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THINK BEYOND THE LIMITS

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Message from the Principal

Dear Students, Faculty, Alumni, and Esteemed Readers,

It is with great pride and enthusiasm that I introduce the latest issue of *I-Deserve*, the Department of Computer Science's technical magazine. This issue explores a theme of paramount importance: *The Social Implications of Computing*. As technology continues to shape and redefine the world around us, it becomes ever more crucial to understand not just how computing works, but *how it affects the people and societies it serves*.

In an era where digital innovation is both pervasive and powerful, we must ask critical questions about the social consequences of the technologies we create. From artificial intelligence and machine learning to big data and cybersecurity, the scope of computing extends far beyond technical excellence. Today's technologies influence every aspect of our lives — from how we communicate, work, and learn, to how we address pressing societal issues such as inequality, privacy, and the future of employment. The articles in this issue delve deeply into the ethical, social, and cultural dimensions of computing. Topics range from the responsibility of tech professionals in creating inclusive and accessible systems, to the role of computing in bridging or widening the digital divide, to the ways technology can both empower and harm vulnerable populations. This magazine invites us to reflect on our responsibilities as technologists, researchers, and educators in an increasingly connected and digital world.

It is heartening to see that our students, faculty, and alumni are engaging with these critical issues. Through thoughtful analysis, research, and discourse, *I Deserve* provides a platform for exploring how we can harness the power of computing to promote social good, while mitigating its potential negative consequences. The content in this issue challenges us to think about the broader impact of our work and emphasizes the importance of developing technology with a human-centred, ethical approach. I would like to commend the editorial team, contributors, and designers for their dedication to bringing this issue to life. Your hard work and commitment to creating a publication of such high caliber are truly inspiring. I am confident that this issue will spark important discussions within and outside our academic community.

As you read through this edition, I encourage you to reflect on your own role in shaping the future of computing and consider how we can, as a collective, create technology that is ethical, inclusive, and aligned with the values of equity and justice.

I hope you find this issue both enlightening and thought-provoking, and that it encourages us all to take a closer look at the responsibilities we bear as creators and consumers of technology.

Warm regards,
Dr. Sukanta Bhattacharyya
Principal
Mankar College

Message from Head of the Department

Dear Students, Faculty, Alumni, and Esteemed Readers,

It is with great excitement and pride that I present to you the latest issue of *I-Deserve*, our departmental technical magazine. This issue carries a theme that is both timely and crucial: *The Social Implications of Computing*. As technology continues to reshape the fabric of society, it is imperative that we, as a community of thinkers, creators, and innovators, engage with the profound and often complex ways in which computing impacts our world.

The articles and research presented in this issue reflect the deep, multifaceted relationship between technology and society. From the ethical challenges of artificial intelligence and data privacy to the digital divide and the role of computing in social justice, this issue offers a platform for critical discussion on how computing technologies influence not only the economy but also the lives of individuals and communities. In exploring these issues, we seek to highlight the responsibilities that come with technological advancements and the imperative to ensure that innovation serves the greater good.

As we move forward in a world that is increasingly driven by algorithms, cloud computing, and data, it is essential that we ask: How can we ensure that technology is inclusive, equitable, and respectful of human rights? How do we navigate the fine line between progress and its unintended consequences? These questions are not only central to the field of computing but are also crucial to shaping a future that is just and sustainable for all. I would like to extend my heartfelt thanks to the editorial team, contributors, and designers for their hard work and dedication to this issue. Your efforts have brought to life a compelling and thought-provoking collection of articles that will undoubtedly inspire conversations and provoke critical thought. I am deeply proud of the work that has gone into this publication, and I am confident that it will serve as a valuable resource for anyone interested in the social dimensions of computing.

As you read through the pages of this issue, I encourage you to reflect on the transformative power of technology and the ethical, social, and cultural considerations that come with it. It is our collective responsibility to ensure that computing advances in a way that is not only innovative but also human-centred, responsible, and socially conscious.

I hope you find this issue both engaging and enlightening, and that it sparks continued dialogue about how we, as a department and a society, can shape the future of technology for the better.

Warm regards,
Dr. Amitava Bondyopadhyay
Head of Department

Message from Editor of the Magazine

Dear Readers,

It is my privilege to welcome you to this year's 3rd edition of *I-Deserve*, the annual magazine of the Computer Science Department. This year, we delve into a theme that is both timely and thought-provoking: *The Social Implications of Computing*.

In this ever-evolving world of technology, *I-Deserve* stands as a platform to celebrate innovation, creativity, and academic excellence within our department. This magazine is more than just a publication—it is a testament to the collective efforts, aspirations, and achievements of our talented students, faculty, and alumni.

In this issue, we delve into the latest advancements in computer science, explore thought-provoking ideas, and showcase the incredible projects that reflect the ingenuity of our community.

The name *I-Deserve* echoes a sentiment of self-worth and ambition—qualities that drive each of us to strive for excellence and innovation. Whether you're flipping through these pages as a contributor, a reader, or a supporter, we hope you find inspiration and motivation to continue exploring the boundless possibilities in the field of computer science.

I extend my heartfelt gratitude to all the contributors, editorial team members, and faculty advisors who made this edition possible. Together, we have created something truly special that celebrates our shared love for technology and learning.

Thank you for being a part of this journey. Here's to another year of discovery, growth, and success!

Warm regards,
Kunal Kumar Mandal
Editor, *I-Deserve*
Department of Computer Science

Leveraging Machine Learning to Enhance Cybersecurity for Women

Dr. Amitava Bondyopadhyay

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Abstract

Cybersecurity is a critical aspect of the modern digital age, and its importance is amplified for vulnerable groups, such as women, who face heightened risks of online harassment, identity theft, and exploitation. Machine learning (ML) offers innovative solutions to enhance cybersecurity measures, providing more robust, adaptive, and proactive defense mechanisms. This paper explores how ML technologies can improve cybersecurity for women by mitigating online threats, addressing gender-specific risks, and empowering women to take control of their digital security. It will cover various ML applications, challenges, and future directions for improving cybersecurity through intelligent systems that prioritize the safety of women online.

Introduction

The proliferation of digital technologies and social media platforms has ushered in a new era of communication, work, and commerce. However, it has also created new vulnerabilities, especially for women, who face disproportionate levels of online harassment, cyberbullying, stalking, and other forms of digital abuse. In recent years, the convergence of machine learning (ML) and cybersecurity has provided powerful tools for enhancing online safety. ML's ability to analyze large datasets, detect patterns, and make predictions offers significant potential to mitigate the risks that women face online. This paper aims to explore the intersection of ML and cybersecurity, with a focus on how these technologies can be tailored to protect and empower women in the digital sphere.

The Cybersecurity Challenges Faced by Women

Women, particularly those in marginalized communities, experience distinct challenges in the digital world. These challenges include:

1. **Cyber Harassment and Abuse:** Women are often the target of online harassment, including cyberstalking, revenge porn, and trolling. These threats can cause significant emotional and psychological distress.
2. **Gender-Based Exploitation:** Women are more vulnerable to various forms of online exploitation, including identity theft, phishing attacks, and scams. Gender-based violence (GBV) has also migrated to the digital realm, with perpetrators using technology to control, track, and harm women.
3. **Privacy Risks:** Women, particularly in high-risk situations such as survivors of domestic violence, may face an increased risk of privacy breaches. The unintentional sharing of sensitive information or location data can lead to severe consequences, including physical harm.
4. **Lack of Awareness and Resources:** Many women lack the technical knowledge or access to digital tools that could help them protect themselves from cyber threats. This creates a gap in cybersecurity preparedness.

These challenges necessitate tailored, adaptive cybersecurity measures that are sensitive to the unique needs and risks faced by women.

How Machine Learning Enhances Cybersecurity for Women

Machine learning provides several capabilities that can improve the cybersecurity landscape for women. The following applications highlight the potential of ML technologies in this context:

1. Detecting and Preventing Cyber Harassment

One of the most significant contributions of machine learning to cybersecurity for women is its ability to detect and mitigate online harassment. By analyzing textual and behavioral data from social media platforms, ML algorithms can identify patterns indicative of abusive language, trolling, and targeted harassment.

- **Natural Language Processing (NLP):** ML-powered NLP algorithms can scan online content (comments, messages, posts) for abusive language, hate speech, or threats, flagging harmful interactions in real-time. These systems can automatically block or report harassers, reducing the mental and emotional burden on women.
- **Behavioral Analysis:** Machine learning models can monitor users' interactions on digital platforms and create profiles based on behavior. When suspicious patterns of harassment or stalking emerge (e.g., repeated comments, messages, or location tracking), these systems can trigger alerts, enabling prompt intervention.

2. Predicting and Mitigating Online Exploitation

ML can also be used to predict and mitigate the risks of online exploitation, including fraud, identity theft, and scams. By analyzing patterns in digital transactions, emails, and browsing behaviors, ML algorithms can detect unusual or potentially harmful activities and alert users to potential threats.

- **Phishing Detection:** ML can be employed to identify phishing attempts by analyzing the structure and content of emails, websites, and messages. Advanced algorithms can recognize subtle signs of fraud, such as fake URLs, misleading language, and fraudulent sender information, and protect women from falling victim to these attacks.
- **Fraud Detection:** In cases where women may be targeted by financial scams or fraudsters, machine learning algorithms can analyze transaction data for anomalies, such as unauthorized credit card charges or unfamiliar login attempts, triggering alerts or blocking suspicious activities.

3. Ensuring Privacy and Security

Women's privacy is frequently compromised online, either due to intentional attacks or accidental sharing of sensitive data. ML technologies can help safeguard privacy through enhanced authentication systems, data encryption, and real-time anomaly detection.

- **Biometric Authentication:** ML-powered biometric systems, such as facial recognition and voice recognition, can provide additional layers of security to protect women's digital identities from unauthorized access. These systems are more secure than traditional passwords and less susceptible to brute-force attacks.
- **Anomaly Detection:** ML algorithms can continuously monitor women's online activity to detect any abnormal behavior, such as unauthorized logins, unusual data access, or suspicious changes in account settings. By flagging potential security breaches in real-time, these systems can mitigate the risks of identity theft and privacy violations.

4. Empowering Women with Knowledge and Tools

Machine learning can also play a role in educating and empowering women to take control of their cybersecurity. Personalized training and assistance systems powered by ML can guide women through securing their online presence, protecting their privacy, and understanding digital threats.

- **Personalized Security Assistance:** ML-powered chatbots or virtual assistants can provide women with tailored advice on how to secure their devices, choose strong passwords, enable two-factor authentication, and recognize phishing attempts. These systems can learn from user interactions and continuously improve their advice based on the specific needs and concerns of each woman.
- **Self-Defense Tools:** Machine learning can be integrated into cybersecurity apps and platforms, offering real-time guidance on how to protect personal data, monitor online activity, and respond to digital threats. For instance, if a woman is being stalked online, ML systems can suggest privacy-enhancing actions such as blocking certain users or hiding location information.

Ethical Considerations and Challenges

While machine learning holds significant promise for improving cybersecurity for women, its implementation comes with challenges and ethical concerns that need to be addressed:

1. **Bias in ML Models:** Machine learning models can sometimes be biased, especially if the data used to train these models reflects societal inequalities. For example, a bias in harassment detection algorithms might lead to the underreporting of harassment faced by women of color or LGBTQ+ women. Ensuring that ML models are trained on diverse and representative datasets is essential to avoid reinforcing harmful stereotypes.

2. **Privacy Concerns:** The use of ML in cybersecurity often involves collecting and analyzing large amounts of personal data. It is crucial to ensure that this data is handled responsibly and ethically to protect women's privacy, particularly in sensitive cases such as domestic violence survivors.
3. **Accessibility:** Many women, especially in underrepresented or low-income communities, may not have access to the tools or resources needed to benefit from ML-driven cybersecurity solutions. Ensuring that these technologies are accessible and user-friendly is key to their widespread adoption and effectiveness.

Future Directions

As machine learning technologies evolve, new opportunities to enhance cybersecurity for women will emerge. Some future directions include:

- **Cross-Platform Integration:** Integrating ML-powered security tools across different platforms (e.g., social media, email, mobile apps) will provide women with a seamless and holistic defense against cyber threats.
- **Collaboration with Legal Frameworks:** ML technologies can be paired with legal frameworks to offer real-time reporting and legal support for women experiencing online abuse or harassment, improving their ability to seek justice.
- **Community-Driven Solutions:** Collaborative efforts between cybersecurity professionals, women's rights organizations, and tech companies can lead to the development of ML tools specifically designed to address the unique challenges faced by women online.

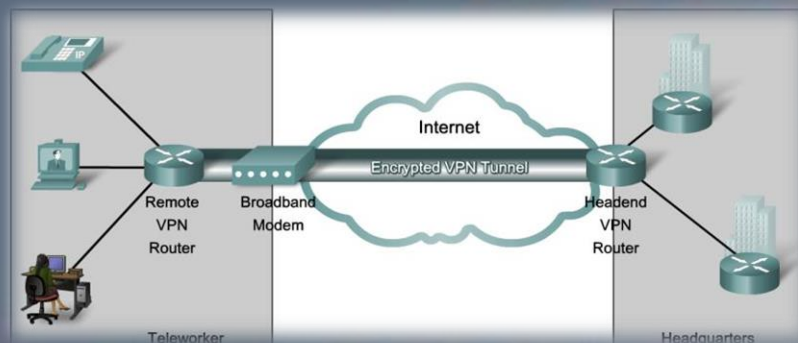
Conclusion

Machine learning offers transformative potential for improving cybersecurity, particularly for women who face unique and often amplified risks in the digital world. By leveraging the power of ML to detect threats, protect privacy, and empower women with knowledge and tools, we can build a safer and more inclusive digital environment. However, it is essential to address the ethical challenges of bias, privacy, and accessibility to ensure that these technologies are deployed responsibly and equitably. Ultimately, machine learning can play a pivotal role in creating a digital ecosystem where women feel empowered, protected, and secure.

Private Networks

Bappaditya Modak
State Aided College Teacher, Department of Computer Science

A **private network** is that computer network which has restricted access for users or devices. Since, like public networks, private networks are closed systems with given boundaries, it means open internet access would not be provided to any person as by these networks a controlled and safe environment was provided for the purpose of information exchange. Private networks commonly use the private IP addresses, which cannot be accessed by an external user without authentic permission.



Types of Private Networks

- Virtual Private Network (VPN)
- Virtual Local Area Network (VLAN)
- Enterprise Private Network (EPN)
- Private Cloud Network
- Cellular Network (Private LTE/5G)

How Does a Private Network Work?

Traditionally, a private network is based on private IP addresses combined with strict access controls. Private IP addresses are reserved for use only within a private network and thus cannot be reached over the general internet. The internal IP addresses enable it to talk internally but do not let all the external threats in. Private networks rely on network routers, firewalls, and VPNs to enhance security. It can, for instance, employ a firewall to prevent unauthorized access and a VPN to secure remote connections from a home office. VLANs are commonly adopted to further segment the network and restrict data flow to various departments or teams; hence, access control and potential risks are controlled.

The Pros of Private Wireless Networks

- *Enhanced Security*
- *Greater Control*
- *Improved Network Performance*
- *Customizable Coverage*

The Cons of Private Wireless Networks

- High Initial Costs
- Need for Expertise
- *Maintenance and Upgrades*

Social Engineering: The Strategy of Human Hacking

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Social engineering, often referred to as "human hacking," is a manipulation technique that exploits psychological vulnerabilities rather than technical weaknesses in systems. This form of hacking preys on human behaviour and emotions to gain unauthorized access to sensitive information, financial assets, or even physical spaces. As digital and physical security systems grow more advanced, the human element remains a significant weak point. This essay explores the current landscape of social engineering attacks, the strategies employed by attackers, and the measures being taken to defend against them.

1. Overview of Social Engineering

Social engineering exploits fundamental aspects of human nature, such as trust, fear, curiosity, and the tendency to follow authority. Cybercriminals use these psychological factors to manipulate individuals into divulging confidential information, clicking on malicious links, or performing actions that undermine security protocols. Unlike traditional hacking, which involves exploiting software vulnerabilities, social engineering works by manipulating the victim's behaviour to achieve the attacker's goal.

Social engineering attacks have become more sophisticated in recent years, evolving from simple phishing emails to highly tailored, multi-layered campaigns designed to deceive even the most security-conscious individuals. Attackers are increasingly leveraging data from social media and other online platforms to craft personalized and convincing scams.

2. Common Social Engineering Attacks

Several tactics are commonly employed by attackers using social engineering methods. Some of the most prevalent include:

a. Phishing

Phishing is the most well-known form of social engineering. Attackers use fraudulent emails, websites, or messages that appear to be from trusted sources to trick victims into revealing sensitive information such as usernames, passwords, or credit card details. Modern phishing attacks are often highly sophisticated, featuring convincing logos, domain names, and even personalized content based on information scraped from social media profiles or previous interactions.

b. Spear Phishing

Spear phishing is a more targeted version of phishing. Unlike generic phishing attacks that cast a wide net, spear phishing is highly personalized. Attackers often gather information about the victim from social media, public records, and other sources to craft a highly convincing message that appears to come from someone the victim knows and trusts, such as a coworker, boss, or business partner.

c. Pretexting

In pretexting, the attacker creates a fabricated scenario or pretext to obtain sensitive information. This might involve impersonating a legitimate service provider (such as a bank or tech support) and convincing the target to reveal personal details under the guise of a routine check or request. Pretexting often targets individuals in high-profile roles, such as executives or employees with access to sensitive company data.

d. Baiting

Baiting involves offering something enticing, such as free software, exclusive access, or gifts, to lure victims into a trap. Once the victim takes the bait—by downloading an infected file, entering login credentials, or accessing a malicious link—the attacker gains access to their personal or financial information. Baiting can be done physically (e.g., leaving infected USB drives in public places) or digitally (e.g., via fake downloads).

e. Quizzes and Surveys

A relatively new method of social engineering, quizzes and surveys exploit the human desire for entertainment and curiosity. Attackers may distribute seemingly harmless quizzes or surveys on social media platforms, which ask personal questions. As people complete these quizzes, they unknowingly provide data that can be used for further attacks, such as answering security questions or creating more convincing spear-phishing attempts.

3. The Role of Technology in Social Engineering

While social engineering primarily relies on human manipulation, attackers have increasingly integrated advanced technology to enhance the effectiveness of their strategies. Machine learning, AI, and automation tools are now used to generate more convincing phishing campaigns, analyze large datasets for personalized attacks, and even conduct social engineering on a massive scale.

For instance, AI-powered chatbots are now being employed to impersonate customer service representatives, allowing attackers to engage with targets in real-time and manipulate them into revealing sensitive information. Similarly, AI is used to analyze the online activity of potential victims to craft targeted messages that resonate with their specific interests and concerns.

Deepfake technology also poses a significant threat, allowing attackers to create hyper-realistic audio and video recordings of individuals. This could be used in scenarios such as impersonating company executives to authorize fraudulent transactions or to influence key decisions.

4. The Evolving Threat Landscape

As more people work remotely, engage in online learning, and use digital tools for everyday tasks, the attack surface for social engineering has grown exponentially. Social media platforms, messaging apps, and even online games provide attackers with abundant opportunities to harvest personal information and establish relationships with targets.

The rise of the "information age" has made individuals more accessible than ever before. Attackers can scrape publicly available data from various platforms—such as LinkedIn, Facebook, or even Twitter—to build a psychological profile of their target. This makes attacks not only more common but also more convincing. In fact, the practice of "OSINT" (Open-Source Intelligence) is now frequently employed by cybercriminals to gather information for social engineering.

Another emerging concern is the intersection of social engineering with cyber warfare. Nation-state actors have begun using social engineering techniques to influence public opinion, sway elections, or cause social unrest. The rise of disinformation campaigns, fake news, and manipulative political ads demonstrates how social engineering tactics can be employed for broader, often malicious, geopolitical purposes.

5. Mitigating Social Engineering Threats

Organizations and individuals must remain vigilant and adopt a multi-faceted approach to defend against social engineering attacks. The following strategies are key to minimizing the risk of falling victim:

a. Education and Awareness

The most effective defence against social engineering is a well-informed population. Regular training sessions, awareness programs, and simulated phishing exercises can help individuals recognize common attack vectors and understand how to respond. Businesses should encourage employees to question suspicious requests and verify information before taking any action.

b. Two-Factor Authentication (2FA)

By requiring a second form of verification, such as a fingerprint or text message code, organizations can make it much harder for attackers to access sensitive accounts even if they manage to obtain login credentials through social engineering.

c. Use of Advanced Security Tools

Many security solutions now include features designed to detect and block social engineering attempts. Anti-phishing software, email filtering systems, and AI-driven threat detection platforms can help identify malicious attempts before they reach the target.

d. Regular Audits and Incident Response Plans

Organizations must conduct regular audits of their security systems to identify potential vulnerabilities, including those involving human factors. Moreover, businesses should have an incident response plan in place to quickly mitigate the effects of a social engineering attack and reduce damage.

6. Conclusion

Social engineering continues to be one of the most potent and dangerous tactics used by cybercriminals. Despite technological advancements in cyber security, human vulnerability remains a significant weak point. As social engineering attacks become more sophisticated and personalized, it is crucial for both individuals and organizations to remain aware of the evolving threats. Education, advanced security measures, and vigilance are key to defending against this ever-growing risk. By strengthening the human element of cyber security, we can build a more resilient defence against the increasing tide of social engineering attacks.

AI in Stock Market

Prasun pal

State Aided College Teacher, Mankar College

Introduction:

We all know more or less what AI is. Also know how AI spread everywhere in the present era. There are very few people who do not know the AI. Although, they are using the AI in daily activities. For example, searching on internet, E-commerce, Social networks, online navigation, Chabot and many devices like Camera, Cars and more. However, we will discuss the application of AI in a very emerging investment system i.e. in stock market.

What is Stock Market?

A stock market, equity market, or share market is the aggregation of buyers and sellers of stocks (also called shares), which represent ownership claims on businesses; these may include securities listed on a public stock exchange as well as stock that is only traded privately, such as shares of private companies that are sold to investors through equity crowd funding platforms. Investments are usually made with an investment strategy in mind.

AI and Stock Market:

Predicting the stock market is challenging yet and crucial for investors, traders, and researchers. Various methods, including mathematical, statistical, and AI techniques, have been proposed to forecast stock prices and outperform the market. AI techniques, particularly Machine Learning (ML) and Deep Learning (DL), have garnered increasing attention.

Now, many of us who doesn't know the investment strategies well can use AI as assistance. The combination of AI and stock trading remains one of the most innovative disruptions available today, allowing investors access to large quantities of financial information to operate better informed investment.

Exploring AI tools for Stock Market analysis:

Today's AI technology for analyzing the stock market includes several types, making it easier to navigate complex market activities.

Machine Learning (ML): Think of these as the heavy lifters in AI. They can quickly sift through vast amounts of data to spot patterns and trends that might not be obvious to us. These algorithms are skilled at digging into financial data to reveal hidden details, which can greatly help in making informed investment choices.

Deep Learning (DL): This technology involves creating computer systems that process information in ways similar to how our brains do. It uses complex networks to make sense of data that might seem confusing or unclear at first glance, such as news articles or online discussions. This capability allows AI to keep track of what investors are feeling and spot significant events in the market that could spell change.

Natural Language Processing (NLP): This technology allows computers to read and understand human language. It goes through heaps of text data — from news reports and online forums to social media posts — to find useful insights about where the market might be headed next. This can be particularly helpful in gauging public sentiment and its potential impact on market trends.

Predictive Analytics: This approach uses a blend of machine learning, deep learning, data mining, and some statistical methods to try and predict future movements in stock prices or overall market volatility. By analyzing past and present data, as well as noticing trends, these analytics aim to forecast what's likely to happen next, offering investors valuable insights for their decision-making processes.

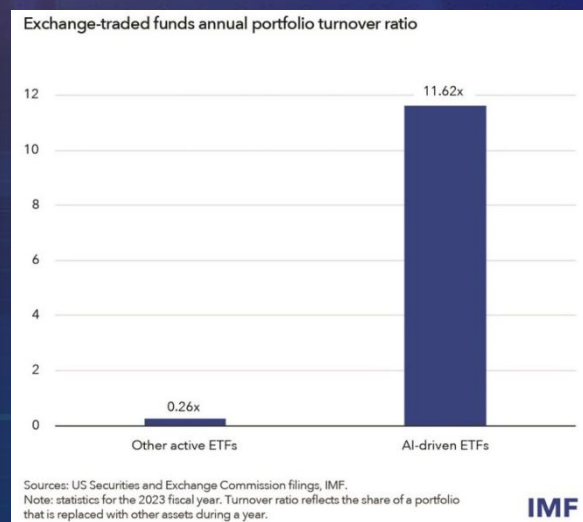
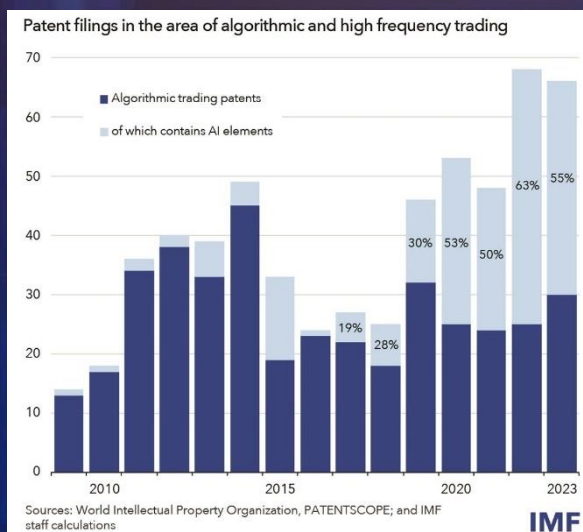
Visualization Tools: With complex data everywhere, being able to see it in a simple and understandable way is crucial. AI-powered visualization tools help investors by showing data patterns and key information through straightforward visual graphs. This not only makes understanding the data easier but also helps in quickly making decisions based on AI's forecasts or recommendations.

Risk Management Integration: This aspect involves the use of AI to monitor trading activities and assess the risks tied to those investments. Incorporating risk management with AI means that investors can be more proactive about avoiding common pitfalls due to bias, fatigue, or emotions influencing their decisions. It ensures a more calculated and informed approach to handling investments.

How AI changes the Stock Market Domain?

The integration of AI in stock market forecasting is not just about processing data; it's about understanding and interpreting complex market dynamics.

According to Nassira Abbas et al. (IMF Blog 2024), AI adoption in trading application is accelerating. And AI driven strategies can drive higher trading volumes.



According to an article of INDIAai, AI has transformed stock trading in India, providing investors with unprecedented opportunities to make informed investment decisions.

Another article of INTELLIAS write that, AI trading brings unprecedented levels of precision, efficiency, and insights to stock market activities. Advanced AI algorithms enable traders to uncover hidden patterns and make more informed decisions.

According to an article of INVESTOPEDIA, If you are a hands-on, active investor, you can use AI-based platforms to manage your portfolio, make decisions on purchases and sales, and manage trading positions. As such, it's important to understand and keep abreast of developments in the AI and investing space.

Challenges of AI in Stock Market:

While AI brings immense opportunities, it also presents certain challenges and risks. These are, Occasional Inaccuracies, Complex functionality, missing the Human Touch, everyone using AI and many factors.

Conclusion:

According to an article of J.P Morgan, India's GDP is expected to grow at a rate of 6.1% over the next five years, making it the world's third-largest economy by 2027. And we mostly for general public who doesn't have much knowledge of trading or stock investing; we have to acquire AI for investing. We Need to develop ourselves to use online AI tools to follow the predictions etc. Although, there are few challenges but, in the future, AI in stock market forecasting is likely to focus on enhancing model accuracy, handling larger datasets, and integrating diverse data sources to overcome. The development of AI models that can effectively interpret and analyse news, social media, and economic indicators will be crucial. Additionally, improving the interpretability and transparency of AI models will be essential to gain the trust of investors and regulators.

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Social Implications of Computing in Political Campaigning

Puja Bhakta

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The integration of computing in political campaigning has transformed how candidates and political parties engage with voters, raising both opportunities and challenges. Below are the key social implications:

1. Enhanced Outreach and Engagement

- **Personalized Messaging:** Campaigns use data analytics to tailor messages to individual voters, increasing relevance and engagement.
- **Social Media Influence:** Platforms like Facebook, Twitter, and Instagram enable direct interaction with voters, fostering real-time communication and transparency.
- **Virtual Events:** Online platforms allow candidates to reach global audiences without the constraints of physical events, making campaigns more accessible.

2. Democratization of Campaigning

- **Cost-Effective Strategies:** Digital tools reduce the cost of campaigning, enabling smaller parties and independent candidates to compete with established entities.
- **Crowdsourcing and Fundraising:** Computing facilitates grassroots movements and crowdfunding, empowering citizens to support their preferred candidates or causes.

3. Misinformation and Propaganda

- **Spread of Fake News:** social media and other computing technologies can amplify misinformation, shaping voter perceptions and decisions.
- **Deepfake Technology:** Advanced computing enables the creation of fake videos or audio clips, potentially damaging reputations or misleading voters.

4. Data Privacy and Ethical Issues

- **Voter Data Exploitation:** Campaigns collect and analyze vast amounts of personal data, often raising concerns about consent and misuse.
- **Surveillance Concerns:** Monitoring voter behavior online can erode trust in democratic systems and lead to feelings of manipulation.

5. Polarization and Echo Chambers

- **Algorithmic Bias:** Social media algorithms reinforce users' existing beliefs, creating echo chambers and contributing to political polarization.
- **Extremism Amplification:** Computing technologies can spread divisive content, influencing the tone and nature of political discourse.

6. Influence of Algorithms

- **Ad Targeting:** Algorithms determine the visibility of political ads, giving tech companies significant influence over public opinion.
- **AI-Generated Content:** Campaigns use AI tools to craft messages, optimize strategies, and predict voter behavior, often lacking transparency in their methods.

7. Foreign Interference and Cybersecurity Risks

- **Election Meddling:** Computing enables foreign entities to interfere in elections through disinformation campaigns or hacking.
- **Vulnerabilities:** Campaign websites, voter databases, and even voting systems are targets for cyberattacks, threatening the integrity of elections.

8. Voter Empowerment and Education

- **Access to Information:** Technology allows voters to learn about candidates, policies, and fact-check claims, fostering informed decision-making.
- **Interactive Tools:** Applications assist with voter registration, finding polling stations, and understanding complex issues, increasing participation.

9. Campaign Transparency

- **Tracking Promises:** Digital platforms enable voters to track candidates' promises and hold them accountable.
- **Financial Disclosure:** Technology facilitates real-time tracking of campaign funding, increasing transparency and reducing corruption.

10. Globalization of Campaign Strategies

- **Adoption of Best Practices:** Political campaigns adopt global digital strategies, such as influencer marketing and advanced analytics.
- **Cultural Challenges:** Imported strategies may conflict with local political norms, affecting how elections are perceived and conducted.

11. Ethical and Democratic Concerns

- **Manipulation of Voter Behavior:** The use of computing to influence decisions can undermine the autonomy of voters.
- **Erosion of Trust:** Over-reliance on computing in campaigns risks diminishing trust in democratic processes.

In conclusion, while computing technologies have revolutionized political campaigning by improving accessibility, efficiency, and engagement, they also pose challenges like misinformation, privacy violations, and polarization. A balanced approach emphasizing accountability, transparency, and ethical practices is essential to ensure that technology strengthens democracy rather than undermines it.

Exploring the Go Programming Language: Simplicity, Performance, and Concurrency

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Alumni (2019-2022)

The Go programming language, often referred to as Golang, is an open-source language developed by **Google engineers** Robert Griesemer, Rob Pike, and Ken Thompson. Introduced in **2009**, Go was designed to address the shortcomings of existing languages in terms of performance, simplicity, and ease of use, especially in the context of large-scale distributed systems. Over the years, Go has gained significant traction among developers for its robust performance, efficient concurrency handling, and straightforward syntax. This article delves into the key features and advantages of Go, exploring why it has become a popular choice for modern software development.

Origins and Philosophy:

Go was created to simplify the process of building reliable and efficient software. The language's design was influenced by the needs of developers working on large-scale projects at Google, where managing dependencies, building swiftly, and ensuring high performance were critical. The creators aimed to develop a language that combined the best features of other programming languages while eliminating their complexities.

The core philosophy behind Go is to keep things simple. This is evident in its minimalistic design, which focuses on reducing the cognitive load on developers. By avoiding features like inheritance, method overloading, and generics, Go ensures that code remains clean and easy to understand. This simplicity doesn't come at the cost of functionality; instead, it encourages developers to write clear and maintainable code.



Key Features of Go:

1. Simplicity and Readability:

Go's syntax is concise and straightforward, making it easy for developers to learn and use. The language enforces a specific code structure and style, which enhances readability and reduces the chances of errors. Features like explicit variable declarations and the elimination of unnecessary boilerplate code contribute to its simplicity.

2. Performance:

Go is a statically typed, compiled language, which translates to fast execution and efficient memory management. It compiles directly to machine code, allowing programs to run at near-native speeds. The garbage collector in Go is designed to handle memory management efficiently without causing significant latency, making it suitable for performance-critical applications.

3. Concurrency:

One of Go's standout features is its powerful concurrency model. Concurrency in Go is achieved through goroutines, which are lightweight threads managed by the Go runtime. Goroutines can be created with minimal overhead, allowing developers to build highly concurrent applications without the complexity of traditional thread management. The language also provides channels for safe communication between goroutines, ensuring data integrity and synchronization.

4. Standard Library:

Go comes with a rich standard library that covers a wide range of functionalities, from file handling and networking to cryptography and web development. This extensive library reduces the need for external dependencies, simplifying the development process and ensuring better compatibility and security.

5. Tooling and Ecosystem:

The Go ecosystem includes a suite of powerful tools that streamline the development process. The `go` command, for instance, handles everything from building and testing to package management and documentation. Tools like `gofmt` ensure consistent code formatting, while `go vet` and `golint` help identify potential issues and enforce best practices.

Advantages of Using Go:

1. Ease of Use:

Go's simplicity makes it accessible to developers of all skill levels. The language's clear syntax and minimalistic design allow new developers to get up to speed quickly, while experienced programmers appreciate the ease with which they can write and maintain large codebases.

2. Scalability:

Go's efficient concurrency model and performance characteristics make it an excellent choice for scalable applications. Companies like Google, Dropbox, and Uber have adopted Go for their backend systems, leveraging its ability to handle large numbers of simultaneous connections and perform well under heavy loads.

3. Rapid Development:

The combination of a simple syntax, a comprehensive standard library, and powerful tools enables rapid development and deployment of applications. Go's build speed is notably fast, allowing developers to iterate quickly and reduce time to market.

4. Community and Support:

Go has a vibrant and growing community of developers who contribute to its development and support. The language's open-source nature means that it continuously evolves with input from the community, ensuring that it stays relevant and up-to-date with modern development needs.

Use Cases and Applications:

Go has found widespread use in various domains, including web development, cloud computing, network programming, and systems programming. Its ability to handle high-concurrency tasks makes it ideal for building web servers, API services, and microservices architectures. Companies use Go to power critical infrastructure components, develop performant command-line tools, and build scalable distributed systems.

Large-scale projects built with Go:

Go has gained prominence in large-scale software development, and several notable projects have been built using it. Here are some examples:

1. **American Express:** The financial services giant utilizes Go for various backend services. Its simplicity, performance, and concurrency support make it an excellent choice for handling high transaction volumes.



2. **PayPal:** PayPal's infrastructure relies on Go for critical components. The language's efficiency and ease of deployment contribute to its success in handling payment processing and other services.



3. **Netflix:** Netflix leverages Go for its microservices architecture. Go's lightweight goroutines and efficient memory management allow Netflix to scale its streaming platform effectively.



4. **Uber:** Uber's backend services, including dispatch, routing, and real-time tracking, are powered by Go. Its robustness and ability to handle concurrent requests make it suitable for Uber's demanding workload.



Computing and Social Change: Exploring the Unintended Consequences of Computing

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Computing basically refers to the use of computer technology to process, manage, and communicate information. It encompasses a wide range of disciplines, including computer science, information technology, and software engineering. Computing technologies, like most other forms of technology, are not socially neutral. They influence society and are influenced by it in return. Computers have changed the way people relate to one another and their surroundings, as well as how humans organize their work, their communities and their time. The advancement and widespread use of computing technology have profoundly reshaped contemporary society. From the emergence of the internet to the proliferation of mobile devices, computing has opened up extensive new avenues for communication, commerce, entertainment and education. Nevertheless, these technological advances also lead to unexpected consequences that are having both positive and negative effects on social structures, individual lives, and global networks. We will explore some of the major unintended effects of computing, emphasizing both the beneficial and the challenging outcomes that have arisen as a result of computing's rapid integration into daily life.

Computers are an important part of today's world. It is forming our society as well as responding to it. The impact of computers on lifestyles has largely similar to the impact of computing on social organization, work, and personal communication. Computers and automation have enhanced industrial efficiency by optimizing production processes, reducing human error and allowing for the management vast amounts of data in real time. Computing has sparked the emergence of new sectors such as technology, software development, cybersecurity, data analysis and artificial intelligence, which have provided millions of jobs opportunities. Computing technologies like encryption, digital footprint, biometrics and data protection protocols have improved both personal and organizational safety, making online transactions more secure and user-friendly. The internet has facilitated global connections, leading to cultural exchange, greater awareness and solidarity around worldwide issues. Additionally, it has provided platforms for mental health assistance, including therapy apps, virtual support groups and informational resources that can help people to deal with mental health issues. Computing technologies are being used to monitor and manage environmental resources, such as tracking climate change, maximum use of energy and waste management more effectively. The Internet has given people all over the world access to enormous amounts of knowledge and information. Empower individuals and communities with educational resources, research and opportunities for self-improvement. The rise of open-source software has fostered collaboration, innovation, and the sharing of knowledge on a global scale, benefiting industries ranging from education to healthcare. The internet has led to unprecedented cultural exchange, allowing people to share music, art, literature, and ideas across the world in real time. This has enriched cultural experiences and encouraged greater understanding of diverse perspectives.

The social impact of computing is complex and difficult. On the one hand, computer technology has transformed society in ways that provide many benefits, such as increased connectivity, economic opportunities, better health care and access to education. On the other hand, these benefits come with significant challenges, such as the digital divide, job displacement, privacy concerns, and mental health risks. Automation and AI have made some manual routines obsolete. This has led to significant job losses in manufacturing, retail and administrative sectors as work becomes more specialized. Workers who lack adaptive skills may face long-term unemployment. The benefits of technological advances are often unevenly distributed. This causes more income inequality. Highly skilled workers in the technological industry will benefit from wage increases. While workers in other sectors, they may have trouble finding a job that pays well. Because digital platforms collect more and more information about individuals. Therefore, privacy is more likely to be compromised. From social media profiles to location tracking by mobile apps, people's lives have been recorded and analyzed in ways never before imagined. The ability of governments and corporations to monitor citizens and consumers raises concerns about civil liberties. Widespread use of surveillance technology such as facial recognition AI-powered data analysis and ubiquitous cameras Makes it easier to monitor behavior on a large scale. Social media and other online platforms have made it easier to create echo chambers. The user will only receive views that match their existing beliefs. This can reinforce bias. Spreading incorrect information and deepen social divisions. The rise of algorithm-driven platforms that prioritize emotional or emotional content has resulted in politics becoming more polarized. Violent scenes will be amplified. While moderate views are often disturbed by noise. Constant connection from a smartphone social media and other digital platforms can lead to burnout, anxiety, and depression. Studies have found that these platforms are overused.

The unintended consequences of computer technology basically emphasize the complexity of its impact on society. Although these innovations provide many benefits but it also creates challenges that require thoughtful responses. Addressing these consequences requires collaboration between technologists, policy maker and society. To create a framework that maximizes the benefits of computation. At the same time, harmful effects are minimized. Computer ethics and values and the social implications of computers are important topics that need to be addressed within the computer science curriculum- A separate course taught by computer science faculty is most appropriate, although there are some arguments for integrating the topics throughout the curriculum, and the bittern format provides sufficient time to cover most topics well. Ideally, computer values and social implications could be integrated into other courses, but it is too easy for faculty to squeeze them out of a course to make more time for technical instruction. Everybody's business, then, becomes nobody's business. I submit that the best environment is one in which computer ethics and social implications are taught in a separate course and professors refer to the issues in other classes. Key to this effort is ensuring that advances in computing are distributed equally. Respect privacy and take into account long-term environmental and social impacts. This balance of progress and responsibility will determine how computing continues to shape society in the years to come.

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The Social Impact of AI and Cybersecurity: Transforming Our Future

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Artificial Intelligence (AI) and cybersecurity are reshaping the modern world in profound ways. AI empowers us with innovations that simplify our lives, such as predictive healthcare, personalized education, and automation. Cybersecurity, on the other hand, ensures the safety of our digital experiences, guarding against threats and protecting sensitive data.

As someone deeply involved in both fields, I witness their potential to address challenges and create opportunities. While AI and cybersecurity enhance our capabilities, they also demand ethical considerations, robust defenses, and responsible use to prevent misuse. This article explores their evolution, societal impacts, challenges, and the exciting future that awaits us.

What Is Artificial Intelligence?

Artificial Intelligence (AI) refers to systems or machines that mimic human intelligence to perform tasks such as decision-making, problem-solving, and language processing. Since its inception in the 1950s, AI has evolved from basic rule-based algorithms to advanced deep learning models capable of analyzing vast datasets and generating insights.

Applications of AI today span diverse fields:

- 1. Healthcare:** AI-driven technologies help doctors detect diseases early, develop personalized treatments, and even predict outbreaks.
- 2. Education:** Adaptive learning platforms like Khan Academy tailor lessons to individual students' needs.
- 3. Automation:** From self-driving cars to virtual assistants, AI automates repetitive tasks and enables convenience.

AI's growing capabilities make it indispensable, though it raises questions about ethical use and societal impact.

What Is Cybersecurity?

Cybersecurity involves protecting systems, networks, and data from unauthorized access, theft, or damage. It plays a vital role in ensuring the reliability of digital systems that we rely on daily, from online banking to social media.

Core aspects of cybersecurity include:

- 1. Network Security:** Securing communication channels against unauthorized access.
- 2. Data Security:** Safeguarding sensitive information using encryption and secure storage.
- 3. Threat Detection:** Identifying and mitigating risks before they result in breaches.

For professionals like me, cybersecurity is about staying ahead of constantly evolving threats to maintain trust in technology.

The Intersection of AI and Cybersecurity

AI and cybersecurity complement each other in protecting the digital world. AI enhances cybersecurity by enabling proactive detection of threats and automating responses to attacks. For example, AI-driven tools can identify unusual network patterns indicative of hacking attempts, allowing for faster interventions.

Conversely, cybersecurity safeguards the integrity of AI systems by preventing data breaches and adversarial attacks that could compromise AI models. As hackers also leverage AI to design more sophisticated attacks, the synergy between AI and cybersecurity becomes even more critical.

Social Impacts of AI

AI's influence on society is transformative, touching nearly every aspect of our lives. Here are a few areas where its impact is most visible:

- 1. Medical Industry:** AI-driven diagnostic tools save lives by identifying conditions such as cancer at earlier stages. Predictive analytics in public health helps in anticipating and controlling disease outbreaks.
- 2. Education:** AI personalizes learning experiences for students. Platforms like Coursera and Duolingo use AI to adapt content based on individual progress.
- 3. Employment:** Automation powered by AI boosts productivity but also raises concerns about job displacement. Reskilling workers for AI-driven industries is crucial for mitigating these impacts.

Social Impacts of Cybersecurity

Cybersecurity is essential for maintaining trust in digital systems and ensuring the safety of users. Its societal impacts include:

- 1. Personal Data Protection:** Cybersecurity safeguards sensitive information such as medical records and financial data, preserving individual privacy.

2. National Security: Governments rely on cybersecurity to protect critical infrastructure and prevent cyberattacks that could destabilize economies or compromise defense systems.

3. Online Safety: Cybersecurity tools protect individuals from scams, phishing attacks, and cyberbullying, fostering a safer online environment.

Challenges and Ethical Considerations

Both AI and cybersecurity face significant challenges that demand careful consideration:

1. Privacy Concerns: AI systems often require vast amounts of data, raising questions about how much personal information should be shared and how it is secured.

2. Bias in AI: Algorithms trained on biased data can perpetuate inequality, such as in hiring or loan approvals. Addressing bias is critical to ensuring fairness.

3. Sophisticated Cyber Threats: Cybercriminals are leveraging AI to create more complex attacks, requiring cybersecurity professionals to innovate continuously.

4. Ethical Use: Both AI and cybersecurity must balance innovation with ethical considerations, ensuring technology benefits society without causing harm.

The Future of AI and Cybersecurity

The potential of AI and cybersecurity to transform the future is immense. Key developments on the horizon include:

1. Smart Cities: AI will optimize urban infrastructure, improving traffic management, energy efficiency, and public safety.

2. Advanced Healthcare: AI will enable personalized treatments, robotic-assisted surgeries, and breakthroughs in drug discovery.

3. Cybersecurity Innovations: AI-driven tools will predict and counter cyberattacks in real-time, enhancing resilience against threats.

4. Addressing Global Challenges: From combating climate change to ensuring food security, AI and cybersecurity will play pivotal roles in solving complex global issues.

Conclusion:

AI and cybersecurity are changing the world in exciting ways, but they also bring new challenges. As someone working in both fields, I've seen how AI is making things smarter—like helping doctors diagnose diseases early, making cities safer with smart traffic systems, and automating tasks in businesses. But as AI grows, so do concerns about fairness, privacy, and how decisions are made without human involvement. These are challenges we need to address to make sure AI helps, not harms, people.

At the same time, cybersecurity has become more important. Hackers are getting smarter, using AI to launch advanced attacks. This means cybersecurity professionals must stay one step ahead, predicting threats before they happen. I believe AI can help us here, too—by detecting and stopping cyberattacks before they cause damage.

But for these technologies to truly help us, we need to develop them responsibly. It's about building trust, making sure AI is used fairly, and ensuring everyone benefits. As we continue to innovate, we should focus on keeping things transparent and accessible for all.

In my work, I am passionate about making technology safer and smarter. I believe the future of AI and cybersecurity is bright if we work together and keep ethical values at the heart of everything we do. This way, we can use technology to improve lives and create a better world for everyone.

Artificial Intelligence

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Artificial Intelligence (AI) is the simulation of human intelligence processes by machines, especially computer systems. These processes include learning (the acquisition of information and rules for using it), reasoning (using the rules to reach approximate or definite conclusions), and self-correction. AI can be categorized into several types based on functionality and capability:

Types of AI Based on Functionality:

1. **Reactive Machines:** These are the most basic forms of AI systems that can only react to existing situations without storing memories for future actions. They are designed to perform specific tasks, like IBM's Deep Blue, which defeated chess champion Garry Kasparov.
2. **Limited Memory:** These AI systems can use past experiences to inform future decisions. Most modern-day applications fall under this category, such as self-driving cars which observe and interpret data to navigate the roads.
3. **Theory of Mind:** This type of AI is more advanced, aiming to understand and emulate human emotions, beliefs, and thought processes. These systems are still in the developmental stages.
4. **Self-Aware:** The most advanced form of AI, which possesses human-level consciousness and self-awareness. This level of AI does not yet exist and remains a theoretical concept.

Types of AI Based on Capabilities:

1. **Artificial Narrow Intelligence (ANI):** Also known as weak AI, this type of AI is specialized in one specific task. Virtual assistants like Siri and Alexa fall under this category.
2. **Artificial General Intelligence (AGI):** This is a hypothetical form of AI where a machine would possess the ability to understand, learn, and apply knowledge across a wide range of tasks, similar to a human being.
3. **Artificial Superintelligence (ASI):** An advanced form of AI that surpasses human intelligence and abilities. ASI is still a speculative concept that raises numerous ethical and philosophical questions.

Applications of AI:

AI technology has a wide range of applications across various fields:

1. **Healthcare:** AI is used to diagnose diseases, recommend treatments, and even predict patient outcomes.
2. **Finance:** AI algorithms help in fraud detection, investment predictions, and managing customer service.
3. **Transportation:** Self-driving cars and predictive maintenance for vehicles rely on AI.

4. **Customer Service:** Chatbots and virtual assistants provide customer support and enhance user experience.
5. **Manufacturing:** AI-powered robots perform complex tasks with high precision and efficiency.

Ethical Considerations:

As AI technology advances, it brings along ethical considerations and challenges, such as:

1. **Job Displacement:** Automation powered by AI can lead to job losses in certain sectors.
2. **Bias and Fairness:** AI systems can inherit biases from their training data, leading to unfair treatment.
3. **Privacy:** The use of AI in data collection and analysis raises concerns about privacy and security.
4. **Accountability:** Determining accountability for AI decisions, especially in critical areas like healthcare and autonomous driving, is complex.

Artificial Intelligence continues to evolve, promising to transform various aspects of our lives and industries. As we embrace its benefits, it's crucial to address the ethical implications to ensure it serves the broader good of society.

Artificial Intelligence: Boon or Bane?

Artificial Intelligence (AI) has emerged as one of the most transformative technologies of the 21st century, sparking debates on whether it is a boon or a bane. Here are some key points to consider from both perspectives:

AI as a Boon

1. **Enhanced Efficiency and Productivity:** AI can process vast amounts of data at unprecedented speeds, leading to improved efficiency and productivity across various industries. Automation of routine tasks frees up human resources for more creative and strategic roles.
2. **Medical Advancements:** AI-driven diagnostics and treatment recommendations have revolutionized healthcare. AI algorithms can detect diseases at early stages, personalize treatment plans, and even assist in complex surgeries, potentially saving countless lives.
3. **Improved Quality of Life:** AI-powered tools such as virtual assistants, smart homes, and personalized learning platforms enhance everyday life. They offer convenience, accessibility, and tailored experiences, making life easier and more enjoyable.
4. **Economic Growth:** AI can drive economic growth by creating new industries and job opportunities. Sectors like AI research, development, and implementation continue to expand, attracting investments and spurring innovation.

5. **Solving Complex Problems:** AI is instrumental in addressing complex global challenges, such as climate change, resource management, and disaster response. AI models can predict natural disasters, optimize resource usage, and develop sustainable solutions.

AI as a Bane

1. **Job Displacement:** The automation of tasks traditionally performed by humans poses a significant threat to employment. Many fear that AI will lead to job losses, especially in sectors that rely heavily on routine and manual labor.
2. **Ethical and Bias Concerns:** AI systems can inherit biases from their training data, leading to discriminatory outcomes. Ensuring fairness, transparency, and accountability in AI decisions remains a critical challenge.
3. **Privacy and Security Issues:** The extensive data collection required for AI poses privacy risks. Cybersecurity threats also increase as AI systems become targets for malicious attacks, potentially leading to breaches of sensitive information.
4. **Dependence on Technology:** Overreliance on AI can reduce human skills and decision-making abilities. There is a concern that excessive dependence on AI might erode critical thinking and problem-solving skills in humans.
5. **Control and Autonomy:** Advanced AI systems raise questions about control and autonomy. The potential for AI to operate beyond human supervision leads to concerns about unintended consequences and the loss of human oversight.

Balancing the Boon and the Bane

To ensure that AI serves humanity positively, it is crucial to implement ethical guidelines and robust regulatory frameworks. Continuous efforts in research, transparency, and collaboration among stakeholders can help maximize the benefits of AI while mitigating its risks.

In conclusion, while AI holds immense potential to improve our world, it also comes with significant challenges. By thoughtfully navigating these issues, we can harness the power of AI to create a brighter, more equitable future.

The Future of Artificial Intelligence

The future of Artificial Intelligence (AI) is a captivating and rapidly evolving landscape, filled with unprecedented potential and profound implications. Here are some key areas where AI is expected to make significant strides:

1. Enhanced Human-AI Collaboration

AI will increasingly augment human capabilities, leading to more sophisticated collaboration between humans and machines. This will involve AI systems assisting in complex decision-making processes, improving productivity, and enhancing creativity across various fields.

2. Personalized Experiences

AI will continue to refine its ability to provide highly personalized experiences. From customized healthcare treatments and tailored education programs to individualized consumer products, AI will enable services and solutions that are precisely tuned to individual needs and preferences.

3. Advanced Healthcare Solutions

AI's role in healthcare will expand, with advancements in diagnostics, treatment, and patient care. AI algorithms will become more adept at predicting disease outbreaks, personalizing medicine based on genetic information, and supporting mental health through virtual assistants and therapy bots.

4. Autonomous Systems

The development of autonomous systems, such as self-driving cars and drones, will transform industries and daily life. These systems will rely on advanced AI to navigate complex environments, make real-time decisions, and improve safety and efficiency in transportation, logistics, and beyond.

5. Smart Cities

AI will play a critical role in the creation of smart cities, where interconnected systems enhance urban living. Smart cities will use AI to manage resources efficiently, improve public services, reduce energy consumption, and enhance the quality of life for residents.

6. Ethical AI Development

As AI becomes more integrated into society, there will be a growing emphasis on ethical AI development. Researchers and policymakers will focus on creating AI systems that are transparent, fair, and accountable. This will involve addressing biases in AI algorithms, ensuring privacy and security, and establishing regulations to govern AI use.

7. AI in Education

AI will revolutionize education by providing personalized learning experiences, automating administrative tasks, and offering innovative teaching methods. AI-powered tools will help identify students' strengths and weaknesses, creating tailored learning plans that enhance educational outcomes.

8. Environmental Impact

AI will contribute to environmental sustainability by optimizing energy use, predicting and mitigating the effects of climate change, and supporting conservation efforts. AI technologies will be used to monitor ecosystems, manage natural resources, and develop sustainable agricultural practices.

9. Creativity and Art

AI will continue to push the boundaries of creativity and art, generating new forms of artistic expression. AI-driven tools will assist artists, musicians, and writers in creating innovative works, and AI itself may become a co-creator in artistic endeavors.

10. Employment and Workforce Transformation

The integration of AI into the workforce will lead to significant changes in employment. While some jobs may be displaced by automation, new job opportunities will emerge in AI-related fields. Workforce training and education programs will need to adapt to prepare individuals for the evolving job market.

Conclusion

The future of AI holds immense promise, but it also presents challenges that must be thoughtfully navigated. By focusing on ethical development, collaboration, and the responsible use of AI, we can harness its potential to create a better, more equitable world. The journey ahead will be marked by innovation, adaptation, and a continued exploration of the boundaries of what AI can achieve.

The Hidden Influence of Social Media Algorithms: How Algorithms Shape Public Opinion, Harm Society, and Exploit Vulnerable Users

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Introduction

Social media platforms like X (formerly Twitter), Instagram, and TikTok have revolutionized communication and entertainment. Yet, beneath their seemingly harmless veneer lies a powerful mechanism: algorithms. These algorithms are not neutral and are designed to curate content tailored to individual preferences. They profoundly impact how society forms opinions, engages with politics, and interacts with the world. While personalization can enhance user experience, the darker consequences—echo chambers, misinformation, exploitation of children, and political manipulation—pose serious threats.

How Algorithms Shape Public Opinion

Echo Chambers and Polarization

Social media algorithms excel at identifying user preferences and delivering similar content. This creates echo chambers—digital spaces where users encounter only like-minded views. On X, curated timelines amplify trending topics based on user activity, limiting exposure to differing perspectives. Instagram's Explore feed functions similarly, reinforcing users' existing biases by suggesting familiar content.

While echo chambers can make users feel validated, they also polarize society. Without exposure to opposing viewpoints, individuals grow increasingly entrenched in their beliefs. This polarization fuels division, making constructive dialogue and consensus difficult.

The Spread of Misinformation

Algorithms prioritize content that drives engagement, often favoring sensational or emotionally charged posts. This approach inadvertently promotes misinformation. For instance, during the 2020 U.S. elections, false claims about voter fraud were widely circulated on X. Similarly, Instagram has faced criticism for amplifying conspiracy theories related to global issues like climate change and public health.

In India, misinformation during the COVID-19 pandemic spread rapidly across social media. Fake news about home remedies and vaccination risks, amplified by algorithms, undermined public trust in scientific institutions.

The Impact on Children and Adolescents

YouTube and Content Addiction

For children, algorithms can be particularly harmful. Platforms like YouTube use recommendation systems that keep young users engaged for hours by suggesting increasingly sensational content. Children watching harmless cartoons may inadvertently be led to inappropriate videos, exposing them to harmful themes.

YouTube's algorithms have also been criticized for promoting exploitative "kid influencer" content that encourages excessive consumerism. These practices not only harm children's mental health but also exploit their naivety for profit.

Social Media and Mental Health

Instagram's algorithmic focus on visually appealing content contributes to body image issues and self-esteem problems among teenagers. Curated feeds filled with edited photos and unrealistic beauty standards create a toxic environment for young users. Studies have linked prolonged Instagram use to anxiety, depression, and eating disorders in adolescents.

TikTok, although banned in India, presents similar concerns globally. Its addictive "For You" feed keeps children glued to screens, often exposing them to inappropriate trends and risky challenges.

Algorithms and Political Manipulation

Elections in India

Social media platforms have become critical tools in Indian electoral campaigns. Algorithms amplify political messaging, often favoring the content that garners the most interaction—regardless of its accuracy.

During the 2019 and 2024 Indian general elections, political parties leveraged X and Instagram to target voters with highly personalized ads. While effective, this approach lacks transparency and can manipulate voters by exploiting their biases. For example, users engaging with content critical of a political party might only see negative posts about that party, skewing their perceptions.

Global Examples

In the U.S., TikTok and X have been accused of influencing elections by spreading politically charged misinformation. Similarly, in countries like Brazil and the Philippines, algorithms have amplified divisive political content, shaping voter behavior and undermining democratic processes.

The Role of Algorithms in Misinformation and Division

Algorithmic Bias

Algorithms are not inherently neutral; they reflect the biases of their creators. This is evident in how certain groups and topics are prioritized or marginalized. For instance, activists have pointed out that platforms often suppress minority voices while amplifying divisive or sensationalist content.

Creating Division

The emphasis on engagement over truth fosters mistrust and hostility not just among individuals but also across religions, communities, and even countries. Algorithms often prioritize divisive content, amplifying tensions between groups with differing beliefs or ideologies.

Religious and Community Conflicts: In diverse nations like India, algorithmic amplification of inflammatory content has escalated tensions between religious and cultural groups. For instance, posts that highlight controversial incidents or propagate stereotypes are frequently pushed to the forefront, fueling animosity and deepening societal divides.

By prioritizing conflict-driven content, social media platforms not only profit from heightened engagement but also inadvertently destabilize relationships within and between societies. This erosion of trust in institutions, leaders, and even fellow citizens can have long-term consequences for global harmony.

Exploitation of User Vulnerability

Children as Target Audiences

Algorithms specifically exploit children by offering endless streams of entertainment that captivate their attention for hours.

- **Materialism and Manipulation:** YouTube Kids and similar platforms have faced backlash for exposing children to advertisements disguised as content, shaping their preferences from a young age.
- **Harmful Content Exposure:** Despite content moderation efforts, children often encounter inappropriate material due to algorithmic flaws.

Manipulation of Adults

Adults, too, are vulnerable to algorithmic exploitation. Platforms manipulate users' emotions by promoting divisive or fear-inducing content, keeping them engaged and emotionally invested. This cycle not only wastes time but also perpetuates feelings of anger, anxiety, and helplessness.

What Can Be Done?

1. Regulating Algorithms

Governments worldwide must enforce stricter regulations on algorithmic transparency.

- **In India:** The Information Technology Rules, 2021, represent a step forward, requiring platforms to address grievances and remove harmful content. However, enforcement remains a challenge.
- **Globally:** Policies like the European Union's Digital Services Act are crucial for holding platforms accountable.

2. Raising Awareness

Users must be educated about the inner workings of algorithms and their impact on behavior. Diversifying content consumption and critically evaluating information can help reduce the influence of algorithmic bias.

3. Ethical Algorithm Design

Tech companies must prioritize ethical considerations when designing algorithms. Promoting diverse perspectives, reducing harmful content amplification, and safeguarding vulnerable users like children are essential steps toward creating a healthier digital ecosystem.

Conclusion

Social media algorithms wield immense power over society, shaping public opinion, exploiting vulnerable users, and influencing democratic processes. While their ability to personalize content can be beneficial, the darker consequences—polarization, misinformation, and mental health crises—cannot be ignored.

To mitigate these harms, greater regulation, ethical design, and user awareness are essential. As society becomes increasingly digital, it is imperative to hold platforms accountable for the impact their algorithms have on individuals and communities. Only then can we ensure that technology serves humanity, rather than exploiting it.

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Research shows that algorithms on platforms like X and Instagram create echo chambers, reinforcing users' existing beliefs and increasing societal polarization ([virginia.edu](#), [Brookings](#)).

2. **Spread of Misinformation**

Algorithms prioritize content that generates high engagement, often spreading misinformation. ([Brookings](#)).

3. **Impact on Children and Adolescents**

Platforms such as YouTube and Instagram exploit children's attention, contributing to mental health issues like anxiety and body image problems. ([Children Society](#), [Apa.org](#), [michiganmedicine.org](#), [Brookings](#)).

4. **Political Manipulation**

Social media algorithms influence public opinion by amplifying political messaging, as seen in elections like those in India ([Oxford](#), [Brookings](#), [Princeton](#)).

5. **Algorithmic Bias and Division**

Algorithms promote divisive content, deepening mistrust and conflicts within and between communities ([Brookings](#), [Knight Columbia](#)).

Data Safety: What Really Happens to Your Deleted Social Media Data?

Narayan Mondal
B.Sc. (Hons) 1st year, Session: 2024-2028

Welcome to this special issue of *Digital Security Today*. Social media has become a part of our daily lives, storing countless photos, messages, and personal details. But when you delete something, **is it really gone?** Many users don't realize that deleting data doesn't always mean it's completely erased. In this issue, we explain the risks of lingering data, how platforms handle it, and what you can do to keep your information safe.

Feature Articles

1. Is Your Data Really Deleted?

When you delete a post or deactivate your account, you might think your data is gone forever. However, many platforms store "deleted" data in backups or archives for months, sometimes longer. This article breaks down why this happens, how it can impact your privacy, and what users should watch out for.

2. Where Does Deleted Data Go?

Even after you hit "delete," your data might still exist in different forms. This includes temporary copies, backups, or cached files. Learn how social media platforms manage data after deletion and the challenges they face in removing it permanently. Real-life examples show how deleted data has resurfaced in court cases and data breaches.

3. Laws and Rules: Are They Enough?

Laws like the GDPR (General Data Protection Regulation) and CCPA (California Consumer Privacy Act) give users the right to request data deletion. But these laws aren't always enforced properly, leaving loopholes that companies can exploit. This article explains what these laws do, their limitations, and ongoing efforts to strengthen user protections.

Spotlight

New Technologies for Better Data Deletion

Scientists and tech companies are developing tools to make data deletion more reliable. From blockchain technology that tracks deletion to advanced software that wipes data completely, this article looks at how these innovations can improve data privacy for everyone.

Interviews

1. An Advocate's View on Data Privacy

Emma Torres, a well-known privacy advocate, talks about why transparency matters in data deletion policies. She shares tips on how users can demand better accountability from social media companies and why understanding your rights is crucial in today's digital world.

2. Inside the System: A Former Engineer Speaks

We interview a former data engineer from a major social media platform. They reveal the technical challenges of truly deleting data and explain why companies often keep backups. Their insights shed light on the balance between user privacy and operational needs.

Practical Tips

1. Protect Your Data Before Deleting

Even though you can't always control what happens after deletion, there are steps you can take to minimize risks:

- *Check and update your privacy settings regularly.*
- *Download a copy of your data to see what information platforms have about you.*
- *Use encrypted platforms for sensitive information.*

2. Verify Data Deletion

Some tools and apps can help you check if your data has been properly deleted. We review a few of these tools, explaining how they work and how reliable they are in ensuring your data is truly gone.

Data Safety and Society

1. How Uncertainty Affects Users

The idea that your deleted data might still exist can make people feel uneasy and mistrust technology. This article explores the emotional effects of unclear data policies and how better communication from companies could help users feel more secure.

2. Social Media's Responsibility

Social media companies collect huge amounts of personal data. This article discusses their ethical duty to respect user privacy, clearly explain data policies, and ensure proper deletion processes. Transparency is key to rebuilding user trust.

Closing Notes

Data safety is an important part of digital life, but many users don't fully understand the risks involved. This issue aims to provide clear and helpful information so you can take control of your digital footprint. Remember, staying informed is the first step to protecting your privacy. Let's work together to demand better practices from social media platforms.

Subscribe

Want to stay ahead in digital safety? Subscribe to **Digital Security Today**. Visit our website or scan the QR code to access expert advice, practical tips, and the latest news on data privacy and security.

Robotics Today: The Future of Automation and Beyond

Narayan Mondal
B.Sc. (Hons) 1st year, Session: 2024-2028

Welcome to the inaugural issue of **Robotics** Today, your definitive guide to the latest trends, innovations, and breakthroughs in the world of robotics. This issue dives into the transformative technologies reshaping industries, the advancements driving robotics into new domains, and the societal impact of these intelligent machines.

Feature Articles

1. Robotics Across Industries: Driving Efficiency and Innovation

Robots are redefining operations in industries ranging from manufacturing to healthcare. This article explores how robotics is being used for assembly lines, precision surgeries, and logistics automation. Learn about case studies showcasing efficiency gains, cost savings, and enhanced precision achieved through robotics. Discover how robots are helping to mitigate labor shortages and enable 24/7 operations in critical industries.

2. Collaborative Robots (Cobots): The New Age of Workplace Synergy

Cobots are transforming workplaces by enabling humans and machines to work side by side. We examine their applications in small- and medium-sized businesses, their safety features, and the economic benefits they bring. Understand how cobots are becoming indispensable in warehousing, assembly, and even customer service. Real-world examples include cobots assisting in retail stock replenishment and assembly lines adapting to fluctuating demands with minimal downtime.

3. Autonomous Mobile Robots (AMRs): The Future of Logistics

AMRs are revolutionizing logistics with their ability to navigate dynamic environments autonomously. This article discusses the role of AMRs in warehouses, their integration with IoT systems, and their scalability in global supply chains. We also explore how AMRs are equipped with AI for real-time decision-making and their applications in last-mile delivery services, creating a seamless flow from production to consumer.

Spotlight

Emerging Robotics Startups in 2024

The robotics startup scene is thriving with innovation. This feature profiles ten emerging startups pioneering advancements in areas such as swarm robotics, robotic arms for micro-manufacturing, and AI-driven robotics software. Discover their unique technologies and their potential to disrupt traditional systems. Highlights include startups tackling underwater exploration robotics and those innovating in agriculture with autonomous crop monitoring drones.

Interviews

1. Visionary Insights from Dr. Adrian Vega

Dr. Adrian Vega, a renowned roboticist, discusses the future of robotics in medicine, including the development of surgical robots, robotic prosthetics, and AI-assisted diagnosis systems. Gain insights into how these technologies are improving patient outcomes. Dr. Vega also addresses the challenges of integrating robotics into healthcare infrastructure and the importance of interdisciplinary collaboration.

2. Entrepreneurs on Scaling Robotics Startups

Leading robotics entrepreneurs share their strategies for funding, scaling, and navigating the regulatory challenges unique to the robotics sector. Learn from their successes and challenges as they build solutions for a highly competitive market. Their advice includes leveraging partnerships with academic institutions and fostering open innovation ecosystems.

Research and Development

1. Humanoid Robots: Mimicking Human Capabilities

From social robots to humanoids designed for disaster response, this article delves into the engineering and AI advancements driving humanoid robotics. Explore their current capabilities and limitations, as well as future research directions. Learn how humanoids are being developed for advanced communication skills, emotional recognition, and real-time environmental adaptation.

2. Soft Robotics: Flexibility in Action

Soft robotics, inspired by biological systems, is making significant strides in areas like minimally invasive surgery and adaptive gripping. Discover the materials and design principles behind soft robots and how they're opening up new possibilities in robotics applications. Applications include handling fragile items in food processing and assisting in physical rehabilitation therapies with tailored robotic solutions.

Robotics and Society

1. Robots in Everyday Life

Robots are no longer confined to industrial applications. From robotic vacuums and lawn mowers to educational robots for children, this article highlights how robots are becoming part of our daily routines and enhancing convenience. Learn about the emerging trend of personal robots offering companionship and assistance for elderly individuals, bridging gaps in social and healthcare services.

2. The Ethical Implications of Robotics

What does the rise of robotics mean for jobs, privacy, and human autonomy? This article explores the ethical debates surrounding robotics, including the challenges of ensuring accountability and preventing misuse of robotic technologies. Key discussions include the development of global ethical standards and the potential long-term societal impacts of widespread automation.

Tech Reviews

Robotics Kits for Beginners and Enthusiasts

A comprehensive review of the best robotics kits for hobbyists, students, and professionals. Learn about their features, pricing, and suitability for different levels of expertise. This section includes recommendations for AI-powered kits capable of teaching machine learning fundamentals and programmable robotic arms for hands-on engineering projects.

Closing Notes

Robotics is not just a field of engineering; it is a driver of transformation in how we live and work. With each advancement, the boundary of what robots can achieve expands. We hope you find this issue of **Robotics Today** both enlightening and inspiring. Stay tuned for our next issue, where we continue to explore the limitless potential of robotics, including exclusive coverage of space robotics and advancements in robotic exoskeletons.

Subscribe

Be at the forefront of robotics innovation by subscribing to **Robotics Today**. Visit our website or scan the QR code below to gain exclusive access to in-depth articles, interviews, and cutting-edge research.

The Role of Computing in Education Equity

Jotirmoyee Ghosh

B.Sc. (Hons) 1st year, Session: 2024-2028

In today's interconnected world, technology has revolutionized education, making it more accessible. From online learning platforms to virtual classrooms, computing plays a pivotal role in bridging educational gaps. However, while these advancements offer immense potential, they also present challenges. Whether technology narrows or widens disparities in education depends on how it is implemented and accessed.

Technology Bridging Gaps in Education

1. Access to Education Anytime, Anywhere

Online learning platforms such as Khan Academy, Coursera, and edX have made quality education available across the globe. A child in a rural area with limited access to trained teachers can now learn math, science, or languages from the same resources students use in urban areas.

- **Example:** In India, platforms like Byju's and government initiatives such as Diksha have expanded their reach to underserved communities.
- **Global impact:** UNICEF's Learning Passport, developed for children in conflict zones, provides a digital curriculum for uninterrupted education.

This flexibility allows students to overcome geographical barriers and pursue learning at their own pace.

2. Personalized Learning

Computing enables personalized education through tools like artificial intelligence (AI) and adaptive learning platforms. These systems tailor content based on a student's performance, helping slower learners catch up and providing advanced challenges to gifted students.

- **Example:** Platforms like DreamBox and Duolingo use algorithms to adjust lessons in real-time, ensuring every learner gets the right level of challenge.

By addressing individual needs, these tools help bridge gaps in traditional "one-size-fits-all" education systems.

3. Inclusive Learning for Students with Disabilities

Technology has transformed special education, offering tools that cater to diverse needs.

- **Assistive technologies** like text-to-speech, speech-to-text, and screen readers empower students with visual, auditory, or motor impairments.
- **Example:** Microsoft's Immersive Reader helps students with dyslexia, while voice recognition tools allow students with physical disabilities to interact with digital content seamlessly.

Such innovations foster inclusivity, ensuring that all learners have the opportunity to succeed.

4. Closing the Gender Gap

In many regions, girls face cultural and logistical barriers to attending school. Online education and mobile-based platforms allow girls to study from home, bypassing societal restrictions.

- **Example:** In Afghanistan and parts of Africa, NGOs use mobile apps to teach girls who cannot attend school in person.

This shift helps empower girls with knowledge and skills, narrowing the gender gap in education.

Challenges of Technology in Education

1. The Digital Divide

While computing can bridge gaps, it can also widen them if access to technology is unequal.

- **Lack of devices:** Families in low-income areas often cannot afford smartphones, laptops, or tablets.
- **Internet connectivity:** Rural and remote regions frequently lack reliable internet access, making online learning inaccessible.
- **Example:** During the COVID-19 pandemic, millions of students globally dropped out of school because they lacked devices or stable internet.

Efforts to bridge the digital divide must prioritize infrastructure and affordability to prevent these disparities from growing...

2. Quality of Digital Content

Not all online content is created equal. Poorly designed platforms or outdated curricula can fail to engage students or deliver meaningful education. Additionally, language barriers can limit the accessibility of global platforms in non-English-speaking regions.

- **Example:** Localized digital education programs in India have been critical to reaching students who speak regional languages.

Ensuring high-quality, culturally relevant content is essential to maximizing the potential of computing in education.

3. Teacher Readiness

Technology cannot replace teachers but should complement them. However, many educators lack the training to integrate digital tools effectively into their teaching methods.

- **Example:** Professional development programs, such as Google's Teaching with Technology initiative, aim to equip teachers with the skills needed for blended learning.

Without proper training, the benefits of computing in education remain underutilized.

4. Overdependence on Technology

While technology offers solutions, it is not a panacea. Over-reliance on digital platforms can isolate students, reduce critical thinking skills, and overlook the value of in-person collaboration. Balancing digital and traditional education methods is crucial for holistic learning.

Initiatives to Promote Education Equity

1. Government Programs

Governments worldwide are investing in computing for education equity.

- **India:** Programs like PM eVIDYA aim to make e-learning accessible across states, while free platforms like Diksha provide open digital resources.
- **United States:** Initiatives like ConnectED focus on providing schools with high-speed internet and digital tools.

2. NGO Efforts

Nonprofits play a key role in bridging gaps.

- **One Laptop Per Child (OLPC)** provides affordable devices to children in low-income countries.
- **Khan Academy** offers free resources for students and teachers globally.

3. Partnerships with Tech Companies

Corporations like Google, Microsoft, and Apple are investing in education by creating tools, providing funding, and training educators. For example:

- Google's Chromebook for Education is an affordable solution for schools, paired with resources like Google Classroom.
- Microsoft's AI for Accessibility initiative focuses on making education more inclusive.

Building a Future of Equal Opportunity

To maximize the role of computing in promoting education equity, several steps are essential:

1. **Improving Accessibility:** Governments must invest in affordable devices, internet connectivity, and localized content.
2. **Training Teachers:** Professional development should focus on equipping educators with digital skills.
3. **Collaborative Learning Models:** Combining in-person teaching with technology can foster deeper engagement.
4. **Monitoring Outcomes:** Regular assessments of digital education programs are crucial to ensure they meet learning objectives.

Technology and Lifelong Learning

- **Adult Education:** Highlight how technology also benefits adults looking to upskill or reskill. Platforms like LinkedIn Learning or Udemy cater to professionals, enabling them to adapt to evolving job markets.
- **Intergenerational Equity:** Discuss how parents and guardians using these platforms can become more involved in their children's education, fostering a culture of lifelong learning at home.

Long-Term Vision for Education Equity

- **Future Technologies:** Speculate on how emerging technologies like augmented reality (AR), virtual reality (VR), or blockchain can make education more immersive and inclusive.
- **Global Collaboration:** Advocate for a global coalition to standardize and fund digital education initiatives, ensuring that no country lags behind.

Conclusion

Computing has immense potential to transform education and create a more equitable society. By enabling personalized learning, fostering inclusivity, and breaking geographical barriers, technology can empower millions of students who were previously left behind. However, realizing this potential requires addressing challenges such as the digital divide, teacher readiness, and content quality.

With a collaborative effort from governments, NGOs, educators, and the private sector, technology can serve as a powerful tool to bridge educational gaps, ensuring that every child, regardless of their background, has the opportunity to learn and thrive.



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