their products or services for upselling or cross-selling.

NLP is quite challenging task in computer science. Languages present lots of problems that vary from one language to another. Doing proper structuring or extracting the meaningful information from free text is of utmost importance and if done correctly, greatly enhances the accuracy of DL model. Previously, computer scientists followed a different technique to break a language into its grammatical forms, using high end processes. Today, deep learning is a key to performing the same exercises through the concepts like bag of words, word cloud, grams, tokenization etc.

NLTK is the toolkit used for developing deep learning models and RNN is the quite popular in language translation. The accuracy of the deep learning models is to look for when we translate from one language to another language. This is another interesting emerging domain.

Deep Learning and Fraud Detection:

Frauds are known to be novel and dynamic, usually without a pattern. For this reason, these are not difficult to identify. Fraudsters use latest advancements in technology area to their side. They somehow bypass the system authorization and authentication validity checks, leading to the loss of millions of dollars. Frauds can be financial or non-financial (e.g. identity thefts). Detecting fraudulent activities using deep learning is one of the ways for tracing fraudulent transactions. The techniques may range from machine learning methods such as k-nearest neighbor (KNN), random forest and support vector machines (SVM), to deep learning methods such as autoencoders, convolutional neural networks (CNN), restricted boltzmann machine (RBM) and deep belief networks (DBN). Depending upon the type of fraud, we may use either supervised or unsupervised learning or deep learning techniques. RBM may prove useful for detecting credit card fraud detection. Also, the deep learning models may help us find out the vulnerabilities of the system to prevent potential frauds of any kind. This is again an interesting sunshine area with challenges of higher orders.

Conclusion:

Deep Learning is an area with very high versatility and holds a lot of promise in years to come. This article has discussed some of the emerging application areas where deep learning can be applied further, in order to achieve higher accuracy of the models, making models such that the learning becomes faster or opening new frontiers of applications using deep learning techniques of CNN, RNN, LSTM, RBM etc.

References:

1. Bengio, Yoshua et al (2016) "Deep Learning" , The MIT Press, London, England

2. Hinton, G. et al (2018) "Deep Learning – A technology with potential to transform healthcare", JAMA, 320(11), 1101-1102

3. Gupta, Parveen Kumar et al (2021). "Data Science and its relation to Big data and Machine Learning", published in International Research Journal of modernisation of Engineering Technology, Vol. 3, Issue 5, pp 61-65.

4. Gupta, Parveen Kumar et al (2013). " A comparative analysis of temporal data models", published in International Journal of Advanced Computational Engineering and Networking.

"Deep learning will create a new set of hot jobs in the next 5 years" – Dave Waters

IOT and Personal data protection

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INTRODUCTION

Nowadays, there is a massive quantity of data accessible to share with customers, gather data, send data to engage with companies, and collect vast amounts of data for other parties. Smart phones that communicate with other smart phones, linked medical equipment, social networks, smart home gadgets, and more examples abound. Connected gadgets damage our capacity to distinguish between these connections and those we choose. The expanding number of Internet of Things (IoT) initiatives, devices, and solutions is having a major influence on the privacy and security of our personal data as well as someone else's data.

The Internet of Things (IoT) and cloud computing are two topics that have attracted the interest of numerous governments throughout the world. This has resulted in a slew of guidelines, rules, and non-binding suggestions, but little meaningful action from the central and federal governments. Simply described, the Internet of Things (IoT) is the process of building physical items that are implanted with sensors, software, and electrical connectivity to establish a worldwide network of physical objects that exchange data and information with one another and with the environment around them. IoT promises a world of linked devices and services that exist not only in the physical world but also in the cloud. This means that it is subject to the same security measures as IPv4 (Internet Protocol version 4). One of the major techniques of standards-based IoT communication technologies in the Internet and other packet-switched networks), but the fact that all physical worlds would be linked to IPv4 has raised a number of security issues.

APPLICATIONS OF IOT

The Internet of Things, or IOT, is a system of interrelated computing bias, mechanical and digital machines, objects, creatures or people that are handed with unique identifiers(UIDs) and the capability to transfer data over a network without taking mortal- to- mortal or mortal- to- computer commerce. In a nutshell, It's the conception of connecting any device (so long as it has an on/ off switch) to the Internet and to other connected bias. The IOT is a giant network of connected environmental effects and people – all of which collect and partake data about the way they're used. That includes an exceptional objects of all shapes and sizes – from smart microwave, which automatically cook your food for the right period of time, to tone- driving automobiles, whose complex detectors descry objects in their path, to wearable fitness bias that measure your heart rate and the number of way you've taken that day, also use that information to suggest exercise plans acclimatized to you. There are indeed connected footballs that can track how far and presto they're thrown and record those statistics via an app for unborn training purposes. These bias range from ordinary household objects to sophisticated artificial tools. With further than 7 billion connected IOT bias moment, experts are awaiting this number to grow to 10 billion by 2020 and 22 billion by 2025.

IMPLEMENTATION OF IOT IN OUR LIFE

The Internet of Things enables people to live, work and take full control of their lives smarter. IoT isn't just

about providing smart devices for home automation, it's essential for businesses.

IoT will give companies real-time visibility into how their systems are performing, giving them insights into everything from machine performance to supply chain and logistics operations.

Businesses may automate procedures and cut labour costs thanks to IoT. It also reduces waste, improves service delivery, makes the manufacturing and delivery of goods more cost-effective, and provides transparency in customer transactions. There are important additives in each IoT system, certainly considered one among them is the Sensor Networks which include low-power, dependable sensors that display the surroundings and file the required records. Then there may be Smart Control that's able to handle the records and supply beneficial offerings to the users.

 One of the maximum extremely good programs of IoT is Smart domestic and security. With sensors like thermostats, movement sensors, or brightness and humidity detectors embedded in family home equipment and linked to a Smart Control hub, you may display and manage miscellaneous gadgets simultaneously.

Challenges faced while implementing IOT

1. ***ROI Challenge -*** Identifying Initiative Impact
2. ***Change Management Challenge -*** Putting People at the Centre
3. ***Cyber security Challenge-*** Balancing Cyber Risk and Fear with IOT Benefits
4. ***Asset management challenges-*** connection of dots between challenges

INFORMATION SECURITY AND INFORMATION PRIVACY

Information security also known as InfoSec protects the information and information systems from unauthorized access, transformation and destruction both while it's being stored and when it's been delivered from one machine or physical location to another. On the other hand, information privacy compliance with data protection laws and regulations. It focuses on how to compile, process, transmit and delete information.

Security can be obtained without privacy but that is not the case with privacy as it cannot be achieved without security. Information security executes a set of regulations and protocols to provide confidentiality, integrity and availability of information assets. Confidentiality makes sure that the information being stored is safe from unauthorized access. Integrity ensures that information is credible whereas availability ensures that information is available and ready to
use when needed. Privacy like security is important as it prevents information leaks. However, whereas security is concerned with information leaks caused by data violations, privacy is concerned with personal data rights in terms of how information is compiled, utilized and maintained as well as who can access it.

In simple words, information security safeguards a company's sensitive information such as employee information, financial
information and customer records whereas information privacy safeguards people's right to manage their personal information.

DATA PROTECTION IN IOT

From a manufacturer's perspective, we facilitate compliance with regulatory requirements and standards for personal data security and protection, including: B. General Data Protection Regulation (GDPR) and ePrivacy Regulation. These laws oblige his IoT manufacturer to provide users with detailed and comprehensive information about the data collected and processed.
 In addition, securing machine-to-machine communication is also important (except for the application layer). Addresses classified as electronic communication services by the e-Privacy Regulation. Therefore, the user's consent is required when transferring data from one IoT device to his other IoT device. In addition to legal issues, criminals may try to break into systems using increasingly sophisticated

techniques, which also require constant system updates.

Authentication mechanisms such as two-factor authentication, digital certificates, and biometrics should be implemented on multi-user her devices. Data encryption and the use of API security methods should become the norm to protect user privacy and prevent intruders.

Your device is password protected. please confirm. If you can. Protect smartphones and PCs used to control IoT systems from cybersecurity threats used to access and interact with IoT devices.

Keep your device up to date, update your firmware and software regularly, and use strong security software. Buy your device from a reputable manufacturer and read the manual carefully to understand how secure the device is, the security threats it can pose, and the types of information it collects.

CONCLUSION

Overall, it is obvious that the idea and operation of the Internet of Things are relatively young and immature, with few functional and efficient legislative requirements for its control and prosecution of offenders. It is also clear that new legislative norms and laws should be implemented, but the delicate balance between personal data protection and totalitarian-like control that law enforcement agencies and corrupt governments may impose should be carefully maintained and safeguarded. We are hopeful that policymakers and stakeholders will launch dialogues and laws to secure consumers' IoT by

defining best practices to improve cyber security for IoT customers.

The code of conduct is part of the department's best practices and safety standards, which were released last year. The department is also driving the establishment of a worldwide focus on IoT security to aid in the development and implementation of security standards for IoT devices. The Internet of Things (IoT) and the security problems it presents, as well as the need to progress in defining and implementing security standards for IoT devices and services in a safe, secure, and transparent way.

REFERENCES

1. https://www.speranzainc.com/iot-and-personal-data-protection-the-ultimate-guide/

2. https://dmexco.com/stories/how-the-iot-is-challenging-data-protection/

3. https://securityintelligence.com/data-protection-in-the-internet-of-things/

4. internet of things (IOT): data security and privacy concerns under the general data protection regulation (GDPR) OLUMIDE BABALOLA school of law, university of reading, white knights, reading, united kingdom

5. https://www.speranzainc.com/iot-and-personal-data-protection-the-ultimate-guide/

"IOT without security = Internet of Threats"
- Stephane Nappo

Scalable and Automated Machine Learning

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INTRODUCTION

Scalable machine learning applications are those that can process large amounts of data and carry out numerous calculations. It is used in scaling ML models to handle massive data sets and perform computation in cost-efficient and time saving way.

Scalability can be achieved by combining statistics. Machine Learning and Data Mining into flexible, scalable and non-parametric techniques.

Its benefits towards organization are scaled productivity, better automation, enhanced modularization and cost-efficient.

Whereas, automated machine learning refers to automation of machine learning. It allows data scientists, analysts and developers to build ML models with high scale efficiency and productivity. It enables business users to implement machine learning solutions with ease and allows an organization's data scientists to focus on more complex problems.

1. Challenges in achieving ML scalability:

1) Data complexities.
2) ML system engineering.
3) Integration is typical.
4) Collaboration issues.
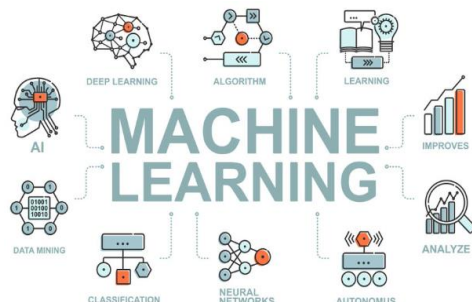
Although there are many other potential approaches to uncover these patterns, machine learning generally refers to any model used to find patterns in data, usually to produce a prediction or classification. Various machine learning architectures may be created to fit a wide range of tasks, including supervised, unsupervised, and reinforcement learning tasks, as was discussed in the last piece in this series. Each of these methods is appropriate for the analyst's specific goals, whether they are to anticipate a value or categorization, identify natural groups within particular data, or develop a practical plan of action for a challenging assignment.

Creating a system that can operate over numerous nodes is a difficulty with scalable machine learning. Scalable machine learning also includes making distributed architectures compatible with machine learning.

2. Traditional ML pipeline:

An ML pipeline, by allowing data to be processed and correlated into a model that can then be evaluated to provide outputs, is one way to automate the machine learning workflow. With the help of our ML pipeline, data entry into the ML model is totally automated.

The technique of dividing up your machine learning operations into separate, reusable, modular components that can then be pipelined together to generate models is another form of ML pipeline. By eliminating unnecessary effort, this sort of ML pipeline streamlines and improves the efficiency of model construction.

2.1 *Why is it important?*

In a mainstream system design, all of these tasks

would be run together in a monolith. This means the same script will extract the data, clean and prepare it, model it, and deploy it. Since machine learning models usually consist of far less code than other software applications, the approach to keep all of the assets in one place makes sense.

However, when trying to scale a monolithic architecture, three significant problems arise:

Volume: Even if the first stages of ingestion and preparation are identical, running the entire workflow twice is necessary when releasing several versions of the same model.

Variety: It is inefficient and a terrible indicator in software development to have to copy and paste code from earlier in the workflow when you grow your model portfolio.

Versioning: You will have to manually update all of the scripts if the configuration of a data source or other frequently used component of your workflow changes, which takes time and leaves possibility for mistake.

There are many steps involved in it:
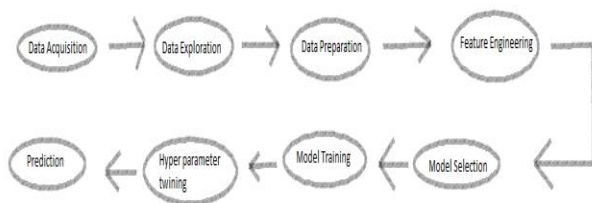
Automated ML helps to skip all these processes:

3. Which type of architecture supports machine learning?

3.1 Containers:

For the provision of an adaptable and mobile machine learning infrastructure, containers are essential. Machine learning tasks may be distributed among various computer resources using containers. Therefore, you may allocate any resource—GPU, cloud GPU, accelerators, etc.—to any job. You may spread work across all of your available resources by using containers. Because it offers a more portable and flexible approach to handle workloads, it's perfect for DevOps engineers.

3.2 Orchestration:

You must construct orchestration tools that are independent of computational resources. There are several variations of Kubernetes, despite the fact that it is quickly becoming the norm for orchestration and machine learning deployment. There is Vanilla Kubernetes, Rancher, and Open Shift. For smaller installations, there are additional MicroK8 and Mini Kube options. Therefore, you must select what sort of orchestration platform you want to support both now and in the future while creating your own infrastructure. Therefore, you must be able to build the stack such that it works with your current infrastructure while also taking future infrastructure requirements into account.

3.3 Agnostic and open infrastructure:

Because machine learning is evolving so quickly, flexibility and the ability to simply expand your basic platform are essential. Therefore, you must create your machine learning infrastructure in a way that makes it simple for you to enhance it. This implies that you may simply incorporate new technologies, operators, and platforms without having to completely change your infrastructure. If there is one thing you learn about machine learning infrastructure from this tutorial, it should be to choose your technologies wisely and make sure they are scalable and agnostic. This will enable you to swiftly accept new operators and technologies as they emerge.

Google has launched many auto ML products on its cloud platform.

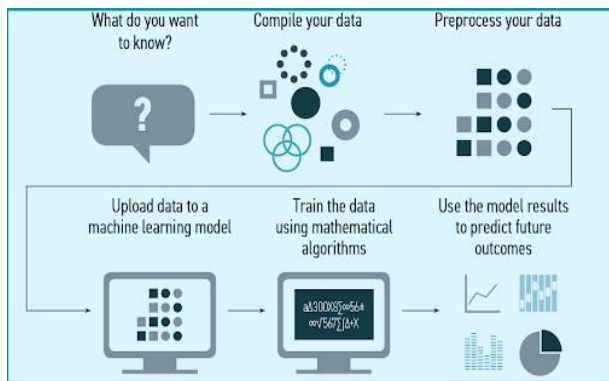- ▪ For images Google has launched Auto ML vision.

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- If we want to deal with text google has auto ML natural language.
- It has also launched auto ML table to handle tabular structured data.

All these Auto ML will automatically build a production which is ready and scalable.
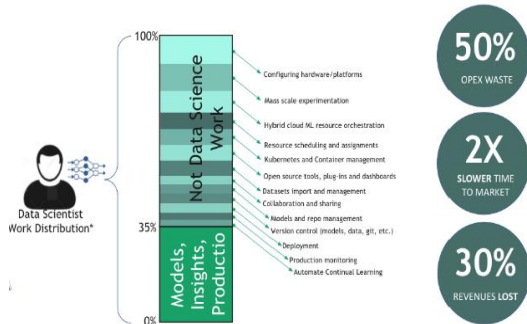
What is the future of machine learning infrastructure?

Having data in your machine learning infrastructure opens the door to endless opportunities. Once the data is collected, you can have very advanced statistics and even develop recommendations or what we like to call intelligent planning. With intelligent scheduling, instead of data scientists defining their own computation, the data can recommend an optimized allocation for a given workload. For example, your data scientist might start a workload and based on previous runs recommend that you use two GPUs for it. Or even recommend hyper-parameters/meta learning. You may receive a recommendation that you should increase the batch size based on previous runs because the GPU memory was very, very low. So maybe increasing the batch size would help make better use of the GPU. The future of machine learning data infrastructure is rich in the right data.

References:

https://cnvrg.io/building-scalable-machine-learning-infrastructure/
https://bipartisanpolicy.org/explainer/complexity-in-machine-learning/

"Machine learning is the last invention that humanity will ever need" - Nick Bostrom

Unleashing the Augmented Reality Non-fungible Token and the Metaverse

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INTRODUCTION

There is much to talk about augmented reality in the present day scenario in the context of wide usage of web 3.0 and metaverse. Augmented reality supplements information to what is being displayed by superimposing it over what you see in the real world. Worth mentioning is the fact that augmented reality enhances the real-world experiences as it aims to enhance customer experience. As smart devices become increasingly accessible, customers can also enjoy more practical and secure shopping experiences

In Augmented reality (AR), Virtual Reality (VR) and non-fungible tokens (NFT) are helpful in transforming experiences and content into verifiable assets. By implementing blockchain technology, it will be easier to buy, sell and access them. With the development of NFT standards, stakeholders and collaborators can start creating more complex agreements.

Augmented Reality is a view of the physical world in which all the elements are enhanced by computer-generated inputs. These inputs can be sound, video, images, digital art, digital assets overlaid on GPS, and more. Augmented Reality is achieved through a variety of technological innovations. The creation of augmented reality requires a variety of technological innovations, which can be implemented individually or in conjunction with General hardware components. An AR device typically contains a processor, a display, accelerometers, GPS, camera, a microphone and other components as well as all the hardware required to be a mobile device. According to Jessica Lowry, who writes for the Next web, augmented reality is the future of social life and human interaction.

Non-fungible Token (NFT) is a digital asset that represents real world object such as artwork music, in game items and videos. NFTs are often bought and sold online with cryptocurrency and they generally run on the same underlying software as other cryptocurrencies. It is important to note that NFT's are also often one of a kind or of a very limited run with unique identifying codes. Accordingly, NFTs create a sense of scarcity within the digital world. The underlying technology behind NFTs is the blockchain which is a distributed public ledger that records transactions. You might know it as the underlying technology behind cryptocurrencies such as bitcoin and Ethereum. NFTs are typically held on the Ethereum blockchain, although other blockchains support them as well. An NFT is created, or "minted" from digital objects that represent both tangible and intangible items.

Role of AR in NFT and Metaverse

AR and VR are keys to providing a more immersive experience in the metaverse. Through augmented reality, you can connect the real world with the Metaverse. AR exists on top of our physical world by allowing users to see the actual environment through the screens of their phones/ tablets or by using smart

glasses and making virtual changes to it on the screen. Some Application of Metaverse:

- **POKEMON GO:** It was huge when came in the market and is still popular and that's why it is the most well-known example of AR. The task in the game is to catch the characters "POKEMON" virtually present in the surroundings.
- **SNAPCHAT:** Another famous example is Snapchat, it has numerous filters created with Artificial Intelligence by detecting the user's face d it gets imposed on the face with the help of २. The filter turn users into a cat, a funny character, who can have animal ears above their heads and a lot more.
- **IKEA:** An app is built named "Ikea place" allows customers to examine how the specific furniture would look at their place.
- **LENSKART:** It also helps users visualize how the frame would look on them when buying online.

In the NFT block, whether the body or an overlaying digital object in our environment AR has the power to enrich our real world in creative and meaningful ways, allowing creators to add depth and context to any digital artwork. AR when combined with NFT can bridge the gap between the physical world and the virtual world. With AR and NFT combined, we can even create real land and turn it into a virtual property.
Some Applications of NFT are:

- **Pak: "The Merge"**
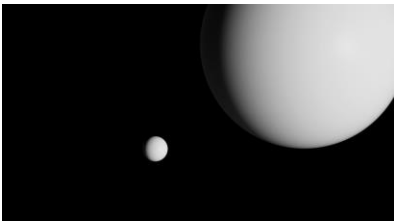
- **Beeple: "Everydays: The First 5000 Days"**

If you want a next level experience of the metaverse you will need few devices like Virtual reality headset and the most popular one is Meta Quest 2 and Oculus Touch Controller basically a joystick.
There are a lot of different metaverse to choose from. Here's a list of popular metaverse platforms you can use:

- Horizon Worlds
- Roblox
- Fortnite
- Decentraland
- The Sandbox

Impact of NFTs on Metaverse

Trader and consumer can transfer real-world services and fortune into a decentralized virtual atmosphere called the metaverse. One strategy to bring further fortune from the real world into the metaverse is through new gaming models that are interoperable with blockchain-based games.

A pay-to-play game model is just one strategy that not just is engaging, but also empowers players in blockchain-based games. Using NFTs, players are capable to be part of economic in-game financial markets in the metaverse. They can also earn prize points for the value they bring to the table, earning money while playing. These games are suitable in the virtual world since players own 100 of their fortune, rather than being under one game object's control as in most traditional games.

However, players can acquire and transfer into different gaming atmospheres to use, if you're thinking of how to participate in these in-game economics and finance NFT's IGO (Initial Game Offering) releases give a range of gaming-related in-game means that are part of gaming programs. These in-game NFTs are largely sought-after, as verified by the response to IGO launches, in which the majority

of NFTs have been sold before the moment they dropped.

Metaverses are virtual 3D worlds that offer users and businesses big opportunities to transfer real-world fortune as well as services. NFTs serve as the bridge to the metaverse and help article in the creation of identity, community, and social experiences within the metaverse.

Metaverse are an unrestricted and fair economic system that is backed by blockchain. To begin with, players can gather in-game NFTs by using the IGO collections of Finance NFT to gain access to the gaming metaverse.

With the applications for NFTs quickly expanding and gaining instigation, these digital fortunes are bringing the dawn of a new age in the digital realm – the Metaverse. It's appearance universally is good demonstrated through Facebook's Meta which signals the transition toward a metaverse age, which is where NFT-based augmented experiences are anticipated to serve as the foundations of upcoming social networks.

Metaverse and NFTs are connected, particularly in blockchain gaming as well as other interoperable games in which they assume the positions of value-adjusters of the vast social media platforms. Although the concept isn't new, NFT gaming is popular and is noticeable in the most recent action that Finance NFT has launched its IGO. This gaming platform has been so well collected by crypto admirers and gamers that it has surpassed $16 million in trading volume within a matter of two weeks, and all IGO's NFT collections are entirely depleted.

NFTs and the Metaverse: how do we create them?

AR NFTs has helped bring brands, creators, and other users together across many industries. The most dynamic of these is the "Metaverse". It is estimated that by 2026, 25% of the world's population will spend at least one hour a day engaged in activities related to the metaverse. These digital activities include shopping, collaboration, playing games, education and social networking. It's now possible to collect, create, and trade AR NFTs across a wide range of metaverse, such as decentralized lands, avatars, skins, virtual clothes, etc. Here are the steps needed to create an AR NFT.

1. *Identify your goals:* Just like selling a painting at an art gallery, the goal is to create a unique piece of digital media.

2. *Choosing a blockchain:* Your NFT will be recorded on network called blockchain, so it's wise to choose one that matches your needs. Ethereum is the most popular blockchain for NFTs, hosting thousands of collections. As an alternative to Ethereum, Solana is a faster, lower-cost platform. This is a PoS(proof-of-stake) blockchain designed for decentralized games and NFTs.

3. *Get your NFT wallet set up:* After choosing a blockchain, you'll need a digital wallet. Wallet apps like MetaMask, Coinbase Wallet, and Ledger Nano X support multiple blockchains.

4. *Choosing the right NFT platform:* There are a number of NFT platforms out there that let you create NFTs, but the most effective ones include a comprehensive marketplace for listing and selling NFTs. OpenSea, Solanart, and Crypto exchanges are some of the most popular NFT platforms.

5. *Creating the NFT:* "Minting" is the process of creating NFTs. A digital object is transformed into a blockchain asset through this process. Using any 3D graphical tool like Blender or Maya, you can create NFT and then 'mint' it. NFT platforms are used for this. These include Rarible, Mintable, and OpenSea.

6. *Listing NFT for sale:* In most NFT platforms, listing an NFT for sale is free. Using the "sell" button on the platform of your choice, you can choose how long you want the sale to last, what price you wish to list your NFT at, and how much you wish to sell it for. An AR asset

becomes NFT once it is uploaded to the platform and given a unique token.

NFT uses in Metaverse

The NFT vs metaverse contrast might also point to the extraordinary examples of non-fungible tokens in tune and paintings. A top level view of the examples of NFTs ought to offer a better impact of the way they're extraordinary from the metaverse. You can observe a number of the famous examples of NFTs, which include the Crypto Punks and BAYC NFTs.

Bored Apes are a large hit amongst celebrities as they may be gaining reputation because the most interesting profile photos at the internet. Similarly, other use cases of NFTs imply a representation of possession over bodily belongings. The awesome trends of the NFTs assist their exceptional use cases. While you buy an NFT, you obtain the ownership certificates for the asset it represents.

NFTs are normally related to websites and transactions that arise via web browsers, and due to the fact the metaverse is often VR-based, there is probably a few confusion about what their not unusual floor is — and whether or not there's any within the first location. Happily, despite the relative novelty of each principles, numerous businesses have already determined creative and fruitful ways to apply both concurrently.

1. *Digital marketplace:* With apps like VR Chat, areas for communique in VR are already thriving, and it isn't always a big jump to anticipate that these spaces also can serve as a fertile trading ground for NFTs. dealers can easily provide hyperlinks and previews to assets on the internet or mint belongings directly in the VR panorama.

2. *Artwork gallery:* VR is possibly the exceptional possible platform (short of an real brick-and-mortar constructing) for viewing artwork. You get to peer it up close with each detail and from every attitude. This type of answer differs from a marketplace due to the fact the fees are already set (and now not negotiated), the assets are all of 1 kind (artwork compositions) and the ecosystem is a lot greater comfy.

Example: Many museums are presently putting NFT paintings in metaverse together with Cryptovoxels, powered via the Ethereum blockchain. In step with "The art Newspaper", Cryptovoxels hosts "art galleries and museums, along with the San Francisco Museum of contemporary art and the FC Francisco Carolinum Linz, Austria."

New frontiers: Real property can be a quite beneficial enterprise to work in inside the bodily world, and the equal may want to observe to the metaverse. We aren't referring to real homes being offered digitally however alternatively digital land and territories being partly or absolutely bought for similarly person improvement.

Drawback of AR NFTs

1. NFTs are often difficult to trade because of their volatility and lack of liquidity. The market for NFTs is largely unknown, and the number of potential buyer and sellers is small. This means that prices can be highly volatile, making it difficult to trade NFTs.
2. NFTs can be used to perpetuate fraud. In recent months, a number of artists have taken to social media to express their shock and dismay at discovering their work being sold without their consent as NFTs on online marketplaces.
3. The process of creating blockchain records takes a significant amount of computing energy, and there's a growing debate around the long-term harm the process is causing the environment.
4. NFTs are not a reliable source of income like dividend-paying stocks, interest-bearing bonds or rent-generating real estate. Unlike these more traditional investments, the returns associated with NFTs are based entirely on price appreciation.

Drawback of Metaverse

1. The metaverse brings many new and advanced technologies such as VR headsets, haptics, blockchain, and other requirements. It is true, however, that not every individual on this planet has access to advanced technologies. For example, In order to participate in the

metaverse, for instance, fast internet connectivity is required.

2. Many of the users on the internet have questioned the safety and security concerns of metaverse. However, these concerns can be addressed by using the latest technologies. For example, blockchain technology can be used to create transparent and secure transactions.

Conclusion

This article explains about the role, impact and uses of AR in NFT and metaverse including how to create them along with it's consequences. Technology provides innovative ways of doing work with innovative means. Augmented Reality connects the real-world to the metaverse and when combined with NFTs brings new era of technology.

References:

1. Weng, C., Otanga, S., Christianto, S. M., & Chu, R. J. C. (2020). Enhancing students' biology learning by using augmented reality as a learning supplement. Journal of Educational Computing Research, 58(4), 747-770.

2. Chylinski, M., Heller, J., Hilken, T., Keeling, D. I., Mahr, D., & de Ruyter, K. (2020). Augmented reality marketing: A technology-enabled approach to situated customer experience. Australasian Marketing Journal (AMJ), 28(4), 374-384.

3. https://en.wikipedia.org/wiki/Non-fungible_token

4. https://www.techtarget.com/whatis/feature/The-metaverse-explained-Everything-you-need-to-know.

"With the meta verse we are transitioning from viewing a 2D world looking at the internet to living inside the internet in a 3D world" - Dave Waters

Alexa Development

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History of Alexa

If you're looking for some fun game to play on your amazon alexa device you're lucky. There are a variety of games available from card games to trivia contests. Some of the more popular games include Quizup, and trival purist.

Alexa is a virtual assistant technology developed by Amazon based largely on Ivona, a Polish speech synthesizer bought by Amazon in 2013.

Alexa was developed out of a predecessor named ivona which was invented in Poland. Alexa was inspired by computer voice and conversational system on board the starship enterprise in science fiction tv series and movie.

It was announced in November 2014 that Amazon was bringing Alexa to the Echo. In order to enhance recognition with greater precision, Amazon developers chose Alexa because it has a hard consonant with the X. According to them, the name is reminiscent of the Library of Alexandria, which Amazon Alexa Internet uses in the same way.

Earlier in 2015, Amazon introduced the Alexa Fund, a program which invests in companies that make voice control technology and skills.

There are a number of pre-set functions functions Amazon Alexa can perform out of the box such as setting timers, sharing weather information, creating lists, and accessing Wikipedia articles.

Alexa responds to your question or command by performing the appropriate skill or function. Alexa converts sound waves into text to answer question by gathering information from multiple sources.

Phones and tablets can connects to Alexa and play music from streaming services like Apple Music and Google Play Music. According to Alexa's support page, only English, German, French, Italian, Spanish, Portuguese, Japanese, and Hindi are supported. The user can also enable third-party skills to enable Alexa to perform additional functions. A couple of the most popular Alexa skills in 2022 "Question of the Day" and National Geographic Geo Quiz. And **Rohit prasand** the creator of alexa.

Working of Alexa

The main challenge while developing Alexa was if it will be able to improve the target signal i.e being able to identify surrounding noises like traffic and television. For this this issue, over seven microphones are used to identify the voice which is giving the instructions.

The next issue was that how will Alexa know when somebody is instructing it? The team came up with 'Wake Word Detection'. Whenever the wake word would be detected, Alexa would start converting the speech to text format. Alexa uses frequency and pitch of the user to understand the instructions.

Alexa is built using NLP. NLP stands for Natural Language Processing. NLP is a mixture of artificial intelligence and computational linguistics which handles communication between machines and human languages.

The steps for Alexa's working are as follows -

- It first records your speech. The recording is then sent to Amazon's servers to be analysed more efficiently.
- It breaks down what we said into fragements. Then it follows a database containing various words and pronunciations.

- It identifies the key words to make sense of what we have said and the task we wish to accomplish.
- Amazon's servers send back the response through which Alexa responds to us.

Alexa in use

- Alexa lets you control your music playback from anywhere, you can ask Alexa to play music of your choice from any music account or any other streaming service.

- Alexa helps our everyday life running smoothly as there are few Alexa skill like for timers timer skill for maintain daily routine , timed event and for good time management. For alarms, there's the Alarm skill, This skill lets you create custom alarms with different sounds and vibration patterns, which help to manage our daily routine.

- Alexa lets us to know sport scores as when we ask "what the score of the Indian team". Alexa easily update you score for your favorite team and sports.

- Alexa tells us about day -today news or gives news briefing ,tells us top highlights of the news.

- Alexa helps in giving weather updates for your current location, so Alexa helps in weather forecasting.

- Alexa helps in calendar management as Alexa helps to keep track of our commitments and plans by manage your calendar using voice commands.

- Alexa lets us to watch our favourite T. V. Shows, movies right from the comfort of your own home .

Alexa Devices

Architecture of Alexa
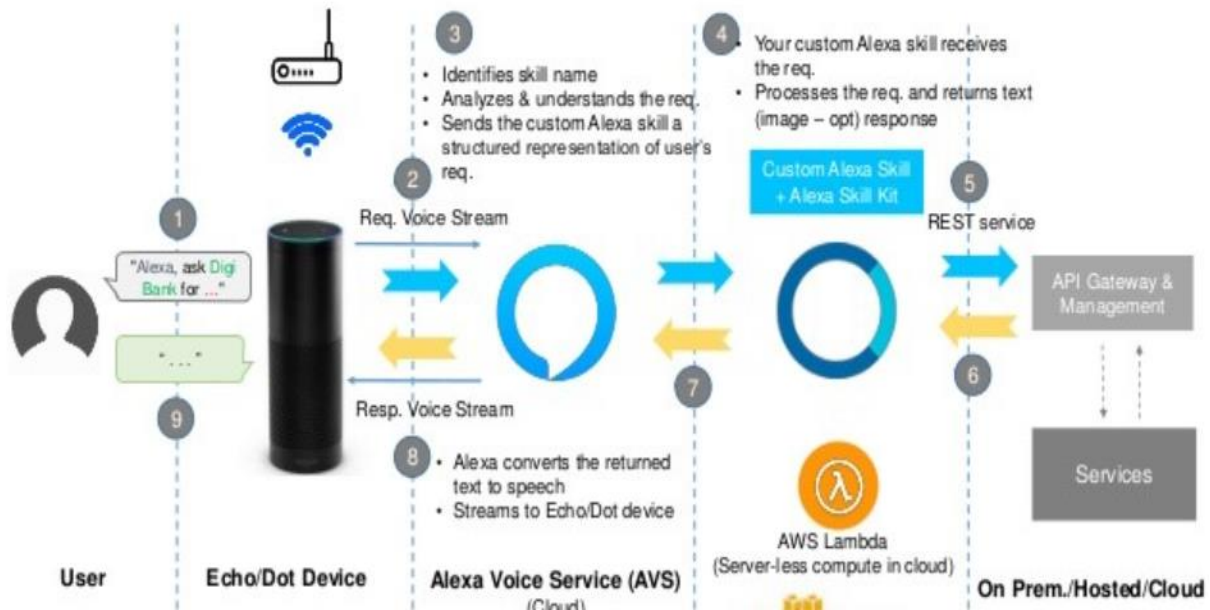
References:

1. Lopatovska and H. Oropeza, "User interactions with 'Alexa' in public academic space," Proc. Assoc. Inf. Sci. Technol., vol. 55, no. 1, pp. 309–318, Jan. 2018.

2. K. Pollmann, C. Ruff, K. Vetter, and G. Zimmermann, "Robot vs. voice assistant: Is playing with pepper more fun than playing with alexa?," in ACM/IEEE International Conference on Human-Robot Interaction, 2020, pp. 395–397.

3. I. Lopatovska, "Personality dimensions of intelligent personal assistants," in CHIIR 2020 - Proceedings of the 2020 Conference on Human Information Interaction and Retrieval, 2020, pp. 333–337.

4. Amazon developer website, https://developer.amazon.com/alexa

5. A. Hidalgo-Paniagua, A. Millan-Alcaide, J. P. Bandera, and A. Bandera, Integration of the Alexa Assistant as a Voice Interface for Robotics Platforms, vol. 1093 AISC. 2020.

6. M. Jesús-Azabal, J. A. Medina-Rodríguez, J. Durán-García, and D. García-Pérez, Remembranza pills: Using alexa to remind the daily medicine doses to elderly, vol. 1185 CCIS. 2020.

"If you think technology can solve your security problems, then you don't understand the problem and you don't understand the technology" –Bruce Schneier

Datafication

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Datafication: Opportunity or Problem

Data is the result of outcome produced as we talk over phone, send textual message, withdraw money, watch video etc. Datafication refers to obtaining the data from a source and this data may be compared, quantified or measured. New technologies may be used to visualize the data and obtain perception about the things in the world in a better way.

Defining Datafication

Datafication is a very commonly term used these days. Today, datafication has resulted in the emerging of Big Data. These days all the real-life events, thoughts are being transformed to data. This is known as datafication. This data is further analyzed and may be used for research or future prediction or generating statistics. The company use the data to draw conclusions using data science. The word data is derived from a latin word meaning raw facts and figures. It is a set of information from which inferences may be drawn. Datafication is important for big organization as well as companies that wish to compete with their counterparts in the market. For investors to stay ahead in the market, they need a competitive edge. They need a method that brings in a consistent flow of new investment opportunities that are of high quality. Datafication is essentially when a company organizes all of the information it has gathered on its customers in a way that allows the company to draw conclusions using data science. It could also allow them to sell the information to third parties. In essence, datafication is dehumanization and unfavorable data (e.g., human lives) are in some cases already judged as undesirable. The extreme consequences that can result are potentially very dangerous: genocide by robots, enormous social unrest, huge inequality, and so on.

Now for the cons of datafication process it may require huge amount of resources like servers to process and store that data not to mention the amount of time it will take to filler out the unnecessary data. Datafication processes may not be carried by all kind of computers. The early computers are very slow in processing or computing.

As datafication has become very popular and as it has impacted lives of people immensely, it is very conducive to understand the development of novice frameworks for datafication for growth at personal level and organizational level.

Revolutionary Aspect

Datafication has revolutionized the world in many ways that one can never dreamt off. Large data resulting from personal, banking, organization information require storage. Database software is required for storing the essential data, and analytics tools is needed for producing meaningful information from businesses. Data management and data analysis technologies provide tools to identify different patterns, relationships, and trends in a political, economic, and social environment.

With the abundant availability of data, organizations need skilled personnel who can efficiently manage and analyze and be able to draw useful conclusions or inferences out of it. The emergence of data and datafication would lead to growth of jobs in sectors such as data management, data analytics, data infrastructure etc. According to Gartner, a renowned firm, around 4.4 million jobs is expected to be opened in the field of data analysis with the explosion of big data. Companies require skilled manpower who are capable of performing data collection, data storage and perform analysis and generate useful results.

Applications of Datafication

Datafication is crucial for big organization and companies that want to stay competent in the market. For investors to stay ahead in the market, they need a competitive edge. They need a methodthat brings in a consistent flow of new investment opportunities that are of high quality. Datafication is essentially when a company organizes all of the information it has gathered on its customers in a way that allows the company to draw conclusions using data science. It could also allow them to sellthe information to third parties. In essence, datafication is dehumanization and unfavorable data (e.g., human lives) are in some cases already judged as undesirable. The extreme consequences that can result are potentially very dangerous: genocide by robots, enormous social unrest, huge inequality, and so on.

Datafication has many conducive applications in the following areas:

- *Banking*: It involves maintaining data of people involved in paying their loan back to bank.
- *Insurance*: It involves building up of business models as well as maintaining risk profiles of individual policy holders.
- *Hiring and recruitment:* It involves maintaining data required for hiring purpose.
- *Human resources*: It involves maintaining data of individual employees
- *Social science research:* Datafication may be used for sentiment analysis or analyzing data to draw conclusion.

Datafication performs replacement of restructures as well as sampling techniques required in a social science research. Data is vital in almost all sectors of capitalism. Industries focused on technology, infrastructure, Datafication is not just involved in building up of information, rather analysing the digital information for the economic gain. This process has major social consequences.

A Real-World Case Study

1. *NETFLIX CASE*

Netflix, a popular internet streaming methodology, may be considered as an excellent example of datafication. Netflix is being used in approximately more than 40 countries and has nearly 33 million streaming members. Initially, Netflix applications were physical in nature and was restricted to its business in disc rental (DVD and Blu-ray). In its operating model, the subscriber performs creation of queue in an ordered list of media content that they wish to lend and manage this queue. If there is a limit, the contents may be piled up as the subscriber wish lists. For the purpose of renting the disk, once the subscriber returns the disk to the Netflix, it is then given to the next subscriber desiring to get the disk. In this way, disk rental was successfully achieved by Netflix. Netflix truly follows datafication process. Video streaming was started by Netflix in 2007. Netflix was then also devoted on collection of data, its storage and then analysis of data. Netflix was involved in achieving heights in terms of data logistics and data analytics. In 2016, they were successful in achieving 94 million subscribers and in 2018, Netflix was successful in achieving 100 million subscribers.

Video streaming consumption in Netflix is 37% of downstream Internet bandwidth. They have a recommender-based system that performs analysis of customer's individual choice of videos and then shows related videos in suggestions based on their previous searches and likes.

Content based recommendation system is being used by Netflix to draw useful conclusions. Netflix House of Cards, began on February 1, 2013, and was officially licensed by Netflix. Based on the data analysis is performed by Netflix,they checked who are the viewers who have liked The House of Cards were fan of renowned Kevin films and it had liking for the movies which were directed by David Flincher. Netflix have algorithm based on prediction and understanding the user preference. Data analytics has resulted in Netflix firm become a sole leader among its competitors in the market.

Conclusion

Datafication has become a part and parcel of our lives these days. With the growth of big data and advancement in Information Technology, there is a need to capture the data and draw useful inferences from these data for future advancement and betterment both at personal and organizational level. In this paper, we have discussed in detail the importance of data, data management, data storage, data analysis and hence datafication. Steps must be taken to develop new technologies

and frameworks to support datafication and achieve success heights in Information Technology.

References

[1]. Mejias, Ulises A., and Nick Couldry. "Datafication." Internet Policy Review 8.4 (2019).

[2]. Lycett, Mark. "'Datafication': making sense of (big) data in a complex world." European Journal of Information Systems 22.4 (2013): 381-386.

[3]. Jarke, Juliane, and Andreas Breiter. "The datafication of education." Learning, Media and Technology 44.1 (2019): 1-6.

[4]. Van Dijck, José. "Datafication, dataism and dataveillance: Big Data between scientific paradigm and ideology." Surveillance & society 12.2 (2014): 197-208.

[5]. Mai, Jens-Erik. "Big data privacy: The datafication of personal information." The Information Society 32.3 (2016): 192-19

"Data Has a Better Idea"

Next Generation Secure Computing Base

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INTRODUCTION

In this generation of technology, we all are fully exposed to the internet, we are surfing different kinds of websites, and applications, we are doing our financial transactions through this network, and it is making our life easy but there are some people who are using these networks to intrude these machines and stealing the data from those machines. Companies began implementing the Trusted Computing Base (TCB) paradigm to establish a more secure environment. The TCB is a system component that incorporates the software and hardware components needed to administer the device system's security measures. Microsoft was a vocal proponent of Trusted Computing. Consequently, in 2002, Microsoft released NGSCB. Their version of TC was called the Next Generation Secure Computing Base.

Fig 1: curtained execution in NGSCB-enabled system.

There are two kinds of processes. One illustration is the use of insecure processes. Another is to execute secure processes. The non-secure operating system is referred to as the left-hand-sided system, whereas the secure operating system is addressed to as the

right-hand-sided system. The agent that interfaces between two separate operating systems are known as the nexus computing agent (NCA). "Only an NGSCB trusted program, NCA, may execute safely within the protected operating environment," Microsoft asserted. NGSCB makes use of a "nexus" software package that runs parallel Windows and with which software interacts, and ordinary apps and nexus-aware applications coexist on the same PC. The Trusted Computing Group's Trusted Platform Module is required by NGSCB. The SSC/TPM contains RSA and AES private keys which never exit the chip and does encryption/decryption as well as digital signature production. NGSCB facilitates system and app authentication rather than user authentication. Smart cards and other forms of user identification are still essential. NGSCB also does not support DRM (digital rights management); nevertheless, rights management systems can use the nexus module for additional security.
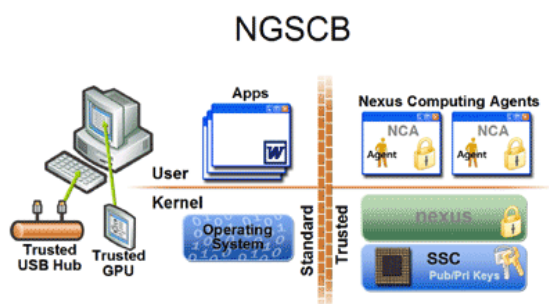
1. Why is NGSCB so important?

When someone accesses a website for the very first time using NGSCB, he will discover that the application you are referring to is the one you are looking at. Previously, when two distinct software interacted with one another for example, if you wish to do shopping online and your browser "talks" to an application on the site you visit — you had to accept the other computer's word for it that it was the system you were supposed to be interacting with. Moreover, NGSCB ensures that no viruses or malware are functioning on the computer and that the machine with whom we are interacting cannot meddle with our interactions. Whenever you purchase products available on the internet, it facilitates all manner of safe payments that were not before conceivable. We have a processor with NGSCB that enables us to send data such as our email address to an authorized application. The firm from which we are purchasing uses the information to produce a slip, which is subsequently deleted. The organization can be certain that we sent them a real email address since we utilize a reputable program. And we can rest assured that corporations will only utilize that data to provide us with the goods we want and would not exploit it.

2. Four features of NGSCB

Four features of NGSCB are given below

2.1 *Strong Process Isolation*

It functions similarly to a bank vault. The NGSCB has formed safe zones known as the "right side" and "left side." This is pretty much like the normal CPUs seen in your everyday computer. Prior to it, computers only had one left side. NGSCB protects and isolates activities conducted on the right side from those executed on the left, making them far safer against assaults. The NGSCB meets this criterion by separating specified parts of random-access memory (RAM) into addresses that authorize secure facilities that non-secure software cannot access. Furthermore, NGSCB prevents DMA gadgets from reading and writing secured data blocks.

2.2 *Sealed Storage*

Individuals can encrypt their data so that only authorized services have access to it. This might contain only the app that generated the info, or it can even include services that the person approves. This capability, often known as operating system file access controls, is aimed at safeguarding non-public NGSCB data. To maintain the security of sealed data storage, NGSCB employs a component known as the Security Support Component (SSC). SSC employs its own cryptography services, which are controlled by Nexus, the protected environment's heart. Public and private key pairs, as well as keys obtained for trusted apps and websites utilizing the Advanced Encryption Standard, are included in the services (AES). NCA encrypts data, accesses file systems, and provides storage services using these keys.

2.3 *Attestation or Cryptographic Attestation*

Notarization is like having a deed notarized. Notaries do not make judgments on the legality of documents. Simply confirm the authenticity of the signer and ensure that the signer is reading it. Attestation informs other computers that your computer is the one they are looking for and that it is running software that claimed to be that system.

This method is designed to affirm to the receiver that the information has been digitally signed by the NGSCB and is cryptographically recognized. Software certification is a strategy. Before your information is processed, you must authenticate your identification. This functionality has proven to be quite beneficial for networking apps that necessitate safe authentication before delivering data. It helps guarantee that the program you're interacting with is legitimate and not malicious.

2.4 *Secure Input and Output*

NGSCB encrypts keystrokes before they are processed by software and decrypts them when they arrive on the right side. This ensures that malicious software cannot record, steal, or change your keystrokes. Safe output follows suit. The info that appears on the screen can be delivered to the individual in such a way that it cannot be intercepted and read by anybody else.

3. Architecture

The Microsoft Next-Generation Secure Computing Base (NGSCB) is a reliable computing solution that can keep stored data concealed from unidentified

applications while also making a user's device environment (hardware and software stack) trusted by distant parties. The Next Generation Secure Computing Board (NGSCB) is a collection of new hardware and OS technologies that could be utilized to create "A trustworthy open platform."

The hardware platform must support an NGSCB system; the CPU and chipset must be upgraded to allow NGSCB capabilities, and the keyboard, mouse, video graphic card, and graphics adaptor must support encrypted data transmission. A new hardware component known as Security Support Component (SSC), or Trusted Platform Module is closely linked to the motherboard (TPM). Furthermore, the motherboard needs to be modified to accommodate the adjustments mentioned above.

Each SSC had at least one private key saved in its non-volatile memory, which never left the chip, as well as a public key certificate issued by its maker. It oversees key storage as well as encryption, decryption, and hashing services for authorized nexuses.

Some secure input devices are essential to establish a trusted route in the NGSCB system; they are utilized to deliver encrypted keystrokes and mouse movement to the NGSCB-trusted drivers or programs, and visual data from the nexus to the graphics adapter should also be secured.

In a secured operating environment, there are two basic system components.

3.1 *Nexus*

Nexus refers to a specific security kernel that serves as the heart of the secured operating system. Nexus's function is to separate the processes of regular mode and trusted mode in memory. It has the following features: Data encryption is used to authenticate and safeguard data (input, stored, transmitted, and displayed).

3.1.1 *Functions of Nexus*

Functions offered by Nexus are-

- It provides services for storing cryptographic keys as well as encrypting and decrypting data.

- Identify and verifies NCAs.
- Controls access to trustworthy programs and resources by utilizing the nexus security kernel's security reference monitor.
- Manages all key NGSCB services, such as memory management, exclusive access to device memory, secure input and output, and access to any non-NGSCB system services.

3.2 *Nexus Computing Agent (NCA)*

An NCA is a trusted software component that can be part of a program, application, or service that interacts with the Nexus while running in the trusted mode. Microsoft has also released the NCA source code, allowing software developers to create their agents to run on a trusted platform.
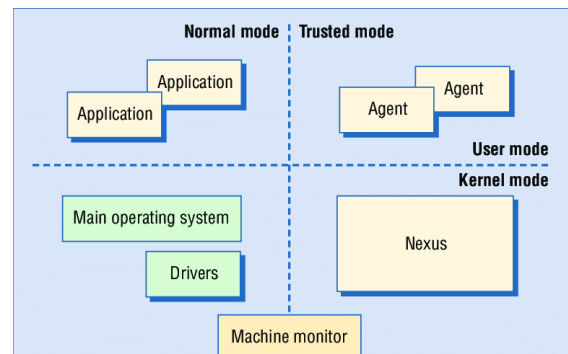

Fig 2: Overview of the NGSCB system

The monitor divides a computer into two parts: an unaltered legacy operating system on the left and a nexus, smaller security-critical system management on the right. The nexus hosts agents, which execute in a separate address space and have access to verified operation primitives. Secure user input and output may also be accessible to the nexus and its hosted agents.

4. How NGSCB works?

The fundamental aims of the NGSCB platform were security and system integrity. Memory is physically isolated from the rest of the system by the protected operating environment, making it immune to rogue applications and other software threats. When trusted code is executed in an isolated execution area, it cannot be saved or changed. Computers that support NGSCB encrypt data with computer-specific algorithms, rendering the files unusable if stolen or

secretly duplicated. This trustworthy hardware design guards against eavesdropping, spoofing, and information interception.
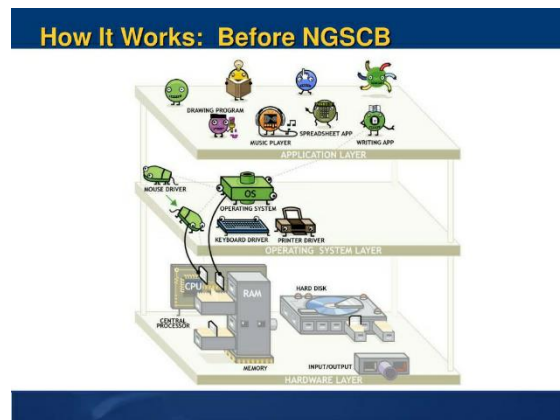

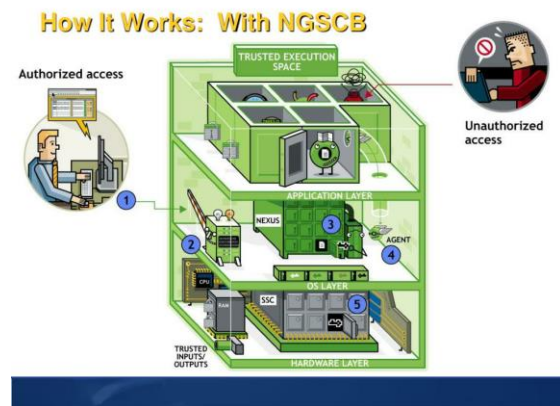**Fig 3: How processes are used to execute before NGSCB.**

Fig 4: Shows the working of NGSCB

CONCLUSION

In recent years, we have witnessed a push among users to seek out ways to protect their works from piracy in a better way, particularly because of the increased availability of digital assets over the Internet. The answer was discovered through the application of technologies targeted at improving control over digitally disseminated items. The increase in use of technology to regulate works, on the other hand, has resulted in a fundamental shift in the equilibrium that has previously existed in copyright law. Furthermore, legal norms and regulations have grown to safeguard not just the users under copyright law, but also the technology used by them.

The use of technology to preserve works, as well as the legal support for such technologies, has had various far-reaching consequences. First, the emphasis has shifted from copyright protection in works to managing and regulating access to works. This transition to access 59 controls, also applies to works where the copyright has expired or never existed. This has kept works from becoming public domain. Furthermore, the attempt to limit access to works, whether they are protected by copyright, has resulted in a disparity in the amount of protection afforded for digital items and products disseminated through more traditional ways.

REFERENCES

1. A Logical Account of NGSCB by Martin Abadi, Ted Wobber (Microsoft).

2. "The Trusted Computing and Next Generation Secured Computing Base (NGSCB)" by Jianji (Joseph) Yu Jeffrey Khuu.

3. "An Examination of Next-Generation Secure Computing Base and its Impact on Access and Control Rights" by Nora.

4. Palladium summary by Schoen Seth.

IoT and Future Internet Architecture

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INTRODUCTION

Digitization is changing the way we interact and work with each other every second. It somehow influences our behavior as well. In all of this, the Internet has played a very important role. And over time, the Internet has evolved, creating opportunities for new inventions. One such invention is the Internet of Things (IoT).

What is IoT?

IoT or Internet of Things is basically a technology where devices or things in them are connected to the internet. Slowly and gradually the list of such things grows. This may include security devices, consumer electronics, our vehicles, etc. These devices send and receive data over the Internet. As a result, things become smarter as various sensors are embedded into the devices to sense their surroundings. The Internet of Things (IoT) is a new paradigm that integrates electronic devices and sensors over the Internet so that they can communicate with each other, simplifying our lives. A wide range of challenges and problems across various industries, governments, and businesses can be addressed through lot by using smart devices and the Internet. A wide array of intelligent systems, frameworks, smart devices, and sensors are integrated into the Internet of Things, which is a technology that is becoming increasingly important in our lives. The storage, retrieval, and processing speeds of this technology are previously unimaginable. loT transformations have been extensively researched in form of academic articles, press reports and case studies to demonstrate their potential effectiveness and applicability. In addition to considering security, assurance, and interoperability, it can be used as a pre-planning tool before creating an innovative business plan.

Why is IoT important?

Better Decision Making

Having multiple sensors allows devices to collect data from a variety of places, providing more information for them to make decisions based on. A great example is smartphones. It monitors your behavior on its interface and makes recommendations based on how you spend your time, where you are, and how old you are. It is also possible for the phone to track and keep track of various activities, such as how much screen time users spend each day, how much power they consume, and how much sleep they get. Each day, smartphone companies collect massive amounts of data about their devices to improve their features. Data analytics made possible by embedded sensors and processors allows companies to track how there devices are being used, and determine their strengths and weaknesses.

Real-time Tracking and Monitoring

From shipping containers to stolen goods, lot tracking systems can monitor and track anything ranging from fleet vehicles to stolen goods. A malfunction in one of these products can result in a company incurring immense losses. The Internet of Things can help companies improve their efficiency in many different industries. IoT-based trackers need to be reliable to provide the best services. These devices should provide the following:

● *Real-time data analytics*
When monitoring assets or changes in the environment, it is essential to have accurate, fast data to make quick, informed decisions.

● *Secure communication*
In order to protect data shared, it is important to ensure that hackers cannot access high-value assets tracked by companies.

● *Stable connectivity*

In order for the device to be useful at all times and from everywhere on the planet, it needs to securely display updated information regarding asset location, machine functionality, and temperature.

Automation

IoT has been created because it is convenient. Smart devices automate daily tasks, allowing humans to do other projects. These devices ultimately reduce people's workloads. Our smartphones allow us to connect with people all over the world, and even use dictation so we can avoid typing. Smart fridges allow us to place orders without having to actually open them. The smart fridge may even be able to detect when milk is almost finished and automatically order more when the food expires so that owners can eat it before it's too late. Imagine having one that can detect when foods are about to expire and notify the owner to eat that food before it's too late. Perhaps the smart fridge could even register that the milk is nearly finished and automatically order more. In the coming years, we will see a self-driving car use the Internet to find the quickest path between two points. This is the ultimate convenience for humans. Lot has plenty of room for innovation.

More Efficient Personal and Business Tasks

Using an online device saves people time and money. You can plan your work schedule, track your time, communicate effectively, and set reminders for daily tasks. You can control light levels automatically once you leave the room, track and order things through IoT devices, and manage tasks for which you have no time. More and more of these devices will become available for use over the coming years, with an estimated total number of IoT connections to reach 27 billion in 2024.

In a world where people are busier than ever before, it is easier than ever to accomplish mundane tasks utilizing wireless devices. People can spend more time with their families with the help of IoT devices.

Applications of IoT

Among the most important characteristics of humans is the ability to work together as a team and gain knowledge from one another. What if this was true of machines, their ability to interact and share data with one another? That would be a truly connected world and that is the concept of Internet of Things: a network of interconnected devices where data can be controlled and shared among them in order to obtain meaningful sights. IoT has a variety of applications in the modern world that are so diverse that you cannot imagine. Application ragging of various types can use IoTs from creating a smart home by connecting all the devices in your house or even connecting all the civil and government services to create a smart city.

Let's see all these applications of IoT in the world

Smart Agriculture: Without food we cannot survive because it is very essential part of our life. And in developed countries like America , lot of food is wasted which is very unfortunate while in poorer countries like Chad, Sudan, etc. , people starve for food. IoT is one of the best way to do better agricultural practices to feed erroneities can be done by first collecting data for a farm like soile quality, sunlightlevels, seed type, rainfall density from various sources like farm sensors, satellites, local weather stations, etc. There after with machine learning using the data and ioT to create custom. To optimize the planting procedure irrigation levels required, fertilizer amount, etc., there will be recommendations for each farm. It will result in better yield or crops. The main motive of doing this is to reduce hunger in the future.

Smart Vehicles: Smart vehicles or Self driving cars are dependent on IoT There are lot of features in these cars that are combined with each other and that need to communicate such as speeding and slowing down is controlled by various antennas, navigation is handled by sensors, itself driving cars need accuracy and there is the need of communication between all the parts in milliseconds on the road. one of the example is Tesla Motor's Cars, latest advancements in Artificial Intelligence and IoTs are used in this.

Smart Home: Everyone have heard about connecting all tech applications like lighting, air conditioners, locks, etc. That can be be controlled from your smartphones into a single system. IoTs give you the freedom to personalize your home as you want that's why IoT devices are becoming more and more popular. Some popular IoT devices are Google home, Amazon echo plus, Philips hue lighting system, etc.

Smart Pollution Control: In the world, one of the biggest problem is Pollution. Sometimes it becomes so uncomfortable if we inhale oxygen or smog! In such situations, to control the pollution levels to more breathable standards, IoTs can help. This can be done by using various

sensors in combination with IoT to collect data related to city pollution like emissions from vehicles, airflow directions, weather, traffic levels. In different areas of city, we can calculate pollution forecasts by Machine Learning algorithms.

Smart Health Care: In health care industry, there are various IoT applications, where through a web of interconnected devices and machines, doctors can monitor patients. then there will be no need of direct contact between patient and doctor. This is very useful in the cases of infectious diseases like COVID-19 Robots are one of the best example of IoT in healthcare sector. Surgical robots can help doctor's in performing surgeries, for cleaning

surfaces quickly disinfectant robots can be used, monotonous tasks can be handled by nursing robots.

Smart Cities: Cities can be more efficient so that thy require fewer resources and are more energy efficient. Combination of sensors can be used in this in different capacities all over the city, for various tasks that can be used like managing the traffic, controlling handling waste management, smart building creation, streetlights optimization, etc. Cities like Singapore, Geneva, Oslo, etc. are working on incorporating IoT and becoming smarter.
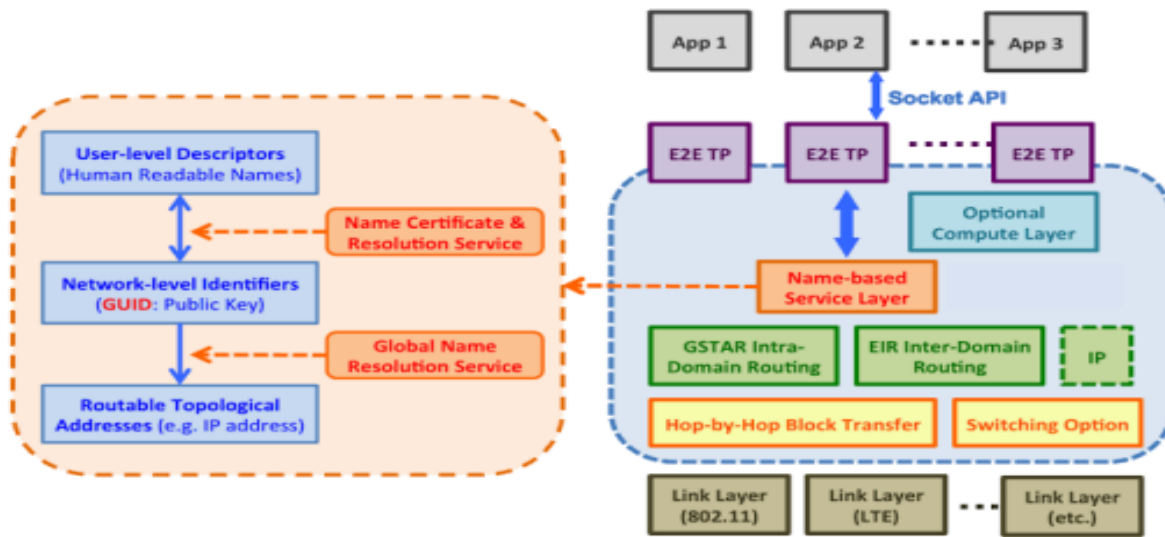
FUTURE INTERNET ARCHITECTURE

Now nearly one-third of the world's population is now online, now we are very dependent on internet and hardly imagine life without it. As we are very fond of new technologies and innovations, the future of internet is likely to look very different than it does today. What began as small network now evolved to becoming vital to the operation of most sector of our society. Future Internet Architecture has been created to stimulate creative research to explore, design and evaluate trustworthy Future Internet Architecture. The main objective of this program is to use their transformative thinking and design and test new network architecture and concept for larger social, economic and legal issues that are coming in our internet now. Integrated services (Insert), differentiated service (DiffServ), IP security (IPSEC), firewalls, mobile IP, Network Address Translator (NAT) devices, label switching, VPNs and Web caches are some

examples of Future Internet Architecture. This tremendous growth of internet cause to large amount of internet traffic, there is a need to find an efficient architecture to handle all these problems. Now the new research is introducing about the converting of IP-based architecture into Information based.

IMPACT OF THE FUTURE INTERNET ARCHITECTURE

Future Internet Architecture should not be judged only by their success of widely adopted, although it has done more work in our network security and re-managing our network and also increases its range of work to impact other users. These are some following example that would show the efforts of Future Internet Architecture: Goal of future Internet Architecture is to grow a new generation of network which is

able to understand large-scale system network within social context. If Future Internet Architecture projects influences the internet in in same way as IPv6 did it would be a great success for the researcher and will make our network strong.

Future Internet Architecture will be more demanded by enterprises because it provides ease of deployment, rapid response to change and more security. Final success of Future Internet Architecture is the lesson which will be published after the research. However, with the growth of internet we also witnessed a wide range of conflicts among its users which includes problem on privacy, security issue, censorship, etc., are some main topic of drawbacks of IOT for our government, designers and soon. While "Clean-Slate" architecture provides us with the solution of these problems and also with the problem that can arrive in future too. With the help of this project we can move one step forward to the future internet. We still don't know where this research will lead the network but from the FIA efforts is expected to make important contribution and hopefully lead to a positive difference in the world. One of the best project to define the future of the next generation internet system is the Internet2 project which grew out as the Very High Speed Backbone Network Services (vBNS). The vBNS support very high bandwidth research applications. Future Internet Architecture will lead to the better development of human resources which will itself improve our social and economical life.

References

[1] Xu, L. D., He, W., & Li, S. (2014). Internet of Things in Industries: A Survey. IEEE Transactions on Industrial Informatics, 10(4), 2233–2243. https://doi.org/10.1109/tii.2014.2300753

[2] Ma, H. D. (2011). Internet of Things: Objectives and Scientific Challenges. Journal of Computer Science and Technology, 26(6), 919–924. https://doi.org/10.1007/s11390-011-1189-5

[3] Chiang, M., & Zhang, T. (2016). Fog and IoT: An Overview of Research Opportunities. IEEE Internet of Things Journal, 3(6), 854–864. https://doi.org/10.1109/jiot.2016.2584538

[4] Antonio J. Jara, Latif Ladid, & Antonio F. Gómez-Skarmeta. (2013). The Internet of Everything through IPv6: An Analysis of Challenges, Solutions and Opportunities. J. Wirel. Mob. Networks Ubiquitous Comput. Dependable Appl., 4, 97–118. https://doi.org/10.22667/JOWUA.2013.09.31.097

[5] Miorandi, D., Sicari, S., De Pellegrini, F., & Chlamtac, I. (2012). Internet of things: Vision, applications and research challenges. Ad Hoc Networks, 10(7), 1497–1516. https://doi.org/10.1016/j.adhoc.2012.02.016

"The Internet of things has the potential to change the world, just as the internet did. Maybe even more so" – Kevin Ashton

5G Technology

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What is 5G?

The 5G network is the next generation of wireless technology that is currently being developed. 5G will provide a significant increase in speed and capacity over current 4G networks, as well as provide new capabilities that are not possible with 4G. 5G is expected to be a major step forward in the development of the Internet of Things, as it will enable a large number of devices to be connected to the network and communicate with each other in real time. 5G is also expected to have a major impact on the development of autonomous vehicles, as it will allow for real-time communication between vehicles and infrastructure. The development of 5G technology is being led by a number of companies, including Qualcomm, Nokia, and Samsung. 5G is expected to be commercially available in 2020. With 5G, data transmitted over wireless broadband links can travel at multigigabit speeds, with peak speeds of up to 20 gigabits per second (GBPS) by some estimates. These speeds exceed landline speeds and have latencies of 5 milliseconds (m s) or less, making them useful for applications that require real-time feedback. With 5G, the available bandwidth and advanced antenna technology can significantly increase the amount of data transmitted over wireless systems. 5G networks and services will be phased out over the next few years to accommodate the growing reliance on mobile and connected devices. Overall, 5G is expected to create a variety of new applications, uses and business cases as the technology is deployed.

How does 5G work?

A wireless network consists of sectorized cell sites that transmit data over the airwaves. Fourth Generation (4G) Long Term Evolution (LTE) wireless technology forms the foundation of 5G. Unlike 4G, which requires large and powerful cell towers to broadcast the signal over long distances The technology is also very sensitive to line-of-sight, which means that it is necessary to deliver the signal directly to the end-user without any obstacles. This means that, in theory, the use of thousands of small cells is necessary to achieve nationwide coverage with 5G. The problem is that this approach is not very practical and can be very expensive, as installing and maintaining thousands of small cells can quickly become a daunting task for network operators. The other approach is to use a mix of macro and small cells, where the small cells are used to supplement the macro cells. The advantage of this approach is that it is much more practical and can be delivered much faster. The brute force approach uses multiple nodes around each block in a populated area to allow 5G capable devices to use the air interface. That is, they move from node to node while maintaining the MM wave velocity. Today's wireless networks are built primarily on low-band and mid-band frequencies, which provide good range and building penetration but relatively slow speeds. High-band spectrum is better suited to mobile broadband because it offers much greater capacity and speed, but has shorter range and poorer building penetration. High-band spectrum is the key to 5G. 5G is designed to operate in a wide range of spectrum bands, including low-band, mid-band, and high-band. High-band spectrum is often referred to as "milli meter wave" or "mm Wave" because it has wavelengths in the milli meter range. Mm Wave spectrum is ideal for 5G because it offers a large amount of capacity.

How fast is 5G?

Today, 5G download speeds exceed 1,000 megabits per second (MBPS) and reach 2.1 GBPS. To illustrate this, a user can launch YouTube videos in 1080p quality on his 5G device without buffering. Downloading an app or episode of a Netflix show that currently takes minutes can now be done in seconds. Streaming videos wirelessly in their 4K is also becoming more realistic. Currently mm Wave requires these examples to be within an unobstructed city block from their 5G node; however, this is rapidly changing.

What are the benefits of 5G?

5G will also have a profound impact on the Internet of Things (IoT), as the high data rates and low latency will enable a new class of applications and services. It has many worthwhile advantages.

- Increased bandwidth limit
- Improved Phone Broadband
- 5 ms low latency
- High speed rates will enable new technology options on 5G telecommunication networks, including 4K resolution streaming or almost real time streaming in virtual reality (VR).

The downsides of 5G are.

The potential downsides of 5G technology are numerous. The biggest concern is that 5G technology will lead to more electromagnetic radiation exposure, as it relies on higher frequency waves than previous generations. This could lead to negative health effects, including an increased risk of cancer. Additionally, 5G technology could also lead to increased traffic congestion and privacy concerns, as well as increased costs for service providers.

5G vs 4G (Main differences)

The main difference between 5G and 4G is that 5G offers higher data speeds, lower latency, and improved capacity when compared to 4G.

5g is the next generation of wireless technology and it is expected to revolutionize the way we use the internet. 5G offers speeds that are up to 99.5 times faster than 4G, and it has the potential to connect devices with each other in ways that were not possible before.

5G is still in its early stages, and it will take some time for it to be fully rolled out. In the meantime, 4G will continue to be the standard for most people.

5G is also more efficient than 4G, which means that it uses less power and can be more easily deployed in rural areas.

4G is the fourth generation of mobile broadband technology, succeeding 3G. 4G offers speeds of up to 100Mbps, which is a significant improvement over 3G. 4G also has a higher capacity, which means that it can support more devices and users. 4G also has a lower latency, which means that it can provide a more responsive experience.

5G offers speeds of up to 1Gbps, which is a significant improvement over 4G. 5G also has a higher capacity, which means that it can support more devices and users. 5G also has a lower latency, which means that it can provide a more responsive experience.

References

1. 5G – https://en.wikipedia.org/wiki/5G

2. http://recode.net/2015/03/13/what-is-5g-and-what-does-it- mean-for-consumers/

3. https://www.lifewire.com/5g-spectrum-frequencies-4579825

4. https://www.geeksforgeeks.org/what-is-5g-wireless-technology-and-how-it-works/

5. https://studymafia.org/5g-technology-ppt-and-pdf-seminar-report-free/#google_vignette

"5G is the network on top of which a <<real>> virtual reality can and will be built" –Christian Lundsgaard-Hansen

ABOUT DEPARTMENT OF INFORMATION TECHNOLOGY

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