

Technique Polytechnic Institute

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Department of Computer Science & Technology NBA Accredited

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contact : (033) 2686-3682(exl:t:216) email : dcst@techniqueedu.com Vision

To make Technique Polytechnic Institute a CENTRE OF EXCELLENCE in learning, teaching and knowledge transfer in an ambience of Humanity, Wisdom, Intellect, Knowledge, Creativity and Innovation in order to nurture our students to become culturally and ethically rich professionals with bright future of our country.

To provide Knowledge with Academic Excellence and to prepare our students for their successful professional career.

To inspire our Faculty members to always Excel and in turn Motivate the Students to achieve Excellence.

To provide a stimulating learning environment with a technological orientation to maximize individual Potential.

To develop innovative and efficient use of modern instructional technology.

To ensure our students of all ability levels are well equipped to meet the challenges of education, work and life.

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To encourage development of interdisciplinary research, which addresses strategic needs of industry and society.

To encourage and support professional development for faculty and staff.

To educate and prepare students to contribute as engineers and citizens through the creation, integration, application, and transfer of engineering knowledge



Departmental **Vision:**

To be a dynamic and efficient department of Computer Science & Technology providing quality education and progressive atmosphere to the students so that they can implement knowledge effectively to meet the needs of society



1) To Provide a learning ambience to enhance innovations, problem solving skills, leadership qualities, team-spirit and ethical responsibilities.

2) To Provide exposure to latest tools and technologies in the area of engineering and technology

3) To motivate student to pursue higher studies will always be alive.

4)To Support society by participating in and encouraging technology transfer.



CYBER SECURITY: STUDY ON ATTACK, THREAT, VULNERABILITY DIGITAL TRUST MACHINE LEARNING: ZERO TO HERO ROBOTIC PROCESS AUTOMATION

UNIFIED PAYMENTS INTERFACE (UPI) AMAZON WEB SERVICES (AWS) METAVERSE ROBOTICS VIRTUAL MOUSE CLOUD COMPUTING ROBOTIC PROCESS AUTOMATION WITH USE OF AI FRAUD DETECTION USING AI ICLOUD COMPUTER VIRUS CLOUD COMPUTING RESEARCH AREAS IN 5G TECHNOLOGY VIRTUAL REAILITY ARTIFICIAL INTELLIGENCE IN AGRICULTURE : USING MODERN DAY AI TO SOLVE TRADITIONAL FARMING PROBLEMS Message from editorial team

It gives us immense pleasure and satisfaction to re-introduce our departmental technical magazine technomutation vol-3 for the session 2017-18. A lot of effort has gone into the making of this issue. We hope you enjoy reading the magazine. The best thing about this issue is that it represents the contemporary face of DCSI students. Amidst the busy schedule of a 4-month semester, with 3-exams, surprise guizzes and all those assignments and problem sheets that make you want to bang your head on the wall, it is fascinating to see how students are keeping abreast with trending technologies. To this time we have made an attempt to bring out the talent concealed within our student community. Faculties of the department has also contributed from their end by touring the grayer side of technical issues. This volume indulges research in one hand on other it presents cutting edges technologies. We hope you enjoy reading this issue as much as we have enjoyed making it.

Editor in Chief Debasish Hati Co-Editor Ichan Goswami

Members: Soumali Roy Shibdas Bhattacharya

CYBER SECURITY: STUDY ON ATTACK, THEART, VULNERABILITY

Abstract:

The broad objective of this study is an attack, threat and vulnerabilities of cyber infrastructure, which include hardware and software systems, networks, enterprise networks, intranets, and its use of the cyber intrusions. To achieve this objective, the paper attempts to explain the importance g in network intrusions and cyber-theft. It also discusses in vivid detail, the reasons for the quickdilation of cybercrime. The paper also includes a complete description and definition of cyber security, the role it plays in network intrusion and cyber recognize theft, a discussion of the reasons for the rise in cybercrime and their impact. In closing the authors recommend some preventive measures and possible solutions to the attack, threats and vulnerabilities of cyber security. The paper concludes that while technology has a role to play in reducing the impact of cyber attacks, the vulnerability resides with human behaviour and psychological predispositions. While literature supports the dangers of psychological susceptibilities in cyber attacks investment in organizational education campaigns offer optimism that cyber attacks can be reduced.

Keywords: Cyber-Warfare, Vulnerability, Cyber-attack, Threat

1. Introduction

World is going on the digitalization or cash less transaction so multifold. Even the government and defense organization have experienced significant cyber losses and disruptions. The crime environment in cyber space is totally different from the real space that is why there are many hurdles to enforce the cybercrime law as real space law in any society. For Example, age in real space is a self-authenticating factoras compare to cyberspace in which age is not similarly self-authenticating. A child under age of 18 can easily hide his age in Cyber space and can access the restricted resources where as in real space it would be difficult for him to do so. Cyber security involves protecting the information by preventing, detecting and responding to cyber-attacks. [1]

The penetration of computer in society is a welcome step towards modernization but needs to be better equipped to keen competition with challenges associated with technology. New hacking techniques are used to penetrate in the network and the security vulnerabilities which are not often discovered arise difficulty for the security professionals in order to find hackers [6].

The defense mechanism mainly concerns with the understanding of their own network, nature of the attacker, inspire of the attacker, method of attack, security weakness of the network to mitigate future attacks.[13]

2. Background

Currently media, Government sectors and organization are hot discussion about the cyber security. Experts claim the topic is over-hyped and artificially inflated by fear vend, with terms such as 'cyber-

warfare 'designed to excite an emotional rather than a rational response. In a recent study by Intelligence, number of the threat like 23, cyber-war has been grossly overstated. Cyber security is the key concepts of discussion topic that can inspire to independent thinking researcher and experts. Indeed, this type of discussion is proposed by many of those calling for caution such as security experts,

These are the points out that many cybercrimes are the direct result of poor security rather than lack of

government polices implementation. The president of the Electronic Privacy Information Center gives suggestion against mandatory Internet identification requirements. He pointed out those countries, attribution requirements have resulted in censorship and international human rights violations.

Nevertheless of which view one may take, it is plain that cyber-security is accepted as a very important and current topic and healthy discussion on.

In this paper give the general or realistic definition of cyber-security for cyber world accepted, it does suggest different key elements for activities inclusion in Information [15]

Technology programs, these are based on a types of research documents and reports published. With the recurrence of cyber-attacks on a constant increase, governments and security organizations worldwide are taking enterprising and preemptive action to reduce the risk of successful attacks against critical infrastructures. It means the relation between the physical and cyber domains. Cyber security involves protecting that infrastructure by preventing, detecting, and responding to cyber incidents. [11]

The association between military strikes on civilians and government base organized Internet suppression was prevalent with actions in the physical world being prepare the way for cyber-events. IT Professionals may be aware of recent events besiege Supervisor Control and Data Acquisition (SCADA) systems virus.

SCADA malware using both insufficient patched vulnerabilities and new Vulnerabilities. The serious physical, financial impact these issues could have on a worldwide basis.

Providentially, all cyber-events are not connected to human loss of life yet the economic impact to a society can still be hugely damaging. It was reported that information and electronic data theft excel all other fraud for the first time rising from the previous year. This is in spite of a reduction in half of other fraud categories.

The CNCI is the first in a series of stages to establish a broader, updated national U.S. cyber-security strategy with the following summarized goals:

- Establish a front line of defense against today's immediate (cyber) threats.
- Defend against the full spectrum of threats
- Strengthen the future of cyber-security environment.

These goals also underline the CNCI's initiatives. Cyber security is a challenge that not only national boundaries it's beyond and requires global cooperation with no single group, country or agency claiming ownership, according to a 2009 report by the US Department of Homeland Security. The report proposes a Roadmap for Cyber-security Research. Building on the 2005 second revision of the INFOSEC Research Council (IRC) Hard Problem List, and in recognition of the aforementioned presidential directives, the roadmap identifies research and development opportunities that are scoped to address eleven "hard problems".

This defines cyber security as the "preservation of confidentiality, integrity and availability of information in the cyberspace", with an accompanying definition of cyberspace as "the complex environment resulting from the interaction of people, software and services on the Internet by means of technology devices and networks connected to it, which does not exist in any physical form". It is current topic of, that cyber-security is an area of much discussion, interest and attention[15].

1. Methodology

This is the 21st edition of the Symantec Internet Security Threat Report and much has changed since the first one. We take a fresh look at the structure and contents of the report. As well as focusing on the threats and findings from our research, it is also tracks industry trends.We try to highlight the

important developments and look to future trends. This goes beyond just looking at computer systems, smartphones, and other products, and extends into broad concepts like national security, the economy, data protection, and privacy [14].

3.1 Threats

Cyber security threats encompass a wide range of potentially illegal activities on internet. Cyber security threats against utility assets have been recognized for decades. The terrorist attacks so give the attention has been paid to the security of critical infrastructures. Insecure computer systems may lead to fatal disruptions, disclosure of sensitive information, and frauds. Cyber threats result from exploitation of cyber system vulnerabilities by users with unauthorized access [7]. There is crimes that target computer networks or services directly like malware, viruses or denial of service attack and crimes facilitated by networks or devices, the primary target of which is independent of the network or device like fraud, identity theft, phishing scams, cyber stalking.

a. Cyber Theft

This is the most common cyber-attack that committed in cyberspace. This kind of offence is normally referred as hacking in the generic sense. It basically involves using the internet through steal information or assets. It also called the illegal access, by using the malicious script to break or crack the computer system or network security without user knowledge or consent, for tampering the critical data and. It is the gravest cybercrimes among the others. Most of the banks, Microsoft, Yahoo and Amazon are victim of such cyber-attack. Cyber thieves use tactics like plagiarism, hacking, piracy, espionage, DNS cache poisoning, and identity theft. Most of the security web sites has described the various cyber threats.

b. Cyber Vandalism

Damaging or exploiting the data rather than stealing or misusing them is called cyber vandalism. It means effect on network services are disrupted or stopped. This deprives the authorized users for accessing the information contained on the network. This cybercrime is like a time bomb, can be set to bring itself into action at a specified time and damage the target system. This creation and dissemination of harmful software which do irreparable damage to computer systems, deliberately entering malicious code like viruses, into a network to monitor, follow, disrupt, stop, or perform any other action without the permission of the owner of the network are severe kind of cyber crimes.

c. Web Jacking

Web jacking is the forceful control of a web server through gaining access and control over the web site of another. Hackers might be manipulating the information on the site.

Stealing cards information

Stealing of credit or debit card information by stealing into the e-commerce server and misuse these information.

d. Cyber Terrorism

Deliberately, usually politically motivated violence committed against civilians through the use of, or with the help of internet.

e. Child Pornography

The use of computer networks to create, distribute, or access materials that sexually exploit underage children pornography in shared drives of community networks.

f. Cyber Contraband

Transferring of illegal items or information through internet that is banned in some locations, like prohibited material.

g. Spam

It includes the Violation of SPAM Act, through unauthorized transmission of spam by sending illegal product marketing or immoral content proliferation via emails.

h. Cyber Trespass

Legal accessing of network resources without altering disturbs, misuse, or damage the data or

system. It may include accessing of private information without disturbing them or snooping the network traffic for gets some important information.

i. Logic bombs

These are event dependent programs. These programs are activated after the trigger of specific even. Chernobyl virus is a specific example which acts as logic bomb and can sleep of the particular date.

j. Drive by Download

A survey is undertaken by search engine companies. Numbers of websites were acting as hosts for malware. The term "Drive by Download (DbD)" is maneuvering in software industry since its inception with different variations. It is a phenomenon in which any software program is installed automatically on a user computer while surfing on the internet. The intent of installing malicious software is to gain benefit over victim machine, e.g. it could be a stealing of confidential information like stored passwords, personal data, using victim terminal as botnet to further spread malicious contents.

k. Cyber Assault by Threat

The use of a computer network such as email, videos, or phones for threatening a person with fear for their lives or the lives of their families or persons whose safety they are responsible for (such as employees or communities). An example of this is blackmailing a person to a point when he is forced to transfer funds to an untraceable bank account through an online payment facility.

I. Script Kiddies

Novices, who are called script kiddies, script bunny, script kitty, script running juvenile is a derogatory term used to describe those who use scripts or programs developed by others to attack computer systems, networks and get the root access and deface websites.

m. Denial of service

A denial of service attack (DoS) or distributed denial of service attack (DDoS) is an attempt to make a computer resource unavailable to its intended users. The computer of the victim is flooded with more requests than it can handle which cause it to crash. Although the means to carry out, motives for, and targets of a DoS attack may vary, it generally consists of the concerted efforts of a person or people to prevent an Internet site or service from functioning efficiently or at all, temporarily or indefinitely. This is also known as email bombing if via used is email. E-bay, Yahoo, Amazon suffered from this attack [1].

3.2 Attacks

Cyber-attack is a big issue in the cyber world that needs to be focus because of the effect on the critical infrastructure and data. The growth of technology is accompanied by cyber security threats or "cyber-attacks" which threaten users security when using such technologies. Cyber threats and attacks are difficult to identify and prevention. So users are not accepting the new technology due to the frequently cyber-attacks less security of data. A cyber-attack is when someone gain or attempts to gain unauthorized access to a computer maliciously [11].

a. Untargeted attacks

Un-targeted attacks in attackers indiscriminately target as users and services possible. They find the vulnerabilities of the service or network. Attacker can take the advantage of technologies like: Phishing:

Phishing means fake people sending the emails to numbers of users and asking the personal information like baking, credit card. They encouraging the visits of fake website and give the good offers. The customers click on the links on the email to enter their information, and so they remain unaware that the fraud has occurred. [8]. Water holing:

Publish the fake, as well as dummy website or compromising a legitimate one in order to exploit visiting user's information.

Ransom ware:

It includes spread disk encrypting extortion malware. Scanning:

Attacking wide swathes of the Internet at random.

b. Targeted attacks:

Targeted attacks in attackers, attack on the targeted users in the cyber world. Spear-phishing Sending links of malicious software and advertisement via emails to targeted individuals that could contain for downloads malicious software. Deploying a botnet. It is deliver a DDOS (Distributed Denial of Service) attack Subverting the supply chain.

To attack on network or software being delivered to the organization In general attackers will, in the first instance use tools and techniques to probe your systems for an exploiting vulnerability of the service [3].

3.3 Vulnerability

Vulnerabilities are weaknesses in a system or its design that allow an intruder to execute commands, access unauthorized data, and/or conduct denial-of service attacks. Vulnerabilities can be found in variety of areas in the systems. They can be weaknesses in system hardware or software, weaknesses in policies and procedures used in the systems and weaknesses of the system users themselves. Vulnerability were identified due to hardware compatibility and interoperability and also the effort it take to be fixed. Software vulnerabilities can be found in operating systems, application software, and control software like communication protocols and devices drives. There are a number of factors that lead to software design flaws, including human factors and software complexity. Technical vulnerabilities usually happen due to human weaknesses. [10]

There is no system is automatically immune from cyber threats, the consequences of ignoring the risks from complacency, negligence, and incompetence are clear. In 2015, an unprecedented number of vulnerabilities were identified as zero-day exploits that have been weaponized, and web attack exploit kits are adapting and evolving them more quickly than ever. As more devices are connected, vulnerabilities will be exploited [14].

4. Results and Analysis

Secure the System

There are basic three methods to secure the system from outsider threat and attack.

Prevention: If you were to secure your network, prevention would be using the firewall, security software and end user use the antivirus software. You are doing everything possible to keep the threat out. Detection: You want to be sure you detect when such failures happen. Everyday update the security software as well as hardware.

Reaction: Detecting the failure has little value if you do not have the ability to respond. If anything it's happen so your security software warn.

4.1 Preventing from Attack and Threats

- Recovering from Viruses, Worms, and Trojan Horses
- Avoiding Social Engineering and Networking Attacks
- Avoiding the Pitfalls of Online Trading
- Using Caution with USB Drives
- Securing Wireless Networks

4.2 Preventing from Email and communication

- Using Caution with Email Attachments
- Reducing Spam
- Using Caution With Digital Signatures

- Using Instant Messaging and Chat Rooms Safely
- Staying safe on social Network Sites

4.3 Safe Browsing

- Evaluating Your Web Browser's Security Settings
- Shopping Safely Online
- Web Site Certificates
- Bluetooth Technology [5].

Conclusion

Cyber security incidents involving attacks, research supports the most effective defense is a computer literate user. To consider is those most vulnerable which are identified in this research as new employees within an organization, as specifically, with the attacker seeking personal identifiable information from those engaged. Further supported in this research are the psychological variables that contribute to user and network vulnerability. This paper concludes that while technology has a role to play in reducing the impact of cyber attacks, threat and vulnerability resides with human behaviour, human impulses and psychological predispositions that can be influenced through education. cyber attacks can be reduced, but an absolute solution to overcome such cyber security threats has yet to be put-forward. In the future work of the cyber attack, threat and vulnerability reduce in the network implement the cyber security model.

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DIGITAL TRUST

Soumali Roy Lecturer, DCST

Digital trust is the confidence users have in the ability of people, technology and processes to <u>create a secure</u> <u>digital world</u>. Digital trust is given to companies who have shown their users they can provide **safety**, <u>privacy</u>, <u>security</u>, <u>reliability</u>, and <u>data ethics</u> with their online <u>programs</u> or <u>devices</u>. When a person decides to use a company's product, they are confirming their digital trust in the business.

How does it work?

Digital trust divides dependable services from corrupt ones, helping the user decide on a secure company rather than an unreliable one. It creates a bond between a user and a company that assures the user they will be receiving what they are asking for in a safe, secure and reliable manner. The more digital trust a company receives, the more likely it will be to gain more users.

Digital trust is used by both digital service companies and their consumers. Users apply digital trust to the search process for a service or device. Consumers are more likely to use a company that is trustworthy than one that is unreliable. Companies aim to gain digital trust from consumers and use this goal to digitally transform themselves and create greater confidence in security, safety, privacy and reliability among consumers.

Digital trust is encouraging companies to focus on removing risk because it is something that negatively affects a consumer's confidence levels. Business leaders have started including <u>cybersecurity</u> and privacy personnel in their <u>development process</u> from the beginning, instead of ignoring them. This helps ensure the company is not avoiding security measures just to get their service or device on the market. Some businesses have also started adopting the <u>zero trust model</u> which decreases the number of opportunities a <u>hacker</u> has to access secure content by limiting who has privileged access to different machines or segments of the network.

Benefits of digital trust

The increased connection between businesses, government, industrial equipment and personal devices is generating increased cyber and privacy risks. Since most businesses are now working digitally in some way, their success is impacted by trust as much as it is by designing new products. As consumers share more and more personal information online with different businesses, they put more at risk and the importance of their confidence in the company increases.

Consumers are now placing more significance on the trust they have in a service and are looking for ways to ensure they are using the most reliable sources. This is forcing business leaders to re-evaluate and transform the ways in which they are running their company and the processes involved in creating services or devices with greater security and reliability; the need for trust is creating a digital transformation (DX). Companies are beginning to focus on managing privacy and cyber risks and including privacy and security personnel in project plans and budgets.

Digital trust will allow customers to find and choose the dependable digital services faster, better and with less unreliable choices to distract them. Eventually, machines will automate the decision process by calculating the level of confidence in a program. This will require more information to be provided about a company's service or product, creating increased transparency that will also build digital trust.

Digital trust in the IoT era

Internet of things (IoT) technologies have been displaying vulnerabilities across all industries. Consumers are losing confidence in the ability of manufacturers to produce secure, safe products. These devices are not being built with security in mind, thus opening them to the threat of hackers and data breaches. The companies are losing digital trust. Without trust, IoT will not be able to produce its intended results. In order to build confidence, IoT device manufacturers must first focus on improving the security in the device authentication process. Trust cannot be given unless the device has a solid authentication method which protects users from malware. Then, IoT must protect personal, sensitive data shared on the device through encryption

Machine Learning: Zero to Hero

Congratulations! If you are reading this, you are highly interested in diving to the world of Machine learning(ML), but you are confused on how to start with this. In the next 3 minutes of reading I will guide you through this journey.

Why to learn ML?

Professor Andrew NG (Adjunct professor of Stanford University, and founder of Deep AI) says Artificial Intelligence (AI) and ML are the new electricity. When electricity was invented on 1752's it brought revolutionary changes in all the industries, like what ML is doing today. Business to Defense, Agriculture to Education almost each sectors are having a new boost with ML.According to AIM Research, Indian AI startups raised <u>\$836.3</u> million in 2020.Learning ML in this era is like giving yourself an extra life line.

Where to start from?

The initial step to begin learning machine learning is to choose a programming language. There are many programming languages in the market, but the most suitable for machine learning are Python and R. Python is my personal recommendation because it quite easy to learn and it has a large community.

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Resources for learning: Google's Python Class

Python for Everybody on Coursera Introduction To R For Data Science from Edx

Note: Make sure while learning python that you should learn these libraries

- Learn Numpy
- Learn Pandas
- All this will be helpful to debug the python/sklearn code

ML, Math and Myth:

Once you are done with learning a programming language you can directly jump into learning ML or you can brush up your mathematical skills (which will be discussed in few minutes) and start learning ML. If you never had a mathematical background don't worry, you can still manage to become a good ML developer, but here I am assuming that all my readers do have some kind of mathematical background. It is wrongly assumed that if you are not a pro problem solver of mathematics you cannot be a good ML developer, actually you can. You do not need to solve mathematical problem very well because problem solving capability only comes from practice in our case computer is doing that very well since it's inception. The only thing you need to be bothered about is to understand the essence of mathematics in **ML practise. For an example if I have a large set of features** (important characteristics that a model learns to do something automatically in **ML**) in your data set it becomes very time taking to train a model, what we should avoid, now we cannot reduce the data set arbitrarily but if we know Principal Component Analysis technique which is a mathematical way of reducing feature size we can call that in a function and reduce the feature size.

In a nut shell you have many different mathematical tools in your tool box, as per situations you just use them, you do not need to solve mathematical problems like your school days here.

Resources for learning: Khan Academy channel or you can also study from the book, **Mathematics for Machine Learning, Cambridge university Press.**

Mathematical Skills you should develop: Linear Algebra, Calculus, Probability and statics.

ML Algorithms:

Now that you know little bit of maths and you have good programming understanding, you can start learning ML algorithms. Here I will give you a small list of algorithms that you must understand in order to be a very good ML developer.

- Linear regression
- Logistic regression
- Decision tree
- SVM algorithm
- Naive Bayes algorithm
- KNN algorithm
- K-means
- Random forest algorithm
- Dimensionality reduction algorithms
- Gradient boosting algorithm and Ada Boosting algorithm

Resources: The 100 page machine learning book by Andriy Burkov, this book is an absolute resource for the beginners. There are few more books which you can keep on queue **Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems by A Geron, Introduction to Machine Learning with Python: A Guide for Data Scientists by Andreas C. Müller and Sarah Guido. Projects:**

Once you have a good grasp on ML algorithms you must do 4 to 5 good projects. For project idea I personally recommend Kaggle (https://www.kaggle.com/) websites. Take few good projects , give yourself a deadline and make it done.

Time line:

This whole thing will take **six to eight months** of complete dedication; the time line may vary with learners but the key thing is do not give up. You need to learn something new every day of ML that is how you can be a good ML developer.

Few more resources:

1. <u>https://www.tensorflow.org/resources/learn-</u> ml?gclid=Cj0KCQjwjbyYBhCdARIsAArC6LKc8VrzSom5Net6f3kOa5oWHdkWHZjuZZ-<u>qBvgrCUQtsY6VQa_SIcEaAjMIEALw_wcB</u>

Robotic Process Automation

Sohan Goswami Lecturer, DCST

Robotic process automation (RPA), also known as software robotics, uses <u>automation</u> technologies to mimic back-office tasks of human workers, such as extracting data, filling in forms, moving files, et cetera. It combines APIs and user interface (UI) interactions to integrate and perform repetitive tasks between enterprise and productivity applications. By deploying scripts which emulate human processes, RPA tools complete autonomous execution of various activities and transactions across unrelated software systems.

This form of automation uses rule-based software to perform business process activities at a high-volume, freeing up human resources to prioritize more complex tasks. RPA enables CIOs and other decision makers to accelerate their digital transformation efforts and generate a higher return on investment (ROI) from their employee, allowing its digital workforce via RPA to shoulder more tedious and time-consuming tasks.

Benefits of RPA

RPA provides organizations with the <u>ability to reduce staffing costs and human error</u>. Intelligent automation specialist Kofax says the <u>principle is simple</u>: Let human employees work on what humans excel at while using robots to handle tasks that get in the way.

Bots are typically low-cost and easy to implement, requiring no custom software or deep systems integration. Such characteristics are crucial as organizations pursue growth without adding significant expenditures or friction among workers.

When properly configured, software robots can increase a team's capacity for work by 35% to 50%, according to Kofax. For example, simple, repetitive tasks such as copying and pasting information between business systems can be accelerated by 30% to 50% when completed using robots. Automating such tasks can also improve accuracy by eliminating opportunities for human error, such as transposing numbers during data entry.

Enterprises can also supercharge their automation efforts by <u>injecting RPA with cognitive technologies</u> such as ML, speech recognition, and <u>natural language processing</u>, automating higher-order tasks that in the past required the perceptual and judgment capabilities of humans.

Why is RPA the future?

RPA's versatility is only starting to be recognized. Businesses can use RPA in several tasks, like generating mass emails, extracting data from media such as PDFs and scanned documents, creating and sending invoices, employee history verification, and payroll automation.

Since the whole point of a business is to generate revenue, RPA can help in quote-to-cash by automating sales operations, thereby not only executing transactions faster but also with a higher degree of accuracy. The entire series of sales-oriented operational activities can be taken over by RPA, resulting in higher customer satisfaction. RPA also really shines in the field of data management. Considering the sheer volume of data out there (and it doesn't seem to show any signs of letting up!), it's a tremendous advantage to have RPA to collect, integrate, analyze, and process the torrents of data generated in today's commercial world.

Lastly, RPA can be used to improve customer service operations. We're not talking about RPA replacing human service reps; there are enough disgruntled people out there who complain about not being able to talk to an actual living person! No sense in alienating them any further. Instead, RPA can be used to tackle the repetitive, easy tasks that plague customer service representatives, thereby freeing the latter to deliver a better experience to customers. RPA can update customer profiles, pull up billing data, and other mundane tasks that would otherwise consume customer service reps' time.



Applications

Different businesses, be it is small, medium or large, want to increase service quality or reduce costs but without any change in existing processes. This is where Robotic Process Automation helps.

RPA is all about training the software robot to do new iterative tasks without changing the system involved. It simulates human work of logging into applications, entering tonnes of data, sending emails and doing other repetitive tasks. Presume a situation, a robot is sitting in front of a computer observing the task being performed by you, gets trained for it quickly and implements the same as is without any manual intervention from you. Isn't that amazing?

RPA doesn't entail any form of physical robot. It mimics a human work by interacting with applications in the similar way that a human does. It also allows interpreting existing application, activating responses, controlling data, and communicating with other digital systems. RPA Solutions can be enhanced with machine learning and Artificial Intelligence.

It is serving the need of different domains:

in **HR**; RPA can be used in New employee joining formalities, Payroll Processes, and save a lot of documentation work done manually.

In Insurance sector, it can be used for Premium Information, Claim Processing & Clearance.

in Travel domain, RPA can be used for Ticket Booking, Passengers Details, and Accounting and much more

in **Finance**, RPA can be used in Accounts Payable i.e. one can streamline the intake of vendor invoices with BPM, and auto-assign invoices to workers based on pre-defined rules.

in **Logistics**, RPA companies contribute to analytics and artificial intelligence by gathering information about business patterns and internal workings to reveal potential disruptions and bottlenecks. These insights can be used to improve and optimize specific areas of the supply chain.

Some of the key benefits of RPA are as follows:

1. <u>Cost Savings</u>

One of the important advantages of RPA is the quick reduction in the cost it can deliver. By automating tasks, the cost saving of almost 30% can be achieved over the yield of productivity. Software robots also cost less than a full-time employee.

2. Increased Employee Productivity

RPA ultimately facilitates humans and robots to try and simply do what they excel at. As RPA liberates the employees from everyday tasks, they can focus more on clients' connection, relationship management and can perform other such activity which they are excel at.

3. Quality & Accuracy

RPA offers enhanced services to processes with the high probability of human errors, thereby increasing accuracy. Robots are reliable, and consistent and don't complain when expected to work tirelessly. They reduce the cases of re-work and enhance quality. The vital part is that robots follow rules exactly thereby producing 100% accuracy.

4. Improved Customer Experience

By distributing RPA, one can liberate high-prices resources from additional routine and repetitive tasks and set them back on the bleeding edge by helping customers.

5. <u>RPA is scalable</u>

With the help of RPA, companies can make adjustments based on seasonality and can easily scale up or down operation as needed.

6. <u>Better Control</u>

Various companies prefer to outsource busy work to external parties. This comes with an inherent risk of human errors, inefficiency etc. RPA brings forth a better solution and since the work stays in-house, the business keeps up most extreme ownership, control and concludes.

7. <u>No New tool learning</u>

As the name suggests, no new tool learning is required to access RPA. By simply logging into any application and by connecting to system APIs, you can simply copy and paste data and move files, folders as per the requirement with saving and sharing it. Menus are easily navigated and mentioned clearly that one can use it easily.

Conclusion

In the coming years, it is likely RPA will go beyond just the automation of procedures and repetitive tasks that reduces productivity at work.

With the combination of advanced technologies, robots will be able to perform even more complex tasks.

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UNIFIED PAYMENTS INTERFACE (UPI) SK JISAN HOQUE DCST, 2nd Year

INTRODUCTION

Unified Payments Interface (UPI) is an instant real-time payment system that powers multiple bank accounts into a single mobile application (of any participating bank), merging several banking features, seamless fund routing & merchant payments into one hood. It also provide the "Peer to Peer" collect request which can be scheduled and paid as per requirement and convenience. UPI is developed by national payments corporation of India. The interface is regulated by the Reserve bank of India and works by instantly transferring funds between two bank accounts on a mobile platform. It is built over a Immediate payment service for fund transfer. With the above context in mind, NPCI conducted a pilot launch with 21 member banks. The pilot launch was held on 11th April 2016 by Dr. Raghuram G Rajan, Governor, RBI at Mumbai. Banks have started to upload their UPI enabled Apps on Google Play store from 25th August, 2016 onwards.

Unified Payments Interface (UPI)

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Objective

The main objective of a unified system is to offer an architecture and a set of standard APIsto facilitate the next generation online immediate payments leveraging trends such as increasing smartphone adoption, Indian language interfaces, and universal access to Internet and data. The following are the some of the key aspects of the unified payments interface.

- 1. The unified payment interface is expected to perform easy instant payments via mobile, web and other applications.
- 2. The payments can be initiated by both payer and payee and are carried out in a secure, convenient and integrated fashion.
- 3. This design provide an ecosystem driven scalable architecture and a set of APIs taking full advantage of mass adoption of smartphone.

- 4. Capabilities include virtual payment addresses, 1-click 2- factor authentication, Aadhaar integration, and use of payer's smartphone for secure credential capture.
- 5. It allows banks and other players to innovate and offer a superior customer experience to make electronic payments convenient and secure.
- 6. Supports the growth of e-commerce, while simultaneously meeting the target of financial inclusion.

Architecture

The following diagram is the architecture of UPI allowing USSD, smartphone, Internet banking and other channel integration onto a common layer at NPCI. This common layer organise the transactions and ensure settlement across accounts using systems such as IMPS, AEPS, NFS, E-com etc. Usage of existing systems ensure reliability of payment transactionsacross various channels and also takes full advantage of all the investments so far.



Here, the merchant sites collect the payment through the virtual address avoiding the need toprovide the account details or the sensitive information on websites or third party applications. Within this solution the payment authentication and authorization are always done using the personal mobile.

The real benefits of UPI lie not in the individual advantages outlined in each of the steps describe above, but in how these advantages stack and work together as a cohesive whole. UPI collapses the existing payments process into a simplified, normalized, authenticationmechanism that can be summarized in the following diagram.

By leveraging the growing penetration of mobile phones as the customer user interface / merchant POS, and by using virtual addresses instead of physical cards to reduce both cost ofacquisition and issuing infrastructure, UPI substantially reduces costs, making it one of the most inexpensive payments systems in the world.In a nutshell, UPI leads to a unified, secure, "form independent", and inexpensive user interface for payments. Before UPI, the only payments system that exhibited this behavior was cold, hard cash. And in a society where 95% of transaction are still based on cash, digital cash will be adopted only if it provides the same level of comfort.Time again for a quick summary. Let's see how the various components thatwe have descibed so far are unified by UPI to provide the same benefits as cash.



UPI is financial inclusion on steroids!

The comprehensive exhibit below summarizes everything we have talked about in one cleandiagram (you may have to click on the picture and zoom in to fully enjoy the magic that is UPI).

"One Ring to rule them all, One Ring to find them, One Ring to bring them all and in the darkness bind them"





Future of Payments

UPI has the potential to completely transform the face of the nation. Imagine, if you will, thefollowing;

• An instantaneous payments system that is as cheap as cash, but infinitely portable and scalable

— A government that reduces leakages and waste in welfare programs by distributing subsidies and benefits directly to Aadhaar linked accounts

— An opportunity to bridge the divide between the rich and the poor

• A network of payments without the need for dedicated physical infrastructure

— A world where poorly designed POS systems are not an excuse to adopting digital currency

A nation empowered by the network effects having a billion people leverage the UPI architecture

• A future of P2P payments unencumbered by lack of interoperability

A world of e-wallets where payments are made using authentication tools at people's fingertips

• A basket of UPI powered apps which act a portal to one's financial world

— A plethora of value-added services that help people integrate payments with other financial services (e.g., inventory management, wealth management, financial statements, tax filing, etc.

- A data rich nation that will unleash credit facilities to both individuals and businesses

CONCLUSIONS

UPI is the fund transfer infrastructure where multiple banks can be handled with the single mobile application, as a result the immediate payments can be done by the future generations. The UPI platform offers several advantages over current systems especially when it comes tosmall value (less than USD 100) payments that customers generally need to make as they go about purchasing goods and services in their daily lives. It can also provide instantaneous settlements for the merchants.

Amazon Web Services(AWS)

Souptik Bej DCST, 2nd Year

What is AWS and Definition ?

AWS is an Amazon company that offers governments, businesses, and people access to on-demand cloud computing platforms and APIs on a metered pay-per-use basis. Through AWS server farms, these cloud computing web services offer software tools and processing capability for distributed computing. One of these services is Amazon Elastic Compute Cloud (EC2), which gives consumers access to a virtual computer cluster that is constantly available over the Internet. The majority of the characteristics of a real computer are replicated by AWS's virtual machines, including hardware central processing units (CPUs) and graphics processing units (GPUs) for processing, local/RAM memory, hard-disk/SSD storage, a choice of operating systems, networking, and pre-loaded application software such as web servers, databases, and customer relationship management (CRM) (CRM).

Customers who use AWS services receive them through a global network of AWS server farms. The "Pay-as-you-go" approach of charging is based on consumption as well as subscriber-selected hardware, operating systems, software, and networking characteristics that must be available, redundant, secure, and offer a range of service alternatives. Subscribers have the option of paying for a single physical or virtual AWS machine, a cluster of either, or both. [8] Subscribers can rely on Amazon for certain security-related services (such as the physical security of the data centers), but they are responsible for other security-related tasks (e.g. account management, vulnerability scanning, patching). Six of the world's geographical regions, including the global one, from which AWS operates.

Amazon positions AWS as a solution for customers to get large-scale computing capability more rapidly and affordably than by creating a real, physical server farm. Although each service has its own unique way of measuring utilization, all services are invoiced according to usage. According to Synergy Group, as of 2021 Q4, AWS has a market share of 33% for cloud infrastructure, while its two main rivals, Microsoft Azure and Google Cloud, have market shares of 21% and 10%, respectively.

Services

By 2021, AWS will offer more than 200[13] products and services, including those for computing, storage, networking, databases, analytics, application services, deployment, management, machine learning,[14] mobile, developer tools, RobOps, and Internet of Things technologies. The most well-

liked ones include AWS Lambda, Amazon Connect, Amazon Simple Storage Service, and Amazon Elastic Compute Cloud (EC2) (a serverless function enabling serverless ETL e.g. between instances of EC2 & amp; S3).

The majority of services provide functionality via APIs so that developers can use it in their apps instead of being directly accessible to end users. Offerings from Amazon Web Services are accessed over HTTP, with older APIs using the SOAP protocol and the REST architectural style and newer ones using only JSON.

Founding(2000-2005)

By 2021, AWS will offer more than 200[13] products and services, including those for computing, storage, networking, databases, analytics, application services, deployment, management, machine learning,[14] mobile, developer tools, RobOps, and Internet of Things technologies. The most well-liked ones include AWS Lambda, Amazon Connect, Amazon Simple Storage Service, and Amazon Elastic Compute Cloud (EC2) (a serverless function enabling serverless ETL e.g. between instances of

The majority of services provide functionality via APIs so that developers can use it in their apps instead of being directly accessible to end users. Offerings from Amazon Web Services are accessed over HTTP, with older APIs using the SOAP protocol and the REST architectural style and newer ones using only JSON. An early employee of AWS named Jeff Barr attributes the creation of EC2, S3, and RDS to Vermeulen, Jassy, Bezos, himself, and a few others, while Jassy recalls that it was the result of a week-long brainstorming session with & quot; ten of the best technology minds and ten of the best product management minds & quot; on about ten different Internet applications and the most basic building blocks needed to build them. According to Werner Vogels, Amazon's desire to make the "invent, launch, reinvent, relaunch, start over, rinse, repeat & quot; process as quick as possible caused them to sabotage organizational structures with " two-pizza teams & quot; and application structures with distributed systems.

These adjustments ultimately made room for the competition.Brewster Kahle, co-founder of Alexa Internet, said that his start-computational up's infrastructure assisted Amazon in resolving its large data issues and later influenced the ideas that underlie AWS. Alexa Internet was bought by Amazon in 1999.

Growth (2010–2015)

The migration of all of Amazon.com's retail websites to AWS was announced in November 2010. AWS,s revenue was not broken out in Amazon's financial statements prior to 2012 since it was regarded as a component of Amazon.com. For the first time, observers of the industry pegged AWS's revenue for that year at over \$1.5 billion.

AWS had its first significant annual conference, re:Invent, on November 27, 2012 with over 150 sessions focused on AWS' partners and ecosystem.

Las Vegas was chosen as the destination for the three-day event because of its more affordable connectivity to other parts of the country and the rest of the world.

Werner Vogels and Andy Jassy gave keynote addresses, and Jeff Bezos joined Vogels for a fireside discussion. Early registrations for AWS customers[58] from more than 190 countries were made available for US\$1099 per person. At the event, which drew over 6000 people, Netflix CEO Reed Hastings announced intentions to move all of the company&;s infrastructure to AWS. On April 30, 2013, AWS started offering a certification programme for computer engineers to emphasize proficiency in cloud computing and facilitate industry-wide training and skills standardization. In October of that same year, AWS introduced Activate, a programme that allows start-ups all around the world to use AWS credits, third-party integrations, and free access to AWS specialists to help grow their businesses.

AWS introduced its partner network, AWS Partner Network (APN), in 2014 with the goal of assisting businesses using AWS to expand and extend the success of their business with close collaboration and best practices.

Conclusion :-

The AWS Well-Architected Framework provides architectural best practices across the five pillars for designing and operating reliable, secure, efficient, and cost -effective systems in the cloud. The Framework provides a set of questions that allows you to review an existing or proposed architecture. It also provides a set of AWS best practices for each pillar.

INTRODUCTION:

The metaverse is "an integrated network of 3D virtual worlds."

These worlds are accessed through <u>a virtual reality headset</u> — users navigate the metaverse using their eye movements, feedback controllers or voice commands. The headset immerses the user, <u>stimulating what is known as presence</u>, which is created by generating the physical sensation of actually being there.



So in general meta verse is a VR-based world independent of our physical one where people can socialize and engage in a seemingly unlimited variety of virtual experiences, <u>all supported with its own digital economy</u>.

Virtual movement, physical discomfort

There are a myriad factors, from missed marketing opportunities to manufacturing obstacles, as to why VR hasn't caught on in a bigger way. But it's possible that using VR is inherently unappealing for a significant number of people, particularly for frequent use.

Despite impressive advancements in screen technology, VR developers are still trying to address the "cybersickness" — a feeling of nausea akin to motion sickness — their devices elicit in many users.

How is Marketing in the Metaverse?

There are several options and ideas that can be taken by brands that want to develop a marketing focused on the Metaverse. We explain some of them below:

• Transfer a real experience to the virtual world

A first step for many companies is to move the experiences they already offer in the real world, to the virtual world. For example, the fashion firm **H&M** held a fashion show in the metaverse with avatars created even live at the event.

• Advertising in the metaverse

In this case, we can also transfer the advertising that the company traditionally carries out, to the metaverse. For example, **PUBG**, a video game ad tech company, went from working on real-world outdoor advertising to placing ads on virtual billboards.



Benefits of metaverse:

With the growing telecommuting trend, more people rely on virtual spaces and digital modes of communication like video and web conferencing to socialize and interact online.

To take their existing digital experience to the next level, Metaverse brings a range of real-world capabilities to users in a 3-D immersive world. Following are the key benefits that Metaverse brings to us.

Addressing remote work challenges

Metaverse has the potential to address all the existing challenges of remote work. It provides managers with a virtual environment where they can meet employees (their avatars), communicate with them, read their body language, and retain in-person interaction. Moreover, the employer can resolve problems like time theft and goldbrick at the workplace by keeping track of the team inside a virtual office.

Making online games more exciting

Today, most Metaverse games are decentralized with an integrated economic model to support play-to-earn gaming. Such games allow users to buy, sell, and trade in-game assets in the form of NFTs. Additionally, the idea of avatars exploring the vast virtual space is enticing for players.



CONCLUSIONS:

Humans have existed on this planet since the last 6 billion years. Exploration and experiences led to our evolution. But there seems to be a certain shortage of space for further expeditions. Land and waters have been well imprinted by humans, and in this search for newer spaces to transverse, technology created a virtual space which is known to us as "The Metaverse."

The Metaverse is a virtual space that connects various digital technologies like Internet, Social networks, Augmented reality (AR), Virtual Reality (VR), video conferencing, cryptocurrency etc. so that Humans can interact virtually and in a futuristic way. It is a new dimension itself, where humans can take their virtual forms through 'Avatars' and experience a simulation.

In simple words, The Metaverse is Digital environment where one can exist as a digital manifestation known as 'Avatars' which present life-like physical features of the user. The 'Avatar' can then meet other real people expressed in the same manner, and interact. People are able to produce desired personal spaces, like houses inside the Metaverse and real economic activities can also take place, through the use of Cryptocurrencies.

ROBOTICS

Sumita Das DCST, 2nd Year

In the latest technical world nowadays the most highlighted topic is **Robotics**. A robot is machine, especially one programmable by a computer—capable of carrying out a complex series of actions automatically.

Robotics involves design, construction, operation, and use of robots. The goal of robotics is to design machines that can help and assist humans. Robotics integrates fields of mechanical engineering, electrical engineering, information engineering, mechatronics, electronics, bioengineering, computer

engineering, control engineering, software engineering, mathematics, etc.

Robotics in Computer Science

Computer science and other disciplines such as mathematics, mechanics, and biology are all used in robotics. Computer science is especially important for developing artificial intelligence and sensor processing (e.g. a computer vision) The use of a hybrid computer system that performs both physical and computational tasks. A robot is a device with one or more arms and joints that can perform many tasks. Industrial robots are not as similar to humans as they can be, but they are not as similar as humans. **Robotics Engineering**

Robotics Engineering is a field that deals with the construction, design, application, and operation of robots. Robotics engineers work with the science of robotics and make these programs or self-sufficient machines (also known as ROBOTS) for multiple functions and businesses such as production, automotive, services, and a lot more!

Application of Robot in real world

Every technology are created to makes human life easy and simple. The primary agenda behind this is to program machines to do outdated, risky, or undesirable jobs.

Humanoid Robot:

A Miracle OF Robotics Science!- Humanoid robots undoubtly are the most ineresting and the mostawaited kind of robots. Engineers across the world have been working on complex problems to develop a successful humanoid robot.





Vacuum Robots

The most popular Domestic Robots Today, vacuum-cleaning robots are the most popular and successful than any other domestic robots.





Robotics in defence sectors

The advancements in robotics are not only bringing comfort to human life, but it is also changing the face of current war machines. Most of these advanced unmanned aerial and ground vehicles are already in use – Drones, and UGVs.

Robotics in Medical sectors:

Robots also help in various medical fields such as laparoscopy, neurosurgery, orthopaedic surgery, disinfecting rooms, dispensing medication, and various other medical domains.



CONCLUSION:

Achieving safe Human-Robot Interaction is one of the grand challenges of robotics. It is necessary to design systems that do not harm human beings during operation. However, due to the lack of real world applications for pHRI, there was very little research on how to assess, rate, and improve the safety of robots for tasks with direct human contact. Mostly, the term safe was used to label dependable robotic components, for which failure rate has to be minimized and reliability to be maximized. In this sense, the monograph gives the first large scale investigation of possible injuries a human would suffer from collisions with robots and elaborates the significant factors in this complex problem.

VIRTUAL MOUSE USING AI

Introduction

With the development technologies in the areas of augmented reality and devices that we use in our daily life, these devices are becoming compact in the form of Bluetooth or wireless technologies. This paper proposes an AI virtual mouse system that makes use of the hand gestures and hand tip detection for performing mouse functions in the computer using computer vision. The main objective of the proposed system is to perform computer mouse cursor functions and scroll function using a web camera or a built-in camera in the computer vision is used as a HCI with the computer. With the use of the AI virtual mouse system, we can track the fingertip of the hand gesture by using a built-in camera or web camera and perform the mouse cursor operations and scrolling function and also move the cursor with it.

While using a wireless or a Bluetooth mouse, some devices such as the mouse, the dongle to connect to the PC, and also, a battery to power the mouse to operate are used, but in this paper, the user uses his/her built-in camera or a webcam and uses his/her hand gestures to control the computer mouse operations. In the proposed system, the web camera captures and then processes the frames that have been captured and then recognizes the various hand gestures and hand tip gestures and then performs the particular mouse function.

Python programming language is used for developing the AI virtual mouse system, and also, OpenCV which is the library for computer vision is used in the AI virtual mouse system. In the proposed AI virtual mouse system, the model makes use of the MediaPipe package for the tracking of the hands and for tracking of the tip of the hands, and also, Pynput, Autopy, and PyAutoGUI packages were used for moving around the window screen of the computer for performing functions such as left click, right click, and scrolling functions. The results of the proposed model showed very high accuracy level, and the proposed model can work very well in real-world application with the use of a CPU without the use of a GPU.

Algorithm Used for Hand Tracking

For the purpose of detection of hand gestures and hand tracking, the MediaPipe framework is used, and OpenCV library is used for computer vision. The algorithm makes use of the machine learning concepts to track and recognize the hand gestures and hand tip.

MediaPipe

MediaPipe is a framework which is used for applying in a machine learning pipeline, and it is an opensource framework of Google. The MediaPipe framework is useful for cross platform development since the framework is built using the time series data. The MediaPipe framework is multimodal, where this framework can be applied to various audios and videos [11]. The MediaPipe framework is used by the developer for building and analyzing the systems through graphs, and it also been used for developing the systems for the application purpose. The steps involved in the system that uses MediaPipe are carried out in the pipeline configuration. The pipeline created can run in various platforms allowing scalability in mobile and desktops. The MediaPipe framework is based on three fundamental parts; they are performance evaluation, framework for retrieving sensor data, and a collection of components which are called calculators [11], and they are reusable. A pipeline is a graph which consists of cate flow through. Developers are able to replace or define custom calculators anywhere in the graph creating their own application. The calculators and streams combined create a data-flow diagram; the graph (Figure 1) is created with MediaPipe where each node is a calculator and the nodes are connected by streams.



OpenCV

OpenCV is a computer vision library which contains image-processing algorithms for object detection [14]. OpenCV is a library of python programming language, and real-time computer vision applications can be developed by using the computer vision library. The OpenCV library is used in image and video processing and also analysis such as face detection and object detection.

Future Scope

The proposed AI virtual mouse has some limitations such as small decrease in accuracy of the right click mouse function and also the model has some difficulties in executing clicking and dragging to select the text. These are some of the limitations of the proposed AI virtual mouse system, and these limitations will be overcome in our future work.

Furthermore, the proposed method can be developed to handle the keyboard functionalities along with the mouse functionalities virtually which is another future scope of Human-Computer Interaction (HCI).

Applications

The AI virtual mouse system is useful for many applications; it can be used to reduce the space for using the physical mouse, and it can be used in situations where we cannot use the physical mouse. The system eliminates the usage of devices, and it improves the human-computer interaction.

Major applications:

- 1. The proposed model has a greater accuracy of 99% which is far greater than the that of other proposed models for virtual mouse, and it has many applications
- 2. the COVID-19 situation, it is not safe to use the devices by touching them because it may result in a possible situation of spread of the virus by touching the devices, so the proposed AI virtual mouse can be used to control the PC mouse functions without using the physical mouse
- 3. system can be used to control robots and automation systems without the usage of devices
- 4. (iv) 2D and 3D images can be drawn using the AI virtual system using the hand gestures
- 5. Al virtual mouse can be used to play virtual reality- and augmented reality-based games without the wireless or wired mouse devices
- 6. Persons with problems in their hands can use this system to control the mouse functions in the computer
- 7. In the field of robotics, the proposed system like HCI can be used for controlling robots
- 8. In designing and architecture, the proposed system can be used for designing virtually for prototyping

Conclusions

The main objective of the AI virtual mouse system is to control the mouse cursor functions by using the hand gestures instead of using a physical mouse. The proposed system can be achieved by using a webcam or a built-in camera which detects the hand gestures and hand tip and processes these frames to perform the particular mouse functions.

From the results of the model, we can come to a conclusion that the proposed AI virtual mouse system has performed very well and has a greater accuracy compared to the existing models and also the model overcomes most of the limitations of the existing systems. Since the proposed model has greater accuracy, the AI virtual mouse can be used for real-world applications, and also, it can be used to reduce the spread of COVID-19, since the proposed mouse system can be used virtually using hand gestures without using the traditional physical mouse.

The model has some limitations such as small decrease in accuracy in right click mouse function and some difficulties in clicking and dragging to select the text. Hence, we will work next to overcome these limitations by improving the finger tip detection algorithm to produce more accurate results.

CLOUD COMPUTING

Introduction:

During the first decade of the current millennium, the term "cloud computing" has become almost ubiquitous in certain circles. Gmail is in the cloud. Facebook is in the cloud. Remotely hosted integrated library systems (ILSs) are also in the cloud. The term "cloud" is on everyone's lips, yet, depending on the community, the term may well mean different things both in theory and in practice. While businesses may look to the cloud for low-cost solutions to data storage and computing power problems, libraries may be interested in targeted solutions for sharing data with other libraries and providing low-cost services to users. Many types of computing problems can benefit from the use of cloud computing solutions, but those solutions may involve a different set of considerations for libraries due in part to the nature of their mission and activities. Different models for nonprofits, and those involved with libraries and cultural heritage institutions are right to explore their options. This book is designed to help librarians and administrators think about cloud computing as a powerful technology, to consider some tools that are available for use in libraries, and to learn about the experiences of libraries already using these technologies.

Cloud Computing Basics:

Cloud computing is a paradigm of distributed computing to provide the customers on-demand, utility based computing services. Cloud users can provide more reliable, available and updated services to their clients in turn. Cloud itself consists of physical machines in the data centers of cloud providers. Virtualization is provided on top of these physical machines. These virtual machines are provided to the cloud users. Different cloud provider provides cloud services of different abstraction level. E.g. Amazon EC2 enables the users to handle very low level details where Google App-Engine provides a development platform for the developers to develop their applications. So the cloud services are divided into many types like Software as a Service, Platform as a Service or Infrastructure as a Service. These services are available over the Internet in the whole world where the cloud acts as the single point of access for serving all customers. Cloud computing architecture addresses difficulties of large scale data processing.

Types of Cloud:

Cloud can be of three types

1. <u>Private Cloud</u> – This type of cloud is maintained within an organization and used solely for their internal purpose. So the utility model is not a big term in this scenario. Many companies are moving towards this setting and experts consider this is the 1st step for an organization to move into cloud. Security, network bandwidth are not critical issues for private cloud.

2. <u>Public Cloud</u> – In this type an organization rents cloud services from cloud providers on-demand basis. Services provided to the users using utility computing model.

3. <u>Hybrid Cloud</u> – This type of cloud is composed of multiple internal or external cloud. This is the scenario when an organization moves to public cloud computing domain from its internal private cloud

Advantages of using Cloud:

The advantages for using cloud services can be of technical, architectural, business etc.

1. Cloud Providers' point of view

(a) Most of the data centers today are under utilized. They are mostly 15% utilized. These data centers need spare capacity just to cope with the huge spikes that sometimes get in the server usage. Large companies having those data centers can easily rent those computing power to other organizations and get profit out of it and also make the resources needed for running data center (like power) utilized properly.

(b) Companies having large data centers have already deployed the resources and to provide cloud services they would need very little investment and the cost would be incremental.

2. Cloud Users' point of view

(a) Cloud users need not to take care about the hardware and software they use and also they don't have to be worried about maintenance. The users are no longer tied to some one traditional system.

(b) Virtualization technology gives the illusion to the users that they are having all the resources available.

(c) Cloud users can use the resources on demand basis and pay as much as they use. So the users can plan well for reducing their usage to minimize their expenditure.

(d) Scalability is one of the major advantages to cloud users. Scalability is provided dynamically to the users. Users get as much resources as they need. Thus this model perfectly fits in the management of rare spikes in the demand.

Motivation towards Cloud in recent time:

Cloud computing is not a new idea but it is an evolution of some old paradigm of distributed computing. The advent of the enthusiasm about cloud computing in recent past is due to some recent technology trend and business models.

1. High demand of interactive applications – Applications with real time response and with capability of providing information either by other users or by nonhuman sensors gaining more and more popularity today. These are generally attracted to cloud not only because of high availability but also because these services are generally data intensive and require analyzing data across different sources.

2. Parallel batch processing – Cloud inherently supports batch-processing and analyzing tera-bytes of data very efficiently. Programming models like Google's map-reduce and Yahoo!'s open source counter part Hadoop can be used to do these hiding operational complexity of parallel processing of hundreds of cloud computing servers.

3. New trend in business world and scientific community – In recent times the business enterprises are interested in discovering customers needs, buying patterns, supply chains to take top management decisions. These require analysis of very large amount of online data. This can be done with the help of cloud very easily. Yahoo! Homepage is a very good example of such thing. In the homepage they show the hottest news in the country. And according to the users' interest they change the ads and other sections in the page. Other than these many scientific experiments need very time consuming data processing jobs like LHC (Large Hadron Collider). Those can be done by cloud.

4. Extensive desktop application – Some desktop applications like Matlab, Mathematica are becoming so compute intensive that a single desktop machine is no longer enough to run them. So they are developed to be capable of using cloud computing to perform extensive evaluations.

Cloud Architecture:

The cloud providers actually have the physical data centers to provide virtualized services to their users through Internet. The cloud providers often provide separation between application and data. This scenario is shown in
the Figure The underlying physical machines are generally organized in grids and they are usually geographically distributed. Virtualization plays an important role in the cloud scenario. The data center hosts provide the physical hardware on which virtual machines resides. User potentially can use any OS supported by the virtual machines used.



Operating systems are designed for specific hardware and software. It results in the lack of portability of operating system and software from one machine to another machine which uses different instruction set architecture. The concept of virtual machine solves this problem by acting as an interface between the hardware and the operating system called as system VMs . Another category of virtual machine is called process virtual machine which acts as an abstract layer between the operating system and applications. Virtualization can be very roughly said to be as software translating the hardware instructions generated by conventional software to the understandable format for the physical hardware. Virtualization also includes the mapping of virtual resources like registers and memory to real hardware resources. The underlying platform in virtualization is generally referred to as host and the software that runs in the VM environment is called as the guest. The Figure 2 shows very basics of virtualization. Here the virtualization layer covers the physical hardware. Operating System accesses physical hardware through virtualization layer. Applications can issue instruction by using OS interface as well as directly using virtualizing layer interface. This design enables the users to use applications not compatible with the operating system.

Virtualization enables the migration of the virtual image from one physical machine to another and this feature is useful for cloud as by data locality lots of optimization is possible and also this feature is helpful for taking back up in different locations. This feature also enables the provider to shut down some of the data center physical machines to reduce power consumption.



Figure 2: Virtualization basic

Comparison between Cloud Computing and Grid Computing:

Most of the cloud architectures are built on Grid architecture and utilizes its service. Grid is also a form of distributed computing architecture where organizations owning data centers collaborate with each other to have mutual benefit. Although if apparently seen it seems that cloud computing is no different from its originator in the first look but there are substantial difference between them in spite of so many similarities.

Relation between Cloud Computing and Utility Computing :

The cloud users enjoy utility computing model for interacting with cloud service providers. This Utility computing is essentially not same as cloud computing. Utility computing is the aggregation of computing resources, such as computation and storage, as a metered service similar to a traditional public utility like electricity, water or telephone network. This service might be provided by a dedicated computer cluster specifically built for the purpose of being rented out, or even an under-utilized supercomputer. And cloud is one of such option of providing utility computing to the users.

Types of utility cloud services:

Utility computing services provided by the cloud provider can be classified by the type of the services. These services are typically represented as XaaS where we can replace X by Infrastructure or Platform or Hardware or Software or Desktop or Data etc. There are three main types of services most widely accepted - Software as a Service, Platform as a Service and Infrastructure as a Service. These services provide different levels of abstraction and flexibility to the cloud users. This is shown in the Figure 3.



Figure 3: Cloud Service stack

Popular Cloud Applications:

Applications using cloud computing are gaining popularity day by day for their high availability, reliability and utility service model. Today many cloud providers are in the IT market. Of those Google App-Engine, Windows Azure and Amazon EC2, S3 are prominent ones for their popularity and technical perspective.

Amazon EC2 and S3 Services:

Amazon Elastic Computing (EC2) is one of the biggest organizations to provide Infrastructure as a Service. They provide the computer architecture with XEN virtual machine. Amazon EC2 is one of the biggest deployment of XEN architecture to date. The clients can install their suitable operating system on the virtual machine. EC2 uses Simple Storage Service (S3) for storage of data. Users can hire suitable amount CPU power, storage, and memory without any upfront commitment. Users can control the entire software stack from kernel upwards. The architecture has two components one is the EC2 for computing purposes and S3 is for storage purposes.

Google App-Engine:

Google App-Engine is a platform for developing and deploying web applications in Google's architecture. This provides Platform as a Service to the cloud users. In 2008 Google App-Engine was first released as beta version. Languages supported by Google App-Engine are python, java and any extension of JVM languages. AppEngine requires developers to use only languages which are supported by it and this is also applied with APIs and frameworks. Now Google App-Engine allows storing and retrieving data from a BigTable non-relational database. AppEngine applications are expected to be request-reply based. Google Appengine provides automatic scalability, persistent data storage service. Data store features a query engine and transaction capabilities. These applications are easy to scale as traffic and data storage need to grow so the cloud user doesn't have to worry about the spikes in the traffic or data. These applications are generally suitable for social networking start-ups, event-based websites catering to seasonal events or institutions (schools, colleges, universities, government agencies) etc.

Windows Azure:

Windows Azure is an intermediate in the spectrum of flexibility vs programmer convenience. These systems use .NET libraries to facilitate language independent managed environment. This service falls under the category of Platform as a Service. Though it is actually in between complete application framework like Google App-Engine and hardware virtual machines like EC2. Azure applications run on machines in Microsoft data centers. By using this service customers can use it to run applications and store data on internet accessible machines owned by Microsoft. windows Azure platform provides three fundamental components - compute component, storage component and fabric component. Basic components of Windows Azure are shown in Figure 4.



Figure 4: Windows Azure component architecture

Conclusion:

Cloud computing is a powerful new abstraction for large scale data processing systems which is scalable, reliable and available. In cloud computing, there are large self-managed server pools available which reduces the overhead and eliminates management headache. Cloud computing services can also grow and shrink according to need. Cloud computing is particularly valuable to small and medium businesses, where effective and affordable IT tools are critical to helping them become more productive without spending lots of money on inhouse resources and technical equipment. Also it is a new emerging architecture needed to expand the Internet to become the computing platform of the future.

ROBOTIC PROCESS AUTOMATION WITH USE OF AI

SICKY KUMAR DCST, 2nd year

ABSTRACT

Robotic process automation (RPA) emerges as a new technology which is focused on automation of repetitive, routine, rule-based human tasks, aiming to bring benefits to the organizations that decide to implement such soft- ware solution. Since RPA is a relatively new technology available on the market, the scientific literature on the topic is still scarce. Therefore, this paper aims to investigate how academic community defines RPA and to which extent has it been investigated in the literature in terms of the state, trends, and application of RPA. Moreover, the difference between RPA and business process management is also addressed. In order to do so, the systematic literature review (SLR) based on Web of Science and Scopus databases have been conducted. The paper provides the results of the conducted SLR on RPA providing an overview of the RPA definitions and practical usage as well as benefits of its implementation in differ- ENT industries.

INTRODUCTION

Changes in the global economy driven by the development of new technologies require businesses to become more agile and to quickly respond to the needs, wishes, and de- mands from their customers. Moreover, competitive and financial pressures force or- ganizations to be more efficient, thus constantly seeking for new technologies and methodologies that would help them become more productive, save costs and add value to their business.

One of the solutions which are emerging as a new technology is robotic process auto- mation (RPA) which can replace employees on repetitive tasks and automate them, and therefore, enable employees to be involved in more complicated tasks which can bring organization more value. According to the reports of consulting companies RPA is recognized as an emerging and disruptive technology that is already delivering value.

Although there is a number of authors reporting various benefits of implementing RPA within an organization according to authors' best knowledge, RPA is, at the moment, more often implemented in practice than it is investigated by the researches. Thus, it very important to discuss differences, similarities, and complementarities between RPA and similar technologies and approaches, one of which is business process management (BPM). For example, there is a recommendation for investigating the integration of BPMS and RPA. Moreover, investigating the state of the BPM market, Harmon indicated that 30% of the surveyed practitioners would like to add some kind of RPA capabilities to their process modeling suite.

ADVANTAGES AND DISADVANTAGES OF ROBOTIC PROCESS AUTOMATION

Robotic Process Automation is a growing technology with several benefits. However, some people still are not convinced of it and make objections. In this article, we have addressed both sides (advantages and disadvantages) of RPA to give you a better understanding of this technology.

ADVANTAGES OF RPA

Some of the significant advantages of Robotic Process Automation software are given below:

Code-Free

RPA doesn't require any coding or programming knowledge. The modern RPA tools are used to automate applications in any department where the clerical work is performed across an enterprise. Hence, Employees only need to be trained on how RPA works and they can easily create bots, just through **GUI (Graphical User Interface)** and different intuitive wizards. It gives an advantage over the traditional methods of automation and enables accelerated delivery of business applications. Besides, this platform reduces the initial cost of installation, training, and deployment.

Security

When an organization is running on automation, more users will demand access to RPA products. Therefore, it is important to have robust user access management features. RPA tools provide options to assign role-based security capabilities to ensure action specific permissions. Furthermore, the entire automated data, audits, and instructions which can be accessed by bots, are encrypted to avoid any malicious tampering. The enterprise RPA tools also offer detailed statistics of the logging of users, their actions, as well as each executed task. Thus, it ensures the internal security and maintains compliance with industry regulations.

Rule-based Exception Handling

RPA system allows users to deploy bots using rules-based exception handling. This feature proactively handles the exception. For example, RPA robot reports an exception, and then the actions given below are triggered:

- The same process is re-assigned to a different bot by the server.
- The current bot retries the same process and removes the previous bot from production.
- If retry is successful, the server maintains the reassignment and raises an alert to report exception & resolution.
- If retry is unsuccessful, it stops the current bot and raises an alert to report exception as well as failed resolution.

Debugging

One of the biggest advantages of RPA from a development perspective is debugging. Some RPA tools need to be stopped running while making changes and replicating the process. The rest of the RPA tools allow dynamic interaction while debugging. It allows developers to test different scenarios by changing the values of the variable without starting or stopping the running process. This dynamic approach allows easy developments and resolution in a production environment without requiring changes to the process.

DISADVANTAGES OF RPA

Some of the major drawbacks of Robotic Process Automation software are given below:

Potential Job Losses

If a robot can work faster with a more consistent rate, then it is assumed that there will be no need for human input. It is the main concern for the employees, and these results as a major threat to the labor market. However, this thinking is not accurate. Amazon has shown a great example of this limitation. The employment rate has grown rapidly during a period where they have increased the number of robots from 1000 to over 45000.

Initial Investment Costs

RPA is still in the stage of innovation, and so it can present challenges that may result in unwanted outcomes. Therefore, it isn't easy for organizations to decide whether they should invest in robotic automation or wait until its expansion. A comprehensive business case must be developed when considering the implementation of this technology; otherwise, it will be useless if returns are only marginal, which may not worth taking the risk.

Hiring Skilled Staff

Many organizations believe that to work with RPA, the staff must have significant technical knowledge of automation as robots may require programming skills and an awareness of how to operate them. It further forces organizations to either hire a skilled staff or train existing employees to expand their skills.

An automation company can be a little beneficial during initial installation and set-up. But the skilled staff can only adopt and manage the robots in the long-term.

Employee Resistance

People are usually habitual, and any change in the organization may cause stress to the employees. People who are involved in new technology will get new responsibilities, and they will have to learn new concepts of a specific technology. Because everyone may not have the same level of knowledge, it may lead existing employees to resign from their job.

BACKGROUND ON ROBOTIC PROCESS AUTOMATION

Robotic Process Automation in Theory and Practice

According to the findings of preliminary literature overview, RPA is defined as the application of specific technology and methodologies which is based on software and algorithms aiming to automate repetitive human tasks. It is mostly driven by simple rules and business logic while interacts with multiple information sys- tems through existing graphic user interfaces. Its functionalities comprise the au- tomation of repeatable and rule-based activities by the use of noninvasive software robot, called "bot".

Recently, RPA definition is extended towards its conjunction with artificial intelligence (AI), cognitive computing, process mining, and data analytics. The introduction of advanced digital technologies allows RPA to be reallocated from performing repetitive and error-prone routines in business processes towards more complex knowledge- intensive and value-adding tasks.

Robotic Process Automation and Business Process Management

BPM is a multidimensional approach aiming to achieve better business performance through continuous process improvement, optimization and digital transformation. BPMS as a holistic software platform that encompasses a wide range of functionalities such as process design, analytics, and monitoring is very often one of the BPM initiative inevitable

perspectives. On the other side, RPA deals with discreet, repetitive tasks and execute processes as a human would. According to Cewe at al. "BPMS is used to orchestrate end-to-end process, and to manage human, robots and system interactions, RPA is responsible for repetitive sequences of tasks that can be fully delegated to software robots".

Identification of Research Questions

The results of the brief literature overview (as presented in Section 2) revealed the significance of RPA for business practitioners and researchers, and the lack of SLR in the RPA domain. The preliminary findings showed the gaps in research contexts, the lack of theoretical frameworks and discrepancies in the definition of RPA and its content. Besides, the ad-hoc portrait of recent RPA literature showed that RPA is recognized in business practice as leverage for performance improvement. Though many benefits and challenges of RPA implementation were addressed, the need to systematize experiences from business practice referring to the usage of RPA was noticed. Finally, the discussion regarding RPA as a newly emerged area of BPM was evidenced in both professional and academic literature.

Following the previous annotations about scientific and professional papers that focus their attention on RPA, the research questions are determined.

Systematic Literature Research Protocol

In order to fulfill the objectives of this paper and to answer the research questions, a SLR approach was adopted. SLR methodology has been originated in medicine re- searches, but during the last two decades, this approach became popular in management and information systems field researches because it systematizes knowledge from a prior body of research and ensures the fidelity, completeness, and quality of findings. According to a typical SLR guideline, our literature retrieval was conducted through a three-step approach SLR protocol definition and literature search and selection quality appraisal and extraction of relevant articles and qualitative analysis and synthesis of the accepted articles.

SLR Protocol Element	Translation in RPA Research	
Digital Sources	Scopus and Web of Science Core Collection (WoS).	
Searched Term	Robotic process automation.	
Search Strategy	No publication date limit; no topic limit; search term contained anywhere in the articles and conference papers only (no editorial, review, conference review).	
Inclusion Criteria	Search string "robotic process automation"	
Exclusion Criteria	Articles without full access; extended abstracts (without full text); book ch professional papers; articles citing the term "robotic process automation" with a Meaning.	

Table1. RPA Research Protocol

RESEARCH RESULTS

SLR Results: The State and Progress of Research on RPA

This section responds to **RQ1** presenting the basic bibliographic results obtained from the analysis of the coded fields: 'Year of publication', 'Publication outlet' (a journal or a conference proceeding), 'Study strategy' (a theoretically applied approach, an empirical research or a review) and 'Journal title'.

Figure 1 presents a publishing frequency (2021-2022) regarding publication outlet. A total of 20 out of 27 articles were published in 2021, among which 14 conference papers and 6 journal articles. Only 4 journal articles and 3 conference

papers were published in 2021 and 2022.

According to Issacet al, functionalities of the traditional RPA are:

- front office (attended) automation and back office (unattended) automation,
- script based designer and visual process designer,
- the openness of the platform,
- macro recorders for process mapping,

DISCUSSION

The aim of this section is to analyze and discuss the previously raised research questions. To address the RQ1 the bibliometric analysis of a sample of articles was con-ducted showing that the research on RPA was almost tripled in 2020 in comparison to period 2021-2022. This can lead to the conclusion that the number of RPA researches will continue the growth in the future. Having in mind that RPA is a rather new and emerging field, the results identifying the appearance of 17 conference papers against 10 journal articles imply that the full research potential on RPA topic hasn't been achieved yet. Hence, it can be concluded that the studies on RPA have only begun to emerge and it is expected they will achieve its proliferation in the next few years, including appearance in peer-reviewed journals. A total of 18 out of 27 articles fell into the "empirical research" category indicating the scarcity of RPA theoretical researches and conceptual frameworks. Only 1 structured literature study (e.g. SLR article) investigating RPA case studies proved our assumption about the lack of SLR approach in the field. The top 2 conferences publishing RPA studies are information-systems related (Lecture Notes in Business Information Processing Series), and IT and computing-related (ACM International Conference Proceeding Series). Similarly, half of the journal articles about RPA were published in journals covering the management of information systems issues (MIS Quarterly Executive) and case studies on contemporary information and communications technology themes (Journal of Information Technology Teaching Cases). Only 3 authors (Lacity, Willcocks, and Anagnoste) contributed with more than one paper. The results of the analysis about the RPA and advanced technologies integration indicate what is coming next to RPA, so giving the answer on the second goal of RQ2-1. According to Anagnoste, RPA solutions are moving toward AI technologies, such as: "IOCR, chat-bots, machine learning, cognitive platforms, anomaly detection, pat- tern analysis, voice recognition, data classification and many more". Besides, the implementation of the "advanced RPA" within different fields is evidenced (e.g. healthcare, tourism, agriculture, distribution, and sales), thus proving the wide range of integrated RPA and advanced technologies applicability.

CONCLUSION

This paper presented the results of SLR on RPA based on the search results from WoS and Scopus databases. According to the authors' best knowledge, this paper rep- resents the first SLR paper focused on all RPA related publications from the named two databases, which is one of its contributions. The results of the SLR conducted for the purpose of this paper revealed the existence of another RPA related SLR; however, it dealt only with case studies and not all available publications. Moreover, named SLR has been focused on publications available on the public Web and Google Scholar. Besides the named contribution, this paper focused on opinions and writings of the academics regarding the RPA, elaborated through three research questions presented in the methodology section of the paper. In that sense, the paper gives an overview of definitions, usage, and benefits of RPA in practice, as well as the explanation of the difference between RPA and BPMS. Moreover, the results of the conducted SLR revealed lack of theoretical studies on RPA, indicating that the area is still relatively new and that no theoretical frameworks have been formed. The limitations of this paper include lack of access to two papers which have been found through the search process and therefore their exclusion from the presented analysis. Based on the results of the conducted SLR, research gap in terms of the lack of both theoretical as wellas empirical research has been noticed.

FRAUD DETECTION USING AI

ARKO BHATTACHARYA DCST, 2rd year



Things that people used to buy in stores are now purchased online, whether it's furniture, groceries, or clothing. Detecting fraud in a dynamic global corporate environment with an overwhelming quantity of traffic and data to monitor can be difficult.

Fraud detection is an excellent application for machine learning, having a track record of success in areas such as banking and insurance.

It's shocking, but it's true! According to <u>McAfee's latest report</u>, cybercrime presently damages the global economy \$600 billion, or 0.8 percent of global GDP. Fraud is becoming a more and more serious threat to banks and their consumers, costing billions of dollars each year.

Scams including false invoices, CEO fraud, and business email compromise (BEC), among others, are being carried out through social engineering rather than high-tech hacking.

Some banks will reimburse their consumers, while others would not, claiming the customer's responsibility for initiating the transaction. Banks are losing money or consumer trust in any case. <u>Al and Fraud Detection</u>

Using AI to detect fraud has aided businesses in improving internal security and simplifying corporate operations. Artificial Intelligence has therefore emerged as a significant tool for avoiding financial crimes due to its increased efficiency.

Al can be used to analyze huge numbers of transactions in order to uncover fraud trends, which can subsequently be used to detect fraud in real-time.

When fraud is suspected, AI models may be used to reject transactions altogether or flag them for further investigation, as well as rate the likelihood of fraud, allowing investigators to focus their efforts on the most promising instances.

The AI model can also offer cause codes for the transaction being flagged. These reason codes direct the investigator as to where they should seek to find the faults and aid to speed up the investigation.

AI may also learn from investigators when they evaluate and clear questionable transactions, reinforcing the AI model's knowledge and avoiding trends that don't lead to fraud.

Role of ML and AI in Fraud Detection

Machine learning is a term that describes analytic approaches that "learn" patterns in datasets without the assistance of a human analyst.

Al is a wide term that refers to the use of particular types of analytics to complete tasks ranging from driving a car to, yep, detecting a fraudulent transaction.

Consider machine learning to be a method of creating analytic models, and AI to be the application of those models.

Because the approaches enable the automatic finding of patterns across huge quantities of streaming transactions, they are very successful in fraud prevention and detection.

Benefits of using Machine Learning and AI in Preventing Frauds

If done correctly, machine learning can tell the difference between legal and fraudulent conduct while also responding to new, previously unknown fraud methods over time.

This may get fairly complicated since patterns in the data must be interpreted and data science applied to constantly enhance the capacity to identify normal from aberrant behavior. This necessitates the correct execution of hundreds of calculations in milliseconds.

Strategies for fraud detection and prevention using AI

1. Using Supervised and Unsupervised AI Models Together

Because organized crime tactics are so clever and adaptable, defensive efforts based on a single, one-size-fits-all analytic methodology will fail. Expertly developed anomaly detection approaches that are optimal for the situation at hand should be supported by each use case.

As a result, both supervised and unsupervised models are critical in fraud detection and must be integrated into complete, next-generation fraud tactics.

A supervised model is one that is trained on a large number of correctly "labeled" transactions, which is the most frequent type of machine learning across all fields.

Each transaction is assigned to one of two categories: fraud or non-fraud. In order to discover patterns that best reflect lawful activities, the models are trained by consuming huge quantities of labeled transaction information.

The amount of clean, relevant training data used in the development of a supervised model is closely connected to model accuracy.

Unsupervised models are intended to detect unusual behavior when labeled transaction data is scarce or non-existent. In these instances, self-learning must be used to uncover patterns in the data that are hidden by traditional analytics.



2. Behavioral analytics in action

Machine learning is used in behavioral analytics to analyze and predict behavior at a granular level across all aspects of a transaction. Profiles that describe the habits of each user, merchant, account, and device are kept track of the data.

These profiles are updated in real-time with each transaction, allowing analytic features to be computed that offer accurate forecasts of future behavior.

The financial and non-financial transactions are detailed in the profiles. Changes of address, a request for a duplicate card, or a recent password reset are all examples of non-monetary transactions.

To mention a few instances, monetary transaction information assists in the construction of patterns that may indicate an individual's average expenditure velocity, the hours and days

when they tend to transact, and the time duration between geographically dispersed payment sites.

Profiles are extremely useful since they provide an up-to-date picture of activity, which can help prevent transaction abandonment due to annoying false positives.

A solid corporate fraud solution comprises a variety of analytic models and profiles, which provide the information needed to analyze real-time transaction trends.

3. Developing Models with Large Datasets

According to research, the quantity and breadth of data have a greater influence on the success of machine learning models than the algorithm's intelligence. It's the equivalent of human experience in computing.

This implies that, where possible, increasing the dataset used to create the predictive features utilized in a machine learning model might increase prediction accuracy.

Consider this: There's a reason why doctors are required to see thousands of patients during their education. This level of knowledge, or learning, enables them to diagnose properly within their field of expertise.

A model will profit from the expertise obtained from absorbing millions or billions of instances, both valid and fraudulent transactions when it comes to fraud detection.

Superior fraud detection is done by evaluating a large amount of transactional data to better understand and estimate risk on an individual basis.

4. Self-Learning AI and Adaptive Analytics

Fraudsters make it incredibly difficult and dynamic to secure consumers' accounts, which is where machine learning excels. Adaptive solutions meant to sharpen reactions, particularly on marginal judgments, should be considered by fraud detection specialists for continuous performance improvement.

These are transactions that are quite near to the investigative triggers, either slightly above or slightly below the threshold.

The narrow line between a false positive event — a legal transaction that has scored too high — and a false negative event — a fraudulent transaction that has scored too low — is where accuracy is most essential.

Adaptive analytics sharpens this difference by providing an up-to-date understanding of a company's danger vectors.

By automatically adjusting to recently proven case disposition, adaptive analytics systems increase sensitivity to evolving fraud trends, resulting in a more accurate distinction between frauds and non-frauds.

When an analyst investigates a transaction, the result — whether the transaction is confirmed

as legitimate or fraudulent — is fed back into the system.

This allows analysts to accurately reflect the fraud environment they are dealing with, including new tactics and subtle fraud patterns that have been dormant for some time. This adaptive modeling approach makes changes to the model automatically.

The weights of predictive characteristics in the underlying fraud models are automatically adjusted using this adaptive modeling method. It's a strong tool for improving fraud detection at the margins and preventing new forms of fraud assaults.



JOSHIM SK DCST, 2rd year

iCloud is the service from Apple that securely stores your photos, files, notes, passwords and other data in the cloud and keeps it up to date across all your devices automatically. iCloud also makes it easy to share photos, files, notes and more with friends and family. You can also back up your iPhone, iPad or iPod touch using iCloud.

iCloud includes a free email account and 5 GB of free storage for your data. For more storage and additional features, you can subscribe to iCloud+.

Seamlessly integrated

iCloud is built into each Apple device. To set up iCloud, you just sign in to your device with your Apple ID, then choose which apps you want to use with iCloud and which iCloud features you want to turn on or off. You can customize these settings for each device. You can also access information stored in iCloud on a Windows computer using iCloud for Windows and in a web browser at iCloud.com.



Advantages of iCloud

- Well designed app and web interfaces.
- Compatible with Windows as well as macOS and iOS devices.
- Account includes 5 GB storage when you buy apple device.
- Security is very tight.
- These type of data can that iCloud can backup from your iOS device.
 - 1. Your personal device setting ,like the screen brightness or call volume.
 - 2. Your app arrangement on the screen.
 - 3. Ringtones and text messages.
 - 4. Apps ,music and books you have purchased from iTunes.
 - 5. App data ,like an account setup or game scoreboard.
 - 6. Photos and videos associated with the camera roll feature in iOS.

Disadvantages of iCloud

- Less straightforward than competing services.
- No search in web interface.
- No Android app.
- Collaborative editing lacks expected capabilities.
- No file versioning aside from iWork documents.

	the second s	
	iCloud	Q Search
	Cloud Drive	Options
	😑 🌸 Photos	Options
	🖌 🎑 Mail	
PC Magazine pc com	Contacts	
Account Details	Calendars	
	Reminders	
	🗹 📝 Safari	
	✓ Notes	
Sign Out	iCloud Documents	5 GB of 5 GB used Manage

How the apple iCloud works..?

Cloud storage is a growing tech trend. Making use of cloud computing technology, cloud storage services give you password-protected access to online storage space. You can upload files to this storage space as a backup copy of content from your hard drive, as additional space to supplement your hard drive, or just to make those files available online from other computers or mobile devices.

Apple's cloud storage product, iCloud, is designed to work seamlessly with all your Apple devices connected to the Internet. For example, you can upload photos from your iPhone and access them from your MacBook, upload music from your MacBook to listen to from your iPod Touch, or upload an important document from your Mac desktop to access from your iPad when you're on the go.

But iCloud isn't Apple's first online storage service. MobileMe was iCloud's long-standing predecessor, offering synchronization services for an annual subscription fee. MobileMe's primary purpose was to keep certain files synchronized between multiple devices. This included e-mail, contacts, calendars, browser bookmarks, photo galleries and Apple iWeb and iDisk services. Though MobileMe was tailor-made for Apple products, it also gave users the option to synchronize data from non-Apple computers.

Apple revamped MobileMe and merged its offerings into the new iCloud service. iCloud not only replaces MobileMe, it also adds features, flexibility and free service for up to 5 GB of storage space. In addition, digital products you purchase through Apple's iTunes Store are available from your iCloud account without counting against that free 5 GB. Later, we'll take a closer look at iCloud's features and pricing and how they compare to other cloud storage products.

Like its MobileMe predecessor, iCloud's biggest advantage is that it's integrated into Apple software. That makes iCloud your most convenient cloud storage option, if all your computers and mobile devices are Apple products. Apps you use in both Mac OS X and Apple iOS can connect to your iCloud space and automatically store your data there, including your contacts list and photo gallery. Also like MobileMe, this can expand to include Apple devices used by other family members, too. With iCloud, you can ensure your data is continuously synchronized among your Apple devices while they're connected to the Internet.

iCloud	-		×
iCloud	 iCloud Drive Photos Mail, Contacts, Calendars, and Tasks With Outlook Bookmarks 	Options	7.4
Michael Muchm mwmpcmag@h	You have 50.0 GB of iCloud storage. Photos and Videos 6.88 GB	Storage	
Account details		<u>iCloud H</u>	<u>elp</u>
Sign out	Apply	Close	

Conclusion

In conclusion, I have answered all of the hopeful questions I was looking to answer. For one, I wanted to know what iCloud was, and as I said before it is a service that connects all of your Apple devices, otherwise known as iDevices, in order to make work and school life easier. The second question I was looking to answer was advantages of iCloud. iCloud is cheaper and can hold more data, but in the long run it may be more expensive because one may have to update their computers and tablets to Apple products if they want to continue using and connecting everything through iCloud versus another cloud computing program.

The third question I was looking to answer was how iCloud is working. After reading information straight from this magazine it was clear that iCloud is secure both when information is transferring from each device and when the information is saved and stored in the cloud. Therefore making me believe that iCloud is very secure with a minimal risk or hacking.

INTRODUCTION OF COMPUTER VIRUS.

A computer virus is a type of malicious software, or malware, that spreads between computers and causes damage to data and software.

Computer viruses aim to disrupt systems, cause major operational issues, and result in data loss and leakage. A key thing to know about computer viruses is that they are designed to spread across programs and systems. Computer viruses typically attach to an executable host file, which results in their viral codes executing when a file is opened. The code then spreads from the document or software it is attached to via networks, drives, file-sharing programs, or infected email attachments.

HOW DOES A COMPUTER VIRUS ATTACK?

Once a virus has successfully attached to a program, file, or document, the virus will lie dormant until circumstances cause the computer or device to execute its code. In order for a virus to infect your computer, you have to run the infected program, which in turn causes the virus code to be executed.

This means that a virus can remain dormant on your computer, without showing major signs or symptoms. However, once the virus infects your computer, the virus can infect other computers on the same network. Stealing passwords or data, logging keystrokes, corrupting files, spamming your email contacts, and even taking over your machine are just some of the devastating and irritating things a virus can do.

While some viruses can be playful in intent and effect, others can have profound and damaging effects. This includes erasing data or causing permanent damage to your hard disk. Worse yet, some viruses are designed with financial gains in mind.

HOW DO COMPUTER VIRUSES SPREAD?

In a constantly connected world, you can contract a computer virus in many ways, some more obvious than others. Viruses can be spread through email and text message attachments, Internet file downloads, and social media scam links. Your mobile devices and smartphones can become infected with mobile viruses through shady app downloads. Viruses can hide disguised as attachments of socially shareable content such as funny images, greeting cards, or audio and video files.

To avoid contact with a virus, it's important to exercise caution when surfing the web, downloading files, and opening links or attachments. To help stay safe, never download text or email attachments that you're not expecting, or files from websites you don't trust.

WHAT ARE THE SIGNS OF A COMPUTER VIRUS?

A computer virus attack can produce a variety of symptoms. Here are some of them:

- **Frequent pop-up windows.** Pop-ups might encourage you to visit unusual sites. Or they might prod you to download antivirus or other software programs.
- **Changes to your homepage.** Your usual homepage may change to another website, for instance. Plus, you may be unable to reset it.
- Mass emails being sent from your email account. A criminal may take control of your account or send emails in your name from another infected computer.

- **Frequent crashes.** A virus can inflict major damage on your hard drive. This may cause your device to freeze or crash. It may also prevent your device from coming back on.
- Unusually slow computer performance. A sudden change of processing speed could signal that your computer has a virus.
- Unknown programs that start up when you turn on your computer. You may become aware of the unfamiliar program when you start your computer. Or you might notice it by checking your computer's list of active applications.
- Unusual activities like password changes. This could prevent you from logging into your computer.



ADVANTAGES OF COMPUTER VIRUS.

They ensure the proper utilization of resources of your pc, see a virus can fill you 1TB drive easily, but you are never ever gonna do that. They test the breaking point of pc, by installing viruses you can check how much virus can you pc can bear. Without viruses, anti-viruses companies don't exist.

DISADVANTAGES OF COMPUTER VIRUS.

- Virus can crash window.
- Virus can remove window files due to this the computer system slow down.
- Virus can stole the valuable data of your computer.
- Due to some virus the hardware of computer system can not work properly.
- Virus can disable some of your operating system settings.
- Virus programs are really the savior of all those whose lives are totally machine dependent.
- Virus can display pop up adds on your computer desktop.

- Virus can hacks important files.
- Virus can generate instability in performance.



What are the different types of computer viruses?

- 1. **Boot sector virus:-** This type of virus can take control when you start or boot your computer. One way it can spread is by plugging an infected USB drive into your computer.
- 2. **Web scripting virus:-** This type of virus exploits the code of web browsers and web pages. If you access such a web page, the virus can infect your computer.
- 3. **Browser hijacker:-** This type of virus "hijacks" certain web browser functions, and you may be automatically directed to an unintended website.
- **4. Resident virus:-** This is a general term for any virus that inserts itself in a computer system's memory. A resident virus can execute anytime when an operating system loads.
- **5. Direct action virus:-** This type of virus comes into action when you execute a file containing a virus. Otherwise, it remains dormant.
- **6. Polymorphic virus:-** A polymorphic virus changes its code each time an infected file is executed. It does this to evade antivirus programs.
- **7.** File infector virus:- This common virus inserts malicious code into executable files files used to perform certain functions or operations on a system.
- **8. Multipartite virus:** This kind of virus infects and spreads in multiple ways. It can infect both program files and system sectors.
- **9.** Macro virus:- Macro viruses are written in the same macro language used for software applications. Such viruses spread when you open an infected document, often through email attachments.

EXAMPLES OF COMPUTER VIRUSES.

- Morris worm
- I love you
- Nimda
- SQL slammer
- Crypto locker

CONCLUSION

Computer viruses are very destructive programs that can be devastating to companies and individuals. Upon completion of this magazine students should be able to have an understanding of the following : what viruses are ,how many types of computer viruses ,how it look like etc. student should also show proficiency in accessing online information.

What is cloud computing:

The cloud" refers to servers that are accessed over the Internet, and the software and databases that run on those servers. Cloud servers are located in data centers all over the world.

Type of cloud computing:

There are also three main types of cloud computing services: Infrastructure-as-a-Service (IaaS), Platforms-as-a-Service (PaaS), and Software-as-a-Service (SaaS).



PaaS:

PaaS means the hardware and an application-software platform are provided and managed by an outside cloud service provider, but the user handles the apps running on top of the platform and the data the app relies on. Primarily for developers and programmers, PaaS gives users a shared cloud platform for application development and management (an important DevOps component) without having to build and maintain the infrastructure usually associated with the process.

SaaS:

SaaS is a service that delivers a software application—which the cloud service provider manages—to its users. Typically, SaaS apps are web applications or mobile apps that users can access via a web browser. Software updates, bug fixes, and other general software maintenance are taken care of for the user, and they connect to the cloud applications via a dashboard or API. SaaS also eliminates the need to have an app installed locally on each individual user's computer, allowing greater methods of group or team access to the software.

Characteristics of Cloud Computing:

- **Resources Pooling.** •
- **On-Demand Self-Service.**
- Easy Maintenance.
- Scalability And Rapid Elasticity.
- Economical. •
- Measured And Reporting Service.
- Security. •
- Automation.

Cloud Deployment Model:

Today, organizations have many exciting opportunities to reimagine, repurpose and reinvent their businesses with the cloud. The last decade has seen even more businesses rely on it for quicker time to market, better efficiency, and scalability. It helps them achieve lo ng-term digital goals as part of their digital strategy.

Though the answer to which cloud model is an ideal fit for a business depends on your organization's computing and business needs. Choosing the right one from the various types of cloud service deployment models is essential. It would ensure your business is equipped with the performance, scalability, privacy, security, compliance & cost-effectiveness it requires. It is important to learn and explore what different deployment types can offer - around what particular problems it can solve.

Read on as we cover the various cloud computing deployment and service models to help discover the best choice for your business.

What Is A Cloud Deployment Model?

It works as your virtual computing environment with a choice of deployment model depending on how much data you want to store and who has access to the Infrastructure.

Different Types Of Cloud Computing Deployment Models

Most cloud hubs have tens of thousands of servers and storage devices to enable fast loading. It is often possible to choose a geographic area to put the data "closer" to users. Thus, deployment models for cloud computing are categorized based on their location. To know which model would best fit the requirements of your organization, let us first learn about the various types.

Types of Cloud Computing Deployment Models



Public Cloud:

The name says it all. It is accessible to the public. Public deployment models in the cloud are perfect for organizations with growing and fluctuating demands. It also makes a great choice for companies with low-security concerns. Thus, you pay a cloud service provider for networking services, compute virtualization & storage available on the public internet. It is also a great delivery model for the teams with development and testing. Its configuration and deployment are quick and easy, making it an ideal choice for test environments.

Public Cloud



Benefits of Public Cloud

- Minimal Investment As a pay-per-use service, there is no large upfront cost and is ideal for businesses who need quick access to resources
- \circ ~ No Hardware Setup The cloud service providers fully fund the entire Infrastructure
- No Infrastructure Management This does not require an in-house team to utilize the public cloud.

Limitations of Public Cloud

- Data Security and Privacy Concerns Since it is accessible to all, it does not fully protect against cyberattacks and could lead to vulnerabilities.
- Reliability Issues Since the same server network is open to a wide range of users, it can lead to malfunction and outages
- Service/License Limitation While there are many resources you can exchange with tenants, there is a usage cap.

Private Cloud:

Now that you understand what the public cloud could offer you, of course, you are keen to know what a private cloud can do. Companies that look for cost efficiency and greater control over data & resources will find the private cloud a more suitable choice.

It means that it will be integrated with your data center and managed by your IT team. Alternatively, you can also choose to host it externally. The private cloud offers bigger opportunities that help meet specific organizations' requirements when it comes to customization. It's also a wise choice for mission-critical processes that may have frequently changing requirements.



Benefits of Private Cloud

- o Data Privacy It is ideal for storing corporate data where only authorized personnel gets access
- Security Segmentation of resources within the same Infrastructure can help with better access and higher levels of security.
- Supports Legacy Systems This model supports legacy systems that cannot access the public cloud.

Limitations of Private Cloud

- Higher Cost With the benefits you get, the investment will also be larger than the public cloud. Here, you will pay for software, hardware, and resources for staff and training.
- o Fixed Scalability The hardware you choose will accordingly help you scale in a certain direction
- High Maintenance Since it is managed in-house, the maintenance costs also increase.

Community Cloud:

The community cloud operates in a way that is similar to the public cloud. There's just one difference - it allows access to only a specific set of users who share common objectives and use cases. This type of deployment model of cloud computing is managed and hosted internally or by a third-party vendor. However, you can also choose a combination of all three.



Benefits of Community Cloud

- Smaller Investment A community cloud is much cheaper than the private & public cloud and provides great performance
- Setup Benefits The protocols and configuration of a community cloud must align with industry standards, allowing customers to work much more efficiently.

Limitations of Community Cloud

- Shared Resources Due to restricted bandwidth and storage capacity, community resources often pose challenges.
- Not as Popular Since this is a recently introduced model, it is not that popular or available across industries

Hybrid Cloud

As the name suggests, a hybrid cloud is a combination of two or more cloud architectures. While each model in the hybrid cloud functions differently, it is all part of the same architecture. Further, as part of this deployment of the cloud computing model, the internal or external providers can offer resources.

Let's understand the hybrid model better. A company with critical data will prefer storing on a private cloud, while less sensitive data can be stored on a public cloud. The hybrid cloud is also frequently used for 'cloud bursting'. It means, supposes an organization runs an application on-premises, but due to heavy load, it can burst into the public cloud.



Benefits of Hybrid Cloud

- Cost-Effectiveness The overall cost of a hybrid solution decreases since it majorly uses the public cloud to store data.
- Security Since data is properly segmented, the chances of data theft from attackers are significantly reduced.

 Flexibility - With higher levels of flexibility, businesses can create custom solutions that fit their exact requirements.

Limitations of Hybrid Cloud

- Complexity It is complex setting up a hybrid cloud since it needs to integrate two or more cloud architectures.
- Specific Use Case This model makes more sense for organizations that have multiple use cases or need to separate critical and sensitive data.

Disadvantages of Cloud Computing:

There are benefits from the cloud computing usage but it is undeniable that this system also has some disadvantages. The risks of cloud computing you should know such as:

Risk of data confidentiality:

There is always a risk that user data can be accessed by other people. So data and cloud protection must be good because if it won't be dangerous for data confidentiality.

Depends on internet connection:

The internet is the only way to cloud computing. When there is no internet connection in your place, or the internet path to the cloud provider is in trouble, automatically access to your cloud computing machine will be disconnected. Now this is where the biggest obstacle is happening in developing countries and remote areas that do not have good internet access. And the weakness of public cloud is where everyone accesses the same server and server and will increase the risk of attack, and down the server.

The level of security:

Secrecy and security are among the most doubtful things in cloud computing. By using a cloud computing system means we are fully entrusted with the security and confidentiality of data to companies that provide cloud computing servers. When you experience a problem, you cannot sue the server for errors in the data. When you experience a problem, you cannot sue the data.

Compliance:

This refers to the risk of a level compliance deviation from the provider against the regulations applied by the user.

Vulnerable in the event of an attack:

There are lots of arguments against cloud computing one of which is computing because the Cloud Computing work system is online, each component that is on Cloud Computing can be exposed to a wide range, this is a wide open opportunity for attacks on data or activities stored on the server. When an attack is carried out by hackers, the problems that occur are data security, and data privacy.

Data Mobility:

Which refers to the possibility of sharing data between cloud services and how to retrieve data if one day the user makes a process of terminating cloud computing services. And there is local storage where the data can be used at any time as needed.

Technical problem:

Besides that the use of Cloud Computing makes you unable to manage it yourself when there is a problem or a problem, you must contact customer support who is not necessarily ready 24/7. This is a problem because for some support you also have to pay more money.

Low Connection:

This will not work well if the connection is slow. The quality of cloud computing servers is one of the most important considerations before we decide to provide cloud computing server service providers. When the server is down or the performance is not good, we will be harmed because of poor server quality.

Well, that's the advantages and disadvantages of using Cloud Computing services. Not only the use of Cloud is all just good, there is also a shortage of Cloud. However, never be afraid to use what is called Cloud Computing. What readers need to note is that there is no single safe and good system. If there is a safe and good system, there is no need for a system update and bug fixes.

What Type of Businesses Get Impact of Cloud Computing Disadvantages?

Marketplace companies such as Amazon, Alibaba and Airbnb have considered cloud computing risks and benefits. Quoting from Hitwise.com, Amazon did an over 17 million transactions made on Amazon over Prime Day 2018 and all of them were done online. Imagine if there was a problem like a server that had to be down for some time, Amazon could lose millions of dollars. This can also happen to Alibaba, Airbnb and e-commerce as well as various other online-based marketplaces that make transactions online.

In addition, for health companies, patient data is a confidential matter and privacy. Disadvantages of cloud computing that has less security can cause data leak to public. Law firms will also potentially get losses when using cloud computing if a problem occurs. This is because law firm cloud computing is at risk in security and the flexibility of work will hinder the performance of law firms. That is why law firm should use the trusted and professional cloud providers for the business.

What do we do to overcome the disadvantages of cloud computing?

Cloud Computing that sounds so dangerous because it has various disadvantages, but you need to remember that Cloud Computing also has several advantages that can help your business grow. It is undeniable that Cloud Computing is an extraordinary system, although there are various disadvantages, because there is no truly perfect system. Besides, cloud service technology is always improving time to time. The future of cloud computing will be more sophisticated and better management. But first essential thing you need to do is finding the best cloud service is before moving to the cloud.

What you need to do to overcome the shortcomings in cloud computing is to find service providers who want to provide your business needs and ensure the security of your server. In addition, inadequate infrastructure is one of the problems that is often experienced, for this you can also use Cloud Hybird where service providers will handle the transition and reduce time & costs greatly using personnel and technology for your business.

Keycomcloud provides the best cloud computing system for your business needs and we are confident to protect our client data. We serve security assurance for any kind of business, but we specialize our scope in legal area.

Research areas in 5G Technology Nabarup Sarkar Dcst, 2nd Year

We are currently on the cusp of 5G rollout. As industry experts predict, 5G deployments will gain momentum, and the accessibility of 5G devices will grow in 2020 and beyond. But as the general public waits for mass-market 5G devices, our understanding of this new technology is continuing to develop. Public and private organizations are exploring several research areas in 5G technology, helping to create more awareness of breakthroughs in this technology, its potential applications and implications, and the challenges surrounding it.

What is especially clear at this point is that 5G technology offers a transformative experience for mobile communications around the globe. Its benefits, which include higher data rates, faster connectivity, and potentially lower power consumption, promise to benefit industry, professional users, casual consumers, and everyone in between. As this article highlights, researchers have not yet solved or surmounted all of the challenges and obstacles surrounding the wide scale deployment of 5G technology. But the potential impact that it will have on the entire matrix of how we communicate is limited only by the imagination of the experts currently at its frontier.

New developments and applications in 5G technologies

Much of the transformative impact of 5G stems from the higher data transmission speeds and lower latency that this fifth generation of cellular technology enables. Currently, when you click on a link or start streaming a video, the lag time between your request to the network and its delivery to your device is about twenty milliseconds.

That may not seem like a long time. But for the expert mobile robotics surgeon, that lag might be the difference between a successful or failed procedure. With 5G, latency can be as low as one millisecond.

5G will greatly increase bandwidth capacity and transmission speeds. Wireless carriers like Verizon and AT&T have recorded speeds of one gigabyte per second. That's anywhere from ten to one hundred times faster than an average cellular connection and even faster than a fiber-optic cable connection. Such speeds offer exciting possibilities for new developments and applications in numerous industries and economic sectors.

E-health services

For example, 5G speeds allow telemedicine services to enhance their doctor-patient relationships by decreasing troublesome lag times in calls. This helps patients return to the experience of intimacy they are used to from inperson meetings with health-care professionals.

As 5G technology continues to advance its deployment, telemedicine specialists find that they can live anywhere in the world, be licensed in numerous states, and have faster access to cloud data storage and retrieval. This is especially important during the COVID-19 pandemic, which is spurring new developments in telemedicine as a delivery platform for medical services.

Energy infrastructure

In addition to transforming e-health services, the speed and reliability of 5G network connectivity can improve the infrastructure of America's energy sector with smart power grids. Such grids bring automation to the legacy power arrangement, optimizing the storage and delivery of energy. With smart power grids, the energy sector can more effectively manage power consumption and distribution based on need and integrate off-grid energy sources such as windmills and solar panels.

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Farming

Another specific area to see increased advancement due to 5G technology is artificial intelligence (AI). One of the main barriers to successful integration of AI is processing speeds. With 5G, data transfer speeds are ten times faster than those possible with 4G. This makes it possible to receive and analyze information much more efficiently. And it puts AI on a faster track in numerous industries in both urban and rural settings.

In rural settings, for example, 5G is helping improve cattle farming efficiency. By placing sensors on cows, farmers capture data that AI and machine learning can process to predict when cows are likely to give birth. This helps both farmers and veterinarians better predict and prepare for cow pregnancies.

However, it's heavily populated cities across the country that are likely to witness the most change as mobile networks create access to heretofore unexperienced connectivity.

Smart cities

Increased connectivity is key to the emergence of smart cities. These cities conceive of improving the living standards of residents by increasing the connectivity infrastructure of the city. This affects numerous aspects of city life, from traffic management and safety and security to governance, education, and more.

Smart cities become "smarter" when services and applications become remotely accessible. Hence, innovative smartphone applications are key to smart city infrastructure. But the potential of these applications is seriously limited in cities with spotty connectivity and wide variations in data transmission speed. This is why 5G technology is crucial to continued developments in smart cities. Other applications

Many other industries and economic sectors will benefit from 5G. Additional examples include automotive communication, smart retail and manufacturing.

VIRTUAL REAILITY

Aakash Ghosh Dcst, 2nd Year

Virtual Reaility :-

We will first and most importantly remind ourselves that the objective of VR is to allow the user to almost complete a task while believing that they are doing it in the real world. VR technology generates this feeling by deceiving our brains, providing it with information identical to the information the brain would perceive in the real environment.

Let us take an example: everyone have always dreamed of flying a rocket without ever having acted on this desire. Well then, a VR(Virtual Reality) system could help us achieve this dream by simulating the experience of flying a rocket. To start with, it is extremely important that you are given images that reproduce the view from a cockpit. In order to give you the impression of "being in the rocket", these images must be large and of good quality, so that the perception of your real environment is pushed to the background or even completely replaced by that of the virtual environment(VE). This phenomenon of modifying perception, is called immersion, is the first fundamental principle of VR. VR headsets, which are known as visioheadsets, offer a good immersion experience as the only visual information perceived is delivered through this device. If the system also generates the sound of the spacecraft engine, your immersion will be greater as your brain will perceive

this information rather than the real sounds in your environment, which then reinforces the impression of being in an spacecraft. In a manner similar to that of the visioheadset, an audio headset is used, as it can insulate against background noise.



A real pilot acts in the real environment by using a joystick and dials to steer the plane. It is extremely important that these actions be reproduced in the VR experience if we wish to simulate reality. Thus, the system must provide several buttons to control the behaviour of

the spacecraft and a joystick to steer it. This interaction mechanism between the user and the system is the second fundamental principle of VR. It also serves to differentiate VR from applications that offer good immersion but no real interaction. For example, movie theaters can offer visual and auditory sensations of very



high quality, but the spectator is offered absolutely no interaction with the story happening on the screen. The same observation can be made for "VR-videos", which have recently become quite popular, but the only interaction offered is a change in point of view (360°). While this family of applications cannot be challenged, they do not qualify as VR experiences as the user is only a spectator and not an actor in the experience.

Generally speaking, why do we use VR? This technology was developed to achieve several objectives:

1. Design

Engineers have used VR for a long time, in order to improve the construction of a building or a vehicle, either for moving around within or around these objects or using them virtually in order to detect any design flaws there may be. It must be noted that these virtual design operations have been extended to contexts beyond real objects, for example, for movements (surgical, industrial, sports) or complex protocols.

2. Learning

As we have seen in our example above, it is possible, today, to learn to pilot any kind of vehicle: plane, car (including F1 cars), ship, space shuttle or spacecraft, etc. VR offers many advantages, the first and foremost being that of safety while learning. Let us note that these learning operations have extended beyond steering vehicles to more complex processes such as the management of a nuclear center from a control room, or even learning to overcome phobias (of animals, empty spaces, crowds, etc.) using behavioral therapy that is based on VR.

Augmented Reaility :-

The goal of AR is to enrich the perception and knowledge of a real environment by adding digital information relating to this environment. This information is most often visual, sometimes auditory related and is rarely haptic. In most AR applications, the user visualizes synthetic images through glasses, headsets, video projectors or even through mobile phones/tablets. The difference between these devices is based on the superimposition of information onto natural vision that the first three types of devices offer, while the fourth only offers remote viewing.



Google's Measure Application



Google's AR Map Application

Let us use the example of a user who wishes to build a house. While they will only have blueprints, initially, AR will allow them to move around the plot, visualize the future building (by overlaying synthetic images onto their natural vision of the real environment) and perceive general

volumes and the implantation in the landscape. As they move on to the process of construction, the user can compare several design and/or furnishing possibilities by visualizing painted walls or furniture arranged in different layouts in a structure that is still under construction. Going beyond interior design and furnishing, it is also possible for an electrician to visualize the placement of insulation and for a plumber to visualize the placement of pipes.

Why develop AR applications? There are several important reasons:

1. Driving assistance

Originally intended to help fighter jet pilots by displaying crucial information on the cockpit screen so that they would not need to look away from the sky to look at dials or displays (which can be crucial in combat), AR gradually



opened up the option of assisted driving to other vehicles (civil aircraft, cars, bikes) including navigation information such as GPS.

2. Tourism

By enhancing the capabilities of the audio-guides available to visitors of monuments and museums, certain sites offer applications that combine images and sound.

Even though they share algorithms and technologies, VR and AR can be clearly distinguished from each other. The main difference is that in VR the tasks executed remain virtual, whereas in AR they are real. For example, the virtual spacecraft that you piloted never really took off and thus never produced CO₂ in the real world, but the electrician using AR may cut through a gypsum board partition to install a real switch that can turn on or off a real light.

As of 2022 We now have more AR capabilities on our devices (particularly our phones and tablets), and we're seeing an even bigger push toward VR. In 2022, we'll see new, lighter, more portable VR devices, so instead of having clunky headsets that require WiFi connections, we will have devices that are more like glasses that



connect to our phones and give us superior VR experiences on the go. These VR & AR advances pave the way for incredible experiences in the metaverse, a persistent, shared virtual world that users can access through different devices and platforms. In the next few years, we may be using augmented reality technology to check our text messages and smart glasses to scroll through Instagram.

Artificial Intelligence in Agriculture :

Using Modern Day AI to Solve Traditional Farming Problems

Overview

- Understand what is Artificial Intelligence
- Lifecycle of agriculture
- Challenges faced in Agriculture with traditional farming techniques.
- How we can overcome challenges in Agriculture with the Application of AI in Agriculture

Artificial Intelligence

Artificial intelligence is based on the principle that human intelligence can be defined in a way that a machine can easily mimic it and execute tasks, from the simplest to those that are even more complex. The goals of artificial intelligence include learning, reasoning, and perception.

Some examples, vision-recognition systems on self-driving cars, in the recommendation engines that suggest products you might like based on what you bought in the past, speech, and language recognition of the Siri virtual assistant on the Apple iPhone.

Al is making a huge impact in all domains of the industry. Every industry looking to automate certain jobs through the use of intelligent machinery. And a good <u>Artificial Intelligence Course Online</u> is all you need to break into any industry. Even Agriculture!

Agriculture and farming are one of the oldest and most important professions in the world. It plays an important role in the economic sector. Worldwide, agriculture is a \$5 trillion industry.

Data Science Immersive Bootcamp

The global population is expected to reach more than nine billion by 2050 which will require an increase in agricultural production by 70% to fulfill the demand. As the world population is increasing due to which land water and resources becoming insufficient to continue the demand-supply chain. So, we need a smarter approach and become more efficient about how we farm and can be most productive

In this article, I will cover are challenges faced by farmers by using traditional methods of farming and how Artificial Intelligence is making a revolution in agriculture by replacing traditional methods by using more efficient methods and helping the world to become a better place.

Lifecycle of Agriculture

We can divide the Process of Agriculture into different parts:



Preparation of soil: It is the initial stage of farming where farmers prepare the soil for sowing seeds. This process involves breaking large soil clumps and remove debris, such as sticks, rocks, and roots. Also, add fertilizers and organic matter depend on the type of crop to create an ideal situation for crops.

Sowing of seeds: This stage requires taking care of the distance between two seeds, depth for planting seeds. At this stage climatic conditions such as temperature, humidity, and rainfall play an important role.

Adding Fertilizers: To maintain soil fertility is an important factor so the farmer can continue to grow nutritious crops and healthy crops. Farmers turn to fertilizers because these substances contain plant nutrients such as nitrogen, phosphorus, and potassium. Fertilizers are simply planted nutrients applied to agricultural fields to supplement the required elements found naturally in the soil. This stage also determines the quality of the crop

Irrigation: This stage helps to keep the soil moist and maintain humidity. Underwatering or overwatering can hamper the growth of crops and if not done properly it can lead to damaged crops.

Weed protection: Weeds are unwanted plants that grow near crops or at the boundary of farms. Weed protection is important to factor as weed decreases yields, increases production cost, interfere with harvest, and lower crop quality

Harvesting: It is the process of gathering ripe crops from the fields. It requires a lot of laborers for this activity so this is a labor-intensive activity. This stage also includes post-harvest handling such as cleaning, sorting, packing, and cooling.

Storage: This phase of the post-harvest system during which the products are kept in such a way as to guarantee food security other than during periods of agriculture. It also includes packing and transportation of crops.

Challenges faced by farmers by using traditional methods of farming

- In farming climatic factors such as rainfall, temperature and humidity play an important role in the agriculture lifecycle. Increasing deforestation and pollution result in climatic changes, so it's difficult for farmers to take decisions to prepare the soil, sow seeds, and harvest.
- Every crop requires specific nutrition in the soil. There are 3 main nutrients nitrogen(N), phosphorous(P) and potassium(K) required in soil. The deficiency of nutrients can lead to poor quality of crops.
- As we can see from the agriculture lifecycle that weed protection plays an important role. If not controlled it can lead to an increase in production cost and also it absorbs nutrients from the soil which can cause nutrition deficiency in the soil.

Applications of Artificial Intelligence in Agriculture

The industry is turning to Artificial Intelligence technologies to help yield healthier crops, control pests, monitor soil, and growing conditions, organize data for farmers, help with the workload, and improve a wide range of agriculture-related tasks in the entire food supply chain.



Use of weather forecasting: With the change in climatic condition and increasing pollution it's difficult for farmers to determine the right time for sowing seed, with help of Artificial Intelligence farmers can analyze weather conditions by using weather forecasting which helps they plan the type of crop can be grown and when should seeds be sown.

Soil and crop health monitoring system: The type of soil and nutrition of soil plays an important factor in the type of crop is grown and the quality of the crop. Due to increasing, deforestation soil quality is degrading and it's hard to determine the quality of the soil.

A German-based tech start-up PEAT has developed an AI-based application called Plantix that can identify the nutrient deficiencies in soil including plant pests and diseases by which farmers can also get an idea to use fertilizer which helps to improve harvest quality. This app uses image recognition-based technology. The farmer can capture images of plants using smartphones. We can also see soil restoration techniques with tips and other solutions through short videos on this application.

Similarly, Trace Genomics is another machine learning-based company that helps farmers to do a soil analysis to farmers. Such type of app helps farmers to monitor soil and crop's health conditions and produce healthy crops with a higher level of productivity.

Analyzing crop health by drones: SkySqurrel Technologies has brought drone-based Ariel imaging solutions for monitoring crop health. In this technique, the drone captures data from fields and then data is transferred via a USB drive from the drone to a computer and analyzed by experts.

This company uses algorithms to analyze the captured images and provide a detailed report containing the current health of the farm. It helps the farmer to identify pests and bacteria helping farmers to timely use of pest control and other methods to take required action

Precision Farming and Predictive Analytics: Al applications in agriculture have developed applications and tools which help farmers inaccurate and controlled farming by providing them proper guidance to farmers about water management, crop rotation, timely harvesting, type of crop to be grown, optimum planting, pest attacks, nutrition management.

While using the machine learning algorithms in connection with images captured by satellites and drones, Alenabled technologies predict weather conditions, analyze crop sustainability and evaluate farms for the presence of diseases or pests and poor plant nutrition on farms with data like temperature, precipitation, wind speed, and solar radiation.

Farmers without connectivity can get AI benefits right now, with tools as simple as an SMS-enabled phone and the Sowing App. Meanwhile, farmers with Wi-Fi access can use AI applications to get a continually AI-customized plan for their lands. With such IoT- and AI-driven solutions, farmers can meet the world's needs for increased food sustainably growing production and revenues without depleting precious natural resources.

In the future, AI will help farmers evolve into agricultural technologists, using data to optimize yields down to individual rows of plantss



Agricultural Robotics: Al companies are developing robots that can easily perform multiple tasks in farming fields. This type of robot is trained to control weeds and harvest crops at a faster pace with higher volumes compared to humans.

These types of robots are trained to check the quality of crops and detect weed with picking and packing of crops at the same time. These robots are also capable to fight with challenges faced by agricultural force labor.

Al-enabled system to detect pests: Pests are one of the worst enemies of the farmers which damages crops.

Al systems use satellite images and compare them with historical data using Al algorithms and detect that if any insect has landed and which type of insect has landed like the locust, grasshopper, etc. And send alerts to farmers to their smartphones so that farmers can take required precautions and use required pest control thus Al helps farmers to fight against pests.

Conclusion

Artificial Intelligence in agriculture not only helping farmers to automate their farming but also shifts to precise cultivation for higher crop yield and better quality while using fewer resources.

Companies involved in improving machine learning or Artificial Intelligence-based products or services like training data for agriculture, drone, and automated machine making will get technological advancement in the future will provide more useful applications to this sector helping the world deal with food production issues for the growing population.

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