Sarvaank

Law Decoded for *Entrepreneurs*

2024 ARTIFICIAL INTELLIGENCE

PRIMER ON ARTIFICIAL INTELLIGENCE

July 2024

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And, everyone else who has supported us through our journey!

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Introduction

"Artificial intelligence is the new electricity." – Dr. Andrew Ng, Founder, Deeplearing.AI

One word dominates the quickly changing field of modern technology: Artificial Intelligence, or AI. Artificial intelligence **("AI")** is becoming more than just a notion displayed in science fiction; it's an ever-evolving force influencing our everyday lives and changing businesses, from self-driving cars to tailored suggestions on streaming platforms. While the fundamental on which AI is created is very simple, it is also at the same time very complex. AI aims to imitate human intellect in machines so that they can think, learn, and solve problems on their own. When a machine starts to think like a human, the effects of it go well beyond simple automation. AI has the potential to transform a wide range of industries, including healthcare, banking, transportation, and many more, and to unleash hitherto unheard-of levels of productivity, creativity, and social advancement. Imagine virtual assistants with the ability to comprehend spoken language, identify medical ailments with unmatched precision, or accurately forecast financial trends. These are only a few examples of the things AI can do to help.

Given the many potentials and realised benefits for people, organisations and society, investment in AI continues to grow across all sectors, with organisations leveraging AI capabilities to improve predictions, optimise products and services, augment innovation, and enhance productivity and efficiency, while at the same time, lowering costs, amongst other beneficial applications. However, the use of AI also poses risks and challenges, raising concerns about whether AI systems (inclusive of data, algorithms and applications) are worthy of trust. These concerns have been fuelled by high profile cases of AI use that were biased, discriminatory, manipulative, unlawful, or violated human rights. Realising the benefits AI offers and the return on investment in these technologies requires maintaining the public's trust: people need to be confident that AI is being developed and used in a responsible and trustworthy manner. Sustained acceptance and adoption of AI in society are founded on this trust.

We cordially encourage you to take a voyage of discovery into the realm of AI with this primer. There is something here for everyone, regardless of experience or interest level.

Together, let's go farther, solve the puzzles, and realize AI's full potential. The future is what's ahead.[1]

What is Artificial Intelligence?

Artificial Intelligence (AI) is a branch of computer science focused on creating machines capable of intelligent behaviours, mimicking human thinking with a high degree of autonomy. It encompasses tasks like problem-solving, speech recognition, language translation, and decision-making, previously requiring human intelligence. AI applications range from smart-phone assistants to complex algorithms driving finance and healthcare decisions.

For instance, Large Language Models (LLMs) such as ChatGPT have democratized AI usage, allowing non-experts to leverage its capabilities. Neural Networks, inspired by the human brain, enable machines to process data intelligently, leading to innovations like smart home controls and advancements in Virtual Reality (VR) and Augmented Reality (AR).

Machine Learning, a core AI technology, handles vast and complex datasets autonomously, enhancing tasks like digital assistants, GPS navigation, and driverless cars. AI, often associated with machine learning and deep learning, employs algorithms modelled after human decision-making to learn and improve predictions over time.[2]

AI has experienced cycles of hype, with recent advancements shifting focus from computer vision to natural language processing (NLP). Today, generative AI can synthesize diverse data types beyond language, showcasing AI's evolving capabilities across various domains.

Generative AI:

Generative AI algorithms, powered by advancements in deep learning and neural networks, enable machines not only to understand and respond to human language but also to generate novel content autonomously. These models learn from vast datasets to generate realistic text, images, and other media that mimic human creativity and problem-solving abilities.

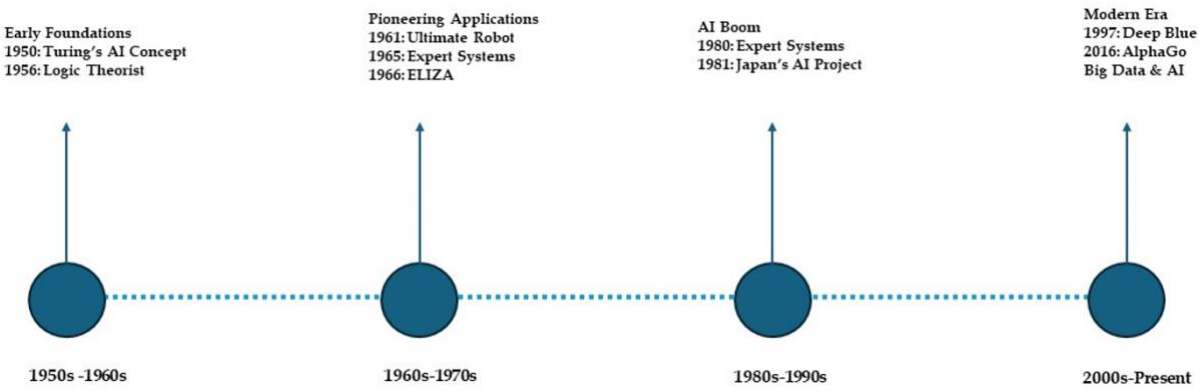
[1] Lev Craig, Nicole Laskowski & Linda Tucci, "What is Artificial Intelligence (AI)? Everything You Need to Know", TechTarget, available at: https://techtarget.com/searchenterpriseai/definition/AI-Artificial-Intelligence
[2] *ibid*

For example, in fields like art and design, generative AI can assist in creating new artistic styles, generating music compositions, or even aiding in architectural design by producing innovative concepts based on input criteria. In healthcare, AI-driven generative models analyse medical data to propose novel drug compounds or assist in medical imaging analysis, potentially revolutionizing patient care and drug discovery processes.

Moreover, generative AI is pivotal in sectors requiring simulation and prediction, such as climate modelling, where it can simulate complex environmental scenarios based on historical data and projections. This predictive capability extends to financial markets, where AI models analyse trends and risk factors to optimize investment strategies.

History and Evolution of Artificial Intelligence: From Conceptual Foundations to Modern Applications

AI has evolved significantly since its conceptual beginnings in the mid-20th century, driven by advancements in computing power, algorithm development, and the availability of vast amounts of data. From theoretical musings on computing machinery by Alan Turing to the groundbreaking advancements in algorithm development and computing power, AI has transformed from a conceptual idea into a powerful tool with profound implications across industries.[3]



Early Foundations (1950s-1960s)

In the 1950s, Alan Turing's seminal paper on "**Computing Machinery and Intelligence**" laid the groundwork for AI by proposing that machines could exhibit intelligent behaviour through information processing and reasoning. This conceptual foundation led to the

[3] Joshua Cena, "Exploring the Evolution of Artificial Intelligence: From Early Concepts to Modern Applications," (24 March 2024), https://www.researchgate.net/publication/379323694_Exploring_the_Evolution_of_Artificial_Intelligence_From_Early_Concepts_to_Modern_Applications

creation of the first AI program, the Logic Theorist, in 1956 by Allen Newell, Cliff Shaw, and Herbert Simon. This program demonstrated the ability to solve mathematical problems and marked the beginning of practical AI research.

Pioneering Applications and Challenges (1960s-1970s)

The 1960s witnessed significant milestones such as the development of LISP or List Processing, by John McCarthy in 1958, a programming language essential for AI research. Industrial applications emerged with General Motors' introduction of Unimate in 1961, the first industrial robot capable of automated tasks on assembly lines. This era also saw the birth of expert systems in 1965, which replicated human decision-making processes, and chatbots like ELIZA in 1966, pioneering natural language processing.

However, despite these advancements, early AI faced limitations such as high costs and computing power constraints. The Dartmouth Summer Research Project on AI in 1956, where the term "artificial intelligence" was coined, laid the foundation for interdisciplinary collaboration but also highlighted challenges in standardizing AI methodologies. The conference highlighted the complexity of defining and replicating human-like intelligence, with debates centring on whether intelligence could be reduced to algorithms or if it required a deeper understanding of cognitive processes. Ethical and philosophical considerations also surfaced, including concerns about the implications of AI for society, ethics of machine decision-making, and human-computer interactions. Despite these challenges, the conference laid a solid foundation for AI research, fostering interdisciplinary collaboration and setting the stage for future advancements in artificial intelligence.

The AI Boom and Technological Advancements (1980s-1990s)

The 1980s marked an **"AI Boom"** characterized by rapid growth in AI research and development fuelled by breakthroughs in computing capabilities and algorithmic innovations. Key developments included Japan's ambitious Fifth Generation Computer project in 1981, aimed at creating advanced computers capable of human-like reasoning and natural language processing. Commercial applications of AI systems, such as expert systems like XCON in 1980 and strategic advisory systems like Alacrity in 1987, demonstrated AI's potential in enhancing decision-making processes across various industries. Legal considerations began to emerge as AI systems were increasingly integrated into business

operations, raising questions about liability, intellectual property rights, and regulatory frameworks.[4]

Modern Era: Big Data and AI Applications (2000s-Present)

In the 21st century, AI has entered the age of big data, leveraging massive datasets to train algorithms and improve performance in tasks ranging from image recognition to natural language understanding. Breakthroughs like IBM's Deep Blue defeating chess champion Gary Kasparov in 1997 and Google's AlphaGo defeating human champions in 2016 showcased AI's ability to surpass human capabilities in specific domains.

Today, AI applications span diverse sectors including finance, healthcare, legal services, and entertainment, revolutionizing processes and decision-making. The legal profession is exploring AI's potential in document review, predictive analytics for case outcomes, and legal research, thereby enhancing efficiency but also raising ethical and regulatory concerns.

Global Laws

1. European Union:

In 2024, the European Union took a significant stride in AI regulation with the introduction of the Artificial Intelligence Act, 2024 **("AI Act")[5].** This legislation marks a pivotal moment on the global stage, setting forth clear guidelines and obligations for AI developers and deployers while reducing administrative burdens, particularly for Small and Medium-sized Enterprises **("SMEs")**. This legislative effort is part of a broader strategy to foster trustworthy AI across the EU, encompassing measures like the AI Innovation Package and the Coordinated Plan on AI. These initiatives collectively aim to ensure the safety and fundamental rights of individuals and businesses in AI applications, thereby boosting investment and innovation in the sector within Europe.[6]

Further, the AI Act introduces a risk-based approach, categorizing AI systems into four levels of risk: Unacceptable, high-risk, limited risk, and minimal or no risk. The following are described as:

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[4]*Supra.*[4]*Joshua Cena, "Exploring the Evolution of Artificial Intelligence: From Early Concepts to Modern Applications," (24 March 2024), https://www.researchgate.net/publication/379323694_Exploring_the_Evolution_of_Artificial_Intelligence_From_Early_Concepts_to_Modern_Applications.*

[5] Artificial Intelligence Act, P9_TA(2024)0138

[6] EY, "The EU AI Act: What It Means for Your Business", available at https://www.ey.com/en_ch/forensic-integrity-services/the-eu-ai-act-what-it-means-for-your-business (last visited July 1, 2024).

a) "**Unacceptable Risk**" is AI systems posing significant threats to safety, rights, and societal well-being, warranting stringent regulatory measures. For Example, Deepfake videos and images, automated car malfunctions, AI-powered social media algorithms amplifying harmful content, AI-driven financial trading systems causing market volatility etc.

b) "**High-Risk**" AI applications, such as those used in critical infrastructures, education, employment, and law enforcement, will face stringent requirements before they can be placed on the market. These requirements include robust risk assessments, high-quality datasets, transparency obligations, human oversight, and rigorous post-market monitoring. For Examples, AI systems used to manage energy grids, automated grading systems for exams etc.

c) "**Limited Risk**" under the Act refers to AI systems that pose some risk due to lack of transparency or potential societal impacts, necessitating specific transparency obligations to mitigate risks and ensure informed human interaction.

d) "**No Risk**" under the Act refers to AI systems with minimal or no potential for harm, such as AI-enabled video games or basic spam filters, which are exempt from stringent regulatory requirements under the legislation.

Moreover, the Act addresses emerging challenges such as the use of remote biometric identification systems, imposing strict conditions and exceptions for their deployment in public spaces and law enforcement contexts. It also mandates transparency measures for AI-generated content like deep fakes and chatbots, ensuring users are informed of AI interaction.[7]

Recognizing the fast-paced evolution of AI technology, the AI Act adopts a future-proof approach, allowing flexibility to adapt rules to technological advancements. This includes ongoing quality management and risk assessment by AI providers even after systems are deployed. Enforcement and implementation will be overseen by the newly established European AI Office, promoting compliance and facilitating international dialogue on AI governance standards.

In preparation for its full applicability, the EU has launched the AI Act, encouraging early compliance with key provisions among AI developers globally.

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[7]*Ibid*[7]*EY, "The EU AI Act: What It Means for Your Business", available at https://www.ey.com/en_ch/forensic-integrity-services/the-eu-ai-act-what-it-means-for-your-business (last visited July 1, 2024).*

2. The United States of America

In the United States, AI regulations follow a decentralized model, reflective of its broader governance approach. Unlike some countries that have comprehensive federal frameworks specifically for AI, the US primarily addresses AI-related issues through sector-specific agencies and regulations.

At the federal level, there is no singular comprehensive AI regulation. Instead, various agencies focus on specific aspects of AI. For instance, the Federal Trade Commission ("**FTC**")[8] oversees consumer protection related to AI applications, ensuring fair and transparent business practices. Meanwhile, the National Highway Traffic Safety Administration ("**NHTSA**")[9] regulates the safety aspects of AI technologies, particularly in autonomous vehicles.

Further, several states have also implemented their own AI-related regulations to complement federal standards and address local concerns more directly. California's Consumer Privacy Act ("**CCPA**")[10] and its successor, the California Privacy Rights Act ("**CPRA**")[11], impose stringent requirements on businesses handling consumer data, impacting AI systems reliant on personal information. Illinois has the Biometric Information Privacy Act ("**BIPA**")[12] governing the use of biometric data, including AI applications using facial recognition. Washington state and Massachusetts have introduced laws addressing transparency and accountability in the use of AI, particularly in government decision-making processes. New York City has regulations focusing on the fairness and accountability of automated decision systems used by municipal agencies.

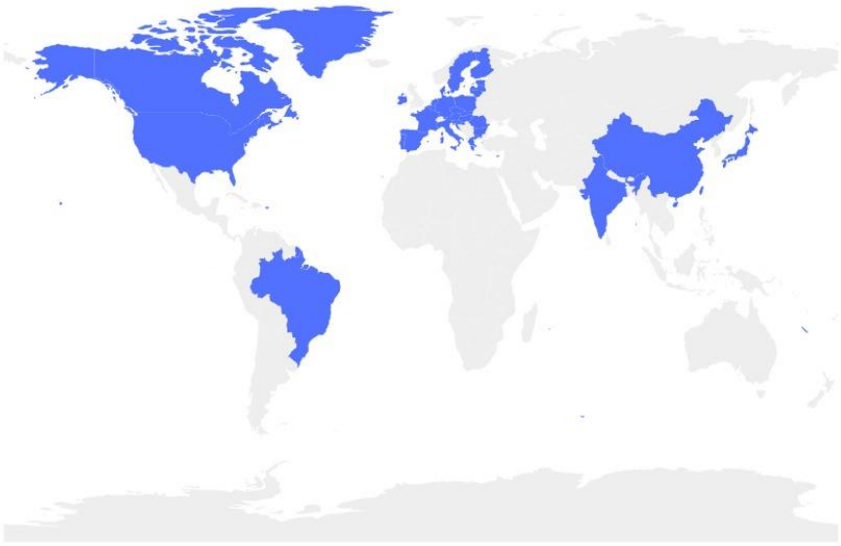
3. China

The People's Republic of China is rapidly becoming a world leader in AI, aiming to be the top global innovator by 2030. The Chinese government is keen on using AI to advance technology while being very aware of the ethical and security challenges that come with it. To manage these challenges, China has created several important laws and plans.

[8] https://www.ftc.gov/
[9] https://www.nhtsa.gov/
[10] California Consumer Privacy Act, 2018
[11] California Privacy Rights Act, 2020
[12] Biometric Information Privacy Act, 2008 (740 ILCS 14/)

One key law is the Chinese Cybersecurity Law[13], which sets strict rules for protecting data and maintaining cybersecurity. This law requires companies to keep data safe and secure, and to manage risks to prevent data breaches and cyberattacks. Another important law is the Data Security Law[14], which makes sure that data handling practices transparent and secure.

The New Generation AI Development Plan is another crucial part of China's strategy to be AI driven. It focuses on integrating AI into various industries while ensuring ethical practices. This plan works together with the Personal Information Protection Law **("PIPL")** of the People's Republic of China, which was enacted in 2021 and is similar to Europe's General Data Protection Regulation. The PIPL sets strict rules for collecting, storing, and using personal data. For instance, companies must get clear consent from individuals before collecting their data, follow strict guidelines for transferring data abroad, and provide ways for people to access and delete their information. Companies also need to regularly check their data protection practices and report any data breaches quickly to the government to initiate corrective actions.



(Geo heatmap showcasing the development of Global Laws on Artificial Intelligence throughout the world.)

4. Canada

Canada has been at the working on developing comprehensive laws and regulations to govern the ethical and responsible use of AI. Central to these efforts is the Pan-Canadian

[13] Cybersecurity Law Of The People's Republic Of China, 2017
[14]Data Security Law of thePeople's Republic Of China, 2021

Artificial Intelligence Strategy, which not only promotes research and innovation but also emphasizes ethical considerations. Managed by the Canadian Institute for Advanced Research ("**CIFAR**")[15], this strategy collaborates with various stakeholders to ensure AI development aligns with societal values and addresses potential risks.

Ethical AI frameworks such as the Montreal Declaration for Responsible AI is an initiative that outlines principles for the ethical development of AI, including transparency, accountability, and respect for privacy and autonomy. This collaborative effort involves academics, industry leaders, and the public to guide the socially responsible deployment of AI technologies, ensuring they benefit society while minimizing potential harms.

Privacy and data protection are critical aspects of Canada's AI regulations. Under laws like the Personal Information Protection and Electronic Documents Act ("**PIPEDA**")[16], organizations must obtain consent before collecting personal data for AI purposes and ensure data is used only for its intended purposes. These regulations aim to safeguard individuals' privacy rights and mitigate risks associated with AI's use of sensitive personal information.

Canada's stance on AI legislation also includes efforts to promote algorithmic accountability and fairness. This involves developing guidelines to ensure AI systems are explainable, transparent, and free from bias.

5. Brazil

Brazil is leading AI regulation efforts in South America, building on its AI Strategy to promote trustworthy and ethical AI. Amid global regulatory movements in Europe, Canada, and the United States, Brazil has introduced several legislative proposals to govern AI development and use.

Between 2019 and 2021, Brazil proposed three AI laws to balance innovation with harm minimization. Although these bills did not pass, a new bill, 2338/2023, was introduced in 2023 to replace the previous proposals. This bill, similar to the EU AI Act, adopts a risk-based approach, emphasizing human rights and prohibiting excessively risky systems. It mandates transparency, bias mitigation, and public impact assessments for high-risk AI

[15] https://cifar.ca/
[16] Personal Information Protection and Electronic Documents Act (S.C. 2000, c. 5)

systems, with strict penalties for non-compliance, including fines up to R$50,000,000.00 or 2% of turnover, and potential operational bans.

Key aspects of the earlier bills included:

- Bill No. 5051 (2019)[17]: Focused on principles like human dignity, transparency, and human oversight, and promoting AI's use for economic development and worker protection.
- Bill No. 21 (2020)[18]: Defined AI broadly, emphasizing scientific and technological advancement, ethical standards, non-discrimination, and sector-specific regulatory frameworks.
- Bill No. 872 (2021)[19]: Stressed ethical AI foundations, human oversight, and fostering an ecosystem for inclusive growth and innovation.

The 2023 bill, 2338/2023[20], centralizes human rights, with rights to information, explanation, contestation, non-discrimination, and privacy protection. High-risk AI applications, like those in critical infrastructure, healthcare, and criminal justice, require thorough assessments and governance measures. Systems employing harmful subliminal techniques or public social scoring are prohibited.

Brazil's comprehensive approach to AI regulation reflects global influences and aims to ensure safe, ethical AI deployment while fostering innovation and economic growth. As Brazil finalizes its AI laws, companies must prepare for compliance to avoid penalties and support responsible AI practices.

5. Japan

Japan is navigating the complex landscape of AI regulation with recent developments and ongoing challenges. As of December 2023, the Japanese government introduced draft guidelines aimed at AI-related businesses, aligning these regulations with the following seven international guiding principles of fairness, accountability, transparency, privacy, safety and security, robustness and reliability, and human-centred values. In February 2024,

[17] Principles of Artificial Intelligence in Brazil, https://www.derechosdigitales.org/wp-content/uploads/Brazil-Bill-No-5051-of-2019-EN.pdf

[18] Federal Senate, Bill of Law No. 21, of 2020, https://www.derechosdigitales.org/wp-content/uploads/Brazil-Bill-Law-of-No-21-of-2020-EN.pdf

[19] Federal Senate, Bill of Law No. 872, of 2021, https://www.derechosdigitales.org/wp-content/uploads/Brazil-Bill-Law-of-No-872-of-2021-EN.pdf

[20] Federal Senate Bill of Law No. 2338/2023, https://legis.senado.leg.br/sdleg-getter/documento?dm=9347622&ts=1719953456243&disposition=inline

Japan took another significant step by establishing the Japan AI Safety Institute to collaborate with domestic and international ministries and agencies, advancing research on evaluating AI safety. Despite these initiatives, Japan currently lacks penalties for issues such as the commercial use of copyrighted works without proper authorization or the dissemination of disinformation created by AI tools. This regulatory environment has led some to label Japan as a "machine learning paradise."

Recognizing the need for stricter oversight, Japan's Liberal Democratic Party ("**LDP**") has urged the government to create a legal framework specifically addressing generative AI by fiscal year 2024. Moreover, there is growing international concern, including within Japan, about the ethical implications of developing Lethal Autonomous Weapons System ("**LAWS**"), which could potentially lead to unintended consequences. Japan aims to take a leadership role in global AI regulations and innovations, emphasizing cooperation with major global players like the United States, the European Union, and China in shaping these frameworks.

6. International organizations

International organizations such as the Organization for Economic Co-operation and Development ("**OECD**") and the United Nations are actively involved in setting and outlining global guidelines on AI regulation. The OECD's AI Principles emphasize transparency, responsibility, and inclusivity in the development and deployment of AI technologies. These principles guide member and partner countries in adopting regulatory frameworks that ensure AI systems are accountable, fair, and respectful of human rights. They promote ethical considerations in AI applications to build trust among stakeholders and mitigate risks associated with AI's societal impacts.

Similarly, the United Nations Sustainable Development Goals ("**SDGs**") highlight the potential of AI to contribute to global benefits and sustainability. The SDGs advocate for using AI technologies responsibly to address challenges such as poverty, inequality, and climate change. By integrating AI into sustainable development agendas, the UN encourages member states to prioritize ethical AI practices that align with humanitarian and environmental goals.

As the regulatory landscape for AI varies across countries, cooperation among nations and international organizations becomes essential. Collaborative efforts focus on standardizing approaches and guidelines to ensure that AI development and deployment are conducted

responsibly and ethically on a global scale. This cooperation facilitates the harmonization of AI laws and policies, enabling countries to address common challenges and maximize AI's potential for societal good.

Global Use Cases

AI has become a transformative force across various industries worldwide, enhancing efficiency, accuracy, and user experience. The global use cases of AI, showcasing its diverse applications in sectors ranging from finance and cybersecurity to retail, science, entertainment, and beyond. A few of these include:

Sector	Company/ Technology	Use case description
Financial	JPMorgan Chase - COiN	AI for reviewing and interpreting commercial loan agreements, improving accuracy and efficiency in risk assessment.[21]
Cybersecurity	Darktrace	Autonomous AI technology for real-time detection and response to cyber threats by learning 'patterns of life' within networks to identify anomalies and mitigate risks.[22]
Supply Chain	IBM and Maersk - TradeLens	AI-driven blockchain solution for managing and reducing risks in supply chain operations by providing real-time data analysis to predict and mitigate disruptions.[23]
Retail	Amazon	AI for predictive inventory management, optimizing logistics, and forecasting product demand to streamline supply chain operations.[24]
Science	Google DeepMind - AlphaFold	AI model for predicting protein folding structures, advancing computational biology by improving accuracy and speed in understanding protein structures.[25]
Entertainment	Netflix	AI-powered recommendation engine for personalized

[21]Marzeih Yazdanipour, *AI Technology in J.P. Morgan Chase & Co.*, Linkedin (Dec. 4, 2024), https://www.linkedin.com/pulse/ai-technology-jp-morgan-chase-co-marzieh-yazdanipour-ah7we

[22]Comport Technology Solutions, *What Is DarkTrace & How Can Its Cyber AI Platform Leave You Less Vulnerable?* (June 5, 2024, 10:29 AM), https://comport.com/resources/it-services/what-is-darktrace-how-can-its-cyber-ai-platform-leave-you-less-vulnerable/

[23]PixelPlex Team, *Maersk & IBM's TradeLens: Enhancing Blockchain-Based Supply Chain Management*, PixelPlex Blog (Apr. 17, 2023), https://pixelplex.io/blog/maersk-ibm-tradelens-blockchain-supply-management/

[24]Maia Jenkins, *Amazon Taps AI to Expand Sellers' Ecosystem and Supply Chain Capabilities*, Consumer Goods Technology (June 5, 2023), https://consumergoods.com/amazon-taps-ai-expand-sellers-ecosystem-and-supply-chain-capabilities.

[25]Kevin Joy, *Unravelling the Protein Puzzle: Google DeepMind's Impact with AI*, LinkedIn (June 7, 2024), https://www.linkedin.com/pulse/unravelling-protein-puzzle-google-deepminds-impact-ai-kevin-joy-

		content recommendations based on user viewing habits and preferences, enhancing user engagement and satisfaction.[26]
Accessibility	Microsoft	AI-driven tools for enhancing accessibility, including voice recognition, visual assistance, and cognitive support applications, to empower users with disabilities.[27]
Music Streaming	Spotify	AI algorithms for personalized music recommendations based on user listening habits and preferences, ensuring a tailored music experience to retain and engage users.[28]
Legal Tech	Smartsettle One	AI-enabled negotiation platform using blind bidding and settlement ranges to facilitate faster and fairer monetary negotiations in alternative dispute resolution (ADR).[29]

These are some examples that highlight AI's ability to drive innovation and improvement across various domains. As AI continues to evolve, its applications will expand, addressing complex challenges and creating new opportunities.

Impact of AI on Judiciary:

Sno	Details
1.	In a recent case at the Manipur High Court, Justice A Guneshwar Sharma utilized ChatGPT for legal research. The case involved Md. Zakir Hussain, a former member of the Village Defence Force, dismissed without receiving a dismissal order after a criminal escaped while he was on duty. The judge referred to ChatGPT when the police affidavit was found inadequate.[30]

[26]Komal Khandelwal, A Study to Know - Use of AI for Personalized Recommendation, Streaming Optimization, and Original Content Production at Netflix, 9 Int'l J. Sci. Res. & Eng'g Trends 1738 (2023), https://ijsret.com/wp-content/uploads/2023/11/IJSRET_V9_issue6_435.pdf.

[27]G3ict, *Microsoft Launches AI for Accessibility Program*, G3ict (May 7, 2018), https://g3ict.org/headlines/microsoft-launches-ai-for-accessibility-program

[28]Poulami Saha, *Spotify Gets Personalised AI Playlists; Here's How It Can Change Music Streaming for You*, Financial Express (June 5, 2023), https://www.financialexpress.com/life/technology-spotify-gets-personalised-ai-playlists-heres-how-it-can-change-music-streaming-for-you-3450381/.

[29]Jain, Mansi, " AI and Mediation: A Threat or Helpful Tool for Mediators - An Indian Perspective " (July, 2023), available at: https://www.juscorpus.com/wp-content/uploads/2023/08/26.-Mansi-Jain.pdf (last visited 1 July 2024).

[30]Srinjoy Das, *Manipur High Court Uses Chat-GPT To Conduct Research & Pass Order In Service Law Matter*, LiveLaw (May 24, 2024), https://www.livelaw.in/high-court/manipur-high-court/artificial-intelligence-manipur-high-court-uses-chat-gpt-to-conduct-research-on-service-law-matter-pass-order-258742. (2024 SCC OnLine Mani 172)

2.	Justice Anoop Chitkara of the Punjab and Haryana High Court used ChatGPT in a bail hearing involving a homicide case, demonstrating AI's utility in legal research and jurisprudence.[31]
3.	The National Judicial Data Grid ("**NJDG**") exemplifies AI's integration to improve the efficiency of the Indian legal system. Technologies like AI-driven prediction models and virtual court tools have been pivotal in modernizing court operations.[32]
4.	In the United States, AI tools such as COMPAS are employed for data analysis, risk assessment, and decision support in the legal system, enhancing efficiency and public access to legal information through AI-powered chatbots.[33]
5.	China has pioneered AI integration in its judicial system with initiatives like the 'Smart Court' system, dating back to 1990, which aids judges in case analysis and decision-making, illustrating its commitment to judicial modernization.[34]
6.	The UK's Digital Case System introduced by the Ministry of Justice allows for real-time case updates, remote court participation, and digital evidence submission, reflecting advancements in judicial technology and efficiency.[35]
7.	The USPTO's decision regarding Stephen Thaler's AI-generated invention highlights global debates over AI's role in intellectual property, affirming human inventorship for patent eligibility while recognizing AI's collaborative potential in innovation.[36]

AI in India

AI is revolutionizing India's economy by transforming how businesses operate and enhancing productivity across various sectors. Over the past decade, India has seen a

[31]Sparsh Upadhyay, *In a First, Punjab and Haryana High Court Seeks ChatGPT's Response on Bail Jurisprudence Across the World*, LiveLaw (Mar. 28, 2023, 6:13 AM), https://www.livelaw.in/news-updates/punjab-and-haryana-high-court-chatgpt-reply-bail-jurisprudence-world-224929. (CRM-M-22496-2022)

[32]Krishnadas Rajagopal, "Supreme Court information a click away as it joins National Judicial Data Grid" The Hindu, (September 14, 2023), available at: https://www.thehindu.com/news/national/sc-data-will-now-be-available-on-national-judicial-data-grid-cji/article67306269.ece (last visited 1 July 2024).

[33]David Magee, "AI in the court: When algorithms rule on jail time" AP News, (January 31, 2018), available at: https://apnews.com/article/ap-top-news-david-magee-courts-cleveland-us-news-20efb1d707c24bf2b169584cf75c8e6a (last visited 1 July 2024).

[34]Changqing Shi, Bin Li, "The Smart Court – A New Pathway to Justice in China?" (2021)Volume: 12 Issue: 1, available at: https://iacajournal.org/articles/10.36745/ijca.367 (last visited 1 July 2024).

[35]Ian Bailey, "The digital transformation sweeping the UK Courts system," Guest blog, Virgin Media Business, (May 19, 2021), available at: https://www.techuk.org/resource/the-digital-transformation-sweeping-the-uk-courts-system.html (last visited 1 July 2024).

[36] Blake Brittain, "US Supreme Court rejects computer scientist's lawsuit over AI-generated inventions," Reuters, (April 25, 2023), available at: https://www.reuters.com/legal/litigation/us-supreme-court-rejects-computer-scientists-lawsuit-over-ai-generated-inventions-2023-04-24/(last visited 1 July 2024).

significant rise in AI adoption, driven by advancements in technology and increasing digital connectivity.[37]

AI is enabling industries to automate complex tasks, which improves efficiency and allows workers to focus on more strategic activities. This automation is not only boosting economic growth but also creating new opportunities for innovation. For instance, AI applications in agriculture are providing farmers with real-time data and insights to optimize crop yields and reduce wastage. In healthcare, AI-powered diagnostics and personalized medicine are improving treatment outcomes and expanding access to healthcare services, especially in remote areas. The financial sector is leveraging AI for fraud detection, risk assessment, and enhancing customer experience through personalized services. Education is benefiting from AI-driven platforms that customize learning experiences and provide better student outcomes. Moreover, AI is playing a crucial role in developing smarter cities by optimizing traffic management, energy consumption, and public services, thereby improving urban living standards.

The Indian government has been proactive in promoting AI through initiatives like the National AI Strategy, aimed at fostering an ecosystem conducive to AI research, development, and innovation. Public-private partnerships are driving investments in AI start-ups and technology deployment, positioning India as a global hub for AI innovation. Further to re-enforce the commitment to AI, the government of India has increased the expenditure in AI to 109.6% during 2018 to reach US$ 665 million. Moreover, AI expenditure is projected to grow with a Compound Annual Growth Rate **("CAGR")** of 39% over the period 2019-2025 touching around US$ 11,781 million by 2025 along with the announcement of the country's first AI city to be established in Lucknow, Uttar Pradesh. As per NITI Aayog, by 2035, AI has the potential to add 1 trillion dollars to India's economy.[38]

Use cases of AI in India

India has an abundance of AI startups driving innovation across a wide array of sectors. These startups are leveraging cutting-edge technologies to address complex problems and improve efficiencies in various industries.

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[37] Artificial Intelligence: way forward for India," (May 2018) 15 Journal of Information Systems and Technology Management 1-23 Available at: https://www.researchgate.net/publication/326575334_Artificial_Intelligence_way_forward_for_India

[38] GlobeNewswire, India Artificial Intelligence (AI) Market Size 2016-2025 and Spending Across 18 Sectors, 140+ Application Segments, AI Domains and Technology Applications, Services, Hardware, https://www.globenewswire.com/news-release/2020/01/09/1968230/0/en/India-Artificial-Intelligence-AI-Market-Size-2016-2025-and-Spending-Across-18-Sectors-140-Application-Segments-AI-Domains-and-Technology-Applications-Services-Hardware.html

Sector	Company/ Technology	Use case description
Healthcare	Qure.ai	Uses AI for radiology imaging to detect abnormalities and assist in diagnosis.
Finance	CreditVidya	Uses AI to improve credit scoring and risk assessment for lenders.
Healthcare	Niramai	AI-based breast cancer screening using thermal imaging and machine learning algorithms.
Retail	Vue.ai	AI-based visual recognition and personalization engine for retail businesses to enhance customer experiences.
Education	Byju's	Offers personalized learning experiences through AI-driven content recommendations and adaptive assessments.
Agriculture	CropIn	AI-driven farm management solutions for crop monitoring and yield prediction.
Transportation	Ather Energy	Uses AI to optimize electric vehicle performance and energy management.
Legal	SpotDraft	AI-powered contract management and legal document automation platform.
Entertainment	FlixStock	Uses AI to generate high-quality apparel images for e-commerce platforms, reducing the need for photoshoots.
Space Technology	Pixxel	Uses AI for analyzing satellite imagery to provide insights for agriculture, climate change, and urban planning.

These examples represent just a fraction of the thriving AI ecosystem in India, highlighting the country's role as a hub of technological advancement and innovation.

Current Regulatory Landscape of India

Presently, the Ministry of Electronics and Information Technology (MeitY) carries the portfolio of regulating technologies in India. Numerous statutes such as the Information Technology Act, 2000[39], and the Patents Act, 1970[40] regulate technological matters and their

[39] Information Technology Act, 2000 (Act 21 of 2000 as amended up to Act 22 of 2023)
[40] The Patents Act, 1970 (39 Of 1970)

development. Several statutory bodies, such as the Reserve Bank of India, the Telecom Regulatory Authority of India, and the Competition Commission of India, provide sectoral regulation and enforcement. The Ministry of Electronics and Information Technology itself hosts divisions dedicated to the development *of 'infrastructure and governance', 'research and development', 'international cooperation', 'human-cantered computing', 'emerging technologies', and 'electronic systems design and manufacturing',* among others. In addition, bodies such as the 'Office of the Principal Scientific Adviser' and the 'Empowered Technology Group' influence the development of policies critical to the ideation, development, and deployment of new technologies.

As a data-driven technology with far-reaching consequences, any observations that are made about the health of the present landscape in India on AI governance must be prefaced with a study of the data protection legislation existing, and the regulatory guidelines and protections in the context of AI respectively.

1. Existing Regulatory Framework:

Digital Personal Data Protection Act, 2023

The enactment of legislation to protect personal and non-personal data in India has seen multiple attempts between 2018 and 2022, ultimately culminating in the Digital Personal Data Protection Act, 2023 ("**DPDP Act**")[41]. DPDP Act represents a significant regulatory framework in India aimed at governing the collection, processing, and protection of personal data. **Section 2(s)**[42] of DPDP Act defines a person, which also include the term Artificial Juristic Person ("**AJP**"), which is not explicitly addressed in the subsection. Given that the definition already encompasses entities traditionally viewed as AJPs, such as companies and associations of persons, it can be inferred that this section pertains to AI.For AI applications, which heavily rely on personal data for training models and making decisions, the DPDP Act introduces stringent provisions that significantly impact their development and deployment. Central to the DPDP Act is the requirement for explicit **consent** from individuals before their personal data can be processed. This consent mechanism is crucial for AI systems, which often process vast amounts of personal data to function effectively. Developers must ensure that AI applications incorporate robust

[41]Digital Personal Data Protection Act, 2023
[42] The Digital Personal Data Protection Act, 2023 (No. 22 Of 2023) s. 2

mechanisms for obtaining, managing, and documenting user consent, enhancing transparency and accountability in data processing practices.

Another critical aspect of the DPDP Act is its provision on data localization. **Section 34**[43] mandates that critical personal data must be stored exclusively within India, unless exempted by the Data Protection Authority **("DPA")**. This requirement poses challenges for AI systems that rely on cross-border data flows, impacting their data management strategies and necessitating compliance with stringent localization norms.[44]

The DPDP Act also establishes fundamental data protection **principles** that AI developers must adhere to. These include principles such as **data minimization, purpose limitation, storage limitation, and accountability**. AI systems must be designed to collect only necessary data, use it for specified purposes, and implement measures to ensure data security and integrity

Section 22[45] requires data fiduciaries, including AI developers and users, to implement data protection by design and default. This entails integrating data protection measures into the design and operation of AI systems, conducting data protection impact assessments **(DPIAs)** for high-risk activities, and maintaining records of data processing activities. [46]

Enforcement of the DPDP Act is essential for its effectiveness in regulating AI. **Section 33**[47] establishes penalties for non-compliance, including fines and sanctions for data breaches or violations of data protection principles. Effective enforcement by the DPA is crucial to ensure that AI developers and organizations adhere to regulatory requirements, maintain accountability, and protect individual privacy rights in AI-driven environments.[48]

Despite its comprehensive aims, the DPDP Act primarily focuses on personal data, leaving non-personal or anonymized data largely unregulated. This limitation is significant in the context of AI, where both types of data are essential for training and improving algorithms. The Act's narrow scope on personal data may not adequately address the interconnected nature of data used in AI applications, posing challenges for comprehensive data governance and privacy protection in evolving technological landscapes.

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[43] The Digital Personal Data Protection Act, 2023 (No. 22 Of 2023) s. 34
[44]Digital Personal Data Protection Act, 2023
[45] The Digital Personal Data Protection Act, 2023 (No. 22 Of 2023) s. 22
[46]Digital Personal Data Protection Act, 2023
[47] The Digital Personal Data Protection Act, 2023 (No. 22 Of 2023) s. 33
[48]Digital Personal Data Protection Act, 2023[48] Sarvagya Chitranshi, "The 'Deepfake' Conundrum - Can the Digital Personal Data Protection Act, 2023 Deal with Misuse of Generative AI?" (December 23, 2023), available at: https://www.ijlt.in/post/the-deepfake-conundrum-can-the-digital-personal-data-protection-act-2023-deal-with-misuse-of-ge (last visited 1 July 2024).

One of the criticisms levelled against the DPDP Act is its provision allowing exemptions for the Government and its instrumentalities from certain provisions of DPDP Act. This exemption raises concerns about accountability and transparency in data processing, particularly concerning AI applications used by government agencies. It could potentially lead to misuse or surveillance without adequate safeguards, undermining trust in AI systems deployed by public authorities. The Act's exemptions for government entities highlight a potential gap in ensuring consistent data protection standards across all sectors, including those heavily reliant on AI technologies.[49]

Ambiguity in defining key terms such as "*personal data,*" "*sensitive personal data,*" *and* "*anonymization*" under the DPDP Act poses challenges in its application to AI technologies. The Act's vague definitions can lead to varying interpretations and inconsistent compliance across different AI applications and sectors.

While the DPDP ACT mandates data localization for critical personal data within India, it lacks clear guidelines or mechanisms for international data transfers. AI development often involves global collaborations and data exchanges, necessitating frameworks that facilitate lawful and secure international data flows. The absence of explicit provisions on international data transfers under the Act could hinder cross-border AI innovation and compliance with both Indian regulations and global data protection standards.

Sector-specific regulations are essential for addressing the unique challenges and requirements of various industries adopting AI technologies. While the DPDP Act acknowledges the need for sector-specific guidelines, its generalized framework may not fully accommodate the nuanced data processing practices and privacy concerns within different sectors. Tailored regulatory approaches are necessary to ensure that AI applications in healthcare, finance, transportation, and other sectors adhere to sector-specific data protection standards while promoting innovation and economic growth.

In conclusion, while the DPDP Act lays a robust foundation for data protection in India and addresses crucial aspects of AI regulation, including consent, localization, and accountability, it faces challenges regarding scope, exemptions, and international data governance.

[49] Sarvagya Chitranshi, "The 'Deepfake' Conundrum - Can the Digital Personal Data Protection Act, 2023 Deal with Misuse of Generative AI?" (December 23, 2023), available at: https://www.ijlt.in/post/the-deepfake-conundrum-can-the-digital-personal-data-protection-act-2023-deal-with-misuse-of-ge (last visited 1 July 2024).

Digital India Act, 2023

The proposed Digital India Act 2023 (DIA) represents a significant overhaul of India's regulatory framework for digital governance, aiming to replace the Information Technology Act, 2000. This draft legislation introduces updated regulations and standards designed to address contemporary challenges in the digital landscape, with specific provisions that impact AI technologies.[50]

Key Objectives and Provisions:

Enhanced Cybersecurity Measures: The Act proposes strengthened cybersecurity provisions to safeguard digital infrastructure and data against evolving threats. It includes mandates for robust cybersecurity protocols and incident response mechanisms to mitigate risks associated with AI-driven technologies, which are increasingly integral to digital operations.

Improved Data Protection Frameworks: Recognizing the critical importance of data protection in the AI era, the DIA aims to enhance existing frameworks. It introduces comprehensive provisions for the collection, processing, storage, and sharing of personal and non-personal data, ensuring compliance with stringent data protection standards. This includes measures to regulate AI applications that handle sensitive data, aligning with global best practices such as data minimization and purpose limitation.

Streamlined Regulatory Oversight: The DIA seeks to streamline regulatory oversight across the digital ecosystem, including AI technologies. It outlines clear guidelines and compliance requirements for the development, deployment, and use of AI systems. This includes provisions for auditing AI algorithms, establishing accountability frameworks, and enforcing transparency in AI operations to foster trust and accountability among stakeholders.

Ethical AI Principles: Building on global trends, the DIA incorporates ethical principles for AI development and deployment. It emphasizes the importance of fairness, accountability, and transparency in AI systems, aiming to mitigate biases and ensure equitable outcomes. The legislation encourages responsible AI practices through guidelines on data ethics, algorithmic transparency, and stakeholder engagement.

[50]Draft Digital India Act, 2023 (Ministry of Electronics and Information Technology, Government of India)

Implementation and Enforcement Mechanisms: The DIA outlines mechanisms for the effective implementation and enforcement of its provisions. It establishes regulatory bodies or empowers existing authorities to oversee compliance with digital and AI-related regulations. This includes provisions for audits, inspections, and penalties for non-compliance to uphold standards of digital governance and protect public interests.

The introduction of the DIA signifies India's proactive approach to adapting its legal framework to the digital age. By incorporating provisions specifically tailored to AI technologies, the Act aims to foster innovation while ensuring responsible and ethical use of AI. However, challenges such as operationalizing ethical guidelines, balancing innovation with regulatory compliance, and addressing emerging AI risks will require continuous dialogue with stakeholders and iterative refinement of the regulatory framework.

National Strategy for AI

In 2018, NITI Aayog, the policy think tank of the Government of India, released a seminal discussion paper titled "**National Strategy for Artificial Intelligence.**" This paper lays out a detailed roadmap for leveraging AI to drive inclusive growth and development across key sectors such as healthcare, agriculture, education, smart cities, and transportation. The strategy states the importance of creating a supportive legal and regulatory environment that encourages innovation while addressing critical ethical, privacy, and security concerns.[51]

Key components of the National Strategy for AI include:

- *AI for All:* Emphasizing the democratization of AI technologies to ensure that the benefits of AI reach all segments of society.
- *Focus Areas:* Identifying key sectors where AI can make a significant impact, such as healthcare (predictive and preventive health), agriculture (improving crop yield), education (personalized learning), smart cities (efficient urban management), and mobility (intelligent transportation systems).
- *Challenges and Mitigation:* Addressing potential risks such as job displacement, ethical issues, and privacy concerns. The strategy recommends developing guidelines and frameworks to mitigate these risks.

[51]NITI Aayog, *National Strategy for Artificial Intelligence* (2023), https://www.niti.gov.in/sites/default/files/2023-03/National-Strategy-for-Artificial-Intelligence.pdf.

- *Collaborative Ecosystem:* Promoting collaboration between academia, industry, and government to foster a robust AI ecosystem in India.

Regulatory Guidelines for AI Models by MeitY

On March 15, 2024, the Ministry of Electronics and Information Technology ("**MeitY**") of India issued a comprehensive advisory aimed at updating regulations AI models, with a particular focus on Large Language Models ("**LLMs**") and generative AI technologies. This advisory introduces several key compliance requirements designed to enhance transparency and mitigate risks associated with AI deployment.[52]

Compliance Requirements:

- No Bias or Discrimination: The advisory mandates that AI systems must not exhibit inherent bias or *discrimination*. This requirement aims to ensure that AI technologies operate fairly and equitably across diverse user groups, without perpetuating biases present in training data or algorithms.
- Labelling Under-Tested AI: AI tools that are under-tested or deemed unreliable must be clearly labelled. This labelling requirement is crucial in informing users about potential inaccuracies or *limitations* in AI-generated outputs. It includes provisions for a "consent popup" or equivalent mechanism to notify users about the reliability of AI outputs before use.
- Identifying Deepfakes: AI-generated content that could be misused, such as deepfakes, must contain metadata that identifies its origin and any subsequent modifications. This *measure* aims to combat the spread of misinformation and enhance digital trust by enabling users to verify the authenticity of AI-generated content.

Further, the updated advisory brings significant changes to the regulatory landscape for AI in India:

- *Removal of Prior Government Approval:* Previously, there was a requirement for government approval before releasing under-tested AI tools to the public. This requirement has now been eliminated, aiming to reduce regulatory ambiguity and promote faster innovation in AI technologies.

[52]Ministry of Electronics and Information Technology, Advisory dated 15.03.2024, available at https://www.meity.gov.in/notices-and-advisories (accessed on July 1, 2024).

- *Emphasis on Labelling:* Intermediaries and platforms hosting AI-generated content are now mandated to ensure appropriate labelling, particularly for under-tested or unreliable AI outputs. This transparency requirement is intended to help users make informed decisions and mitigate potential risks associated with AI use.
- *Removal of Reporting Requirement:* The advisory also eliminates the mandate for intermediaries and platforms to submit an Action Taken-cum-Status Report (ATS Report) to MeitY within a specific timeframe. This streamlining of reporting requirements aims to reduce administrative burdens while still promoting accountability in AI deployment.

International Collaboration:

India is actively engaged in international dialogues and collaborations aimed at shaping the regulatory landscape for AI. This proactive involvement shows India's commitment to adopting global best practices while contributing to the development of international standards for AI governance. One significant aspect of India's strategy involves partnerships with influential global organizations such as the **OECD, UNESCO, and the United Nations**. By collaborating with these organizations, India seeks to ensure that its regulatory framework for AI promotes transparency, accountability, and ethical AI deployment.

Moreover, India has pursued **bilateral agreements** in collaborations with countries like the United States, United Kingdom, Israel, and Japan for AI research and development. These agreements facilitate the exchange of knowledge, expertise, and best practices in AI regulation.

In addition to bilateral engagements, India actively participates in global AI summits and conferences. These forums provide platforms for policymakers, experts, and industry leaders to discuss and share insights on AI ethics, governance, and regulatory frameworks.

Sectoral Impact of AI with Companies driving the change

India presents a unique landscape for AI development and implementation, acting as both an opportunity hub and a testing ground for scalable AI solutions that can benefit emerging economies worldwide. Addressing challenges in India can have a significant global impact, given that solutions developed here have the potential to be adapted for other regions with similar issues, benefiting over 40% of the global population. Below we aim to provide a detailed explanation of impact of AI on different sectors and startups driving the change.

1. Healthcare

The Indian healthcare sector, expected to grow to USD 280 billion by 2020, faces critical challenges in quality, accessibility, and affordability. AI can play a transformative role in overcoming these barriers.[53]

Shortage of Qualified Healthcare Professionals:

- India has 0.76 doctors and 2.09 nurses per 1,000 population, below WHO recommendations of 1 doctor and 2.5 nurses per 1,000 population.[54]
- AI-driven diagnostic tools can aid less skilled healthcare workers in rural areas, ensuring timely and accurate diagnoses.[55]

Non-uniform Accessibility:

- AI-powered telemedicine platforms can bridge the gap between urban and rural healthcare services.
- AI-based logistics can optimize the distribution of medical supplies and resources.[56]

Affordability:

- AI can streamline hospital operations, reducing overhead costs and making healthcare more affordable.
- Predictive analytics can identify high-risk patients early, potentially reducing treatment costs through early intervention.[57]

Reactive Approach to Healthcare:

- AI can facilitate early detection of diseases through predictive modeling and big data analytics.
- AI systems like IBM Watson can analyze patient history and suggest personalized treatment plans, improving patient outcomes and reducing costs.[58]

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[53]NITI Aayog, *National Strategy for Artificial Intelligence* (2023), https://www.niti.gov.in/sites/default/files/2023-03/National-Strategy-for-Artificial-Intelligence.pdf.

[54]*Artificial Intelligence at the Cornerstone of Making India a World-Class Healthcare Destination*, Economic Times (July 30, 2022), https://health.economictimes.indiatimes.com/news/industry/artificial-intelligence-at-the-cornerstone-of-making-india-a-world-class-healthcare-destination/93228502.

[55]*Beyond Human Perception, AI Algorithms*, ScienceDirect (2024), https://www.sciencedirect.com/science/article/pii/S2949866X24000285.

[56]EY. (2024, June 13). How generative AI can optimize health care supply chains. EY. https://www.ey.com/en_us/insights/health/how-generative-ai-can-optimize-health-care-supply-chains#:~:text=AI%20can%20help%20health%20care,course%2Dcorrect%20for%20disruptions%20automatically

[57]Rucker, H., Dory, V., & Yeo, M. (2023). Improving health professions education through targeted interventions: A scoping review. *BMC Medical Education, 23*(1), 248. https://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-023-04698-z

Companies changing the feat:

- **Niramai:** Uses AI for early detection of breast cancer through thermal imaging.
- **Qure.ai:** Employs AI to interpret radiology images, aiding in the early detection of tuberculosis and other conditions.

2. Agriculture

Agriculture remains vital to India's economy, employing 49% of the workforce and contributing 16% to GDP. AI can enhance productivity and sustainability in this sector.

Predictive Analytics for Crop Yields:

- AI models predict weather patterns, pest infestations, and crop diseases, enabling proactive measures to protect crops.[59]
- AI-based platforms like CropIn provide real-time insights into crop health and farm conditions.[60]

Precision Farming:

- AI-driven drones and satellite imagery analyze soil health and monitor crops, optimizing resource usage and increasing yields.[61]
- Intello Labs uses image recognition to monitor crops and predict yields.[62]

Efficient Resource Management:

- AI systems can optimize irrigation practices by analyzing weather data and soil conditions.[63]

Market Access and Supply Chain:

- AI can connect farmers directly with buyers, ensuring fair prices and reducing wastage.

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[58]IBM. (2021, November 30). IBM Watson Health introduces new opportunities for imaging AI adoption. IBM Newsroom. https://newsroom.ibm.com/2021-11-30-IBM-Watson-Health-Introduces-New-Opportunities-for-Imaging-AI-Adoption

[59]Papa, R. (2024, June 15). Revolutionizing crop management: Current applications of AI technology. *Medium*. https://redepapa.medium.com/revolutionizing-crop-management-current-applications-of-ai-technology-a5a09e658feb

[60]The Hindu. (2024, June 26). Cropin in pact with AWS to build a solution to address global hunger, food insecurity. *The Hindu*. https://www.thehindu.com/business/cropin-in-pact-with-aws-to-build-a-solution-to-address-global-hunger-food-insecurity/article67972209.ece

[61]NASSCOM. (2024, June 20). Improving crop yields with cloud-powered predictive analytics. *NASSCOM Community*. https://community.nasscom.in/index.php/communities/cloud-computing/improving-crop-yields-cloud-powered-predictive-analytics

[62]The Spoon. (2024, June 22). Intello Labs uses AI to help farmers get a fair price for their crops. *The Spoon*. https://thespoon.tech/intello-labs-uses-ai-to-help-farmers-get-a-fair-price-for-their-crops/

[63]Kour, P., & Bhan, N. (2020). AI-driven solutions in healthcare: Current status and future directions. *Journal of Biomedical Informatics, 108*, 103518. https://www.sciencedirect.com/science/article/pii/S258972172030012X

- Ninjacart uses AI to streamline supply chains, reducing post-harvest losses and improving market access.[64]

Companies changing the feat:

- **SatSure:** Utilizes AI and satellite imagery to provide actionable insights for farmers and agribusinesses.
- **Aibono:** Uses AI to stabilize crop yields through predictive analytics and precision farming techniques.
- **Fasal:** An AI-based platform that helps farmers to make data-driven decisions about irrigation, pest control, and harvesting.

3. Education

AI has the potential to revolutionize education in India, addressing issues of quality, access, and personalized learning.

Adaptive Learning:

- AI-driven platforms like BYJU'S offer personalized learning experiences, adapting content to individual student's learning pace and style.[65]
- AI can assess students' strengths and weaknesses, tailoring lessons to improve understanding and retention.

Intelligent Tutoring Systems:

- AI-powered tutoring systems provide interactive and personalized support to students, enhancing engagement and comprehension.
- Systems like Eduten offer AI-based interactive math exercises, adapting to students' learning levels.[66]

Administrative Efficiency:

[64]Business Today. (2024, January 8). Ninjacart: The start-up which made agritech look cool is now looking to have a legacy of its own. *Business Today*. https://www.businesstoday.in/magazine/deep-dive/story/ninjacart-the-start-up-which-made-agritech-look-cool-is-now-looking-to-have-a-legacy-of-its-own-412227-2024-01-08

[65] Yogesh Shinde, "AI in eLearning Market Size to Grow USD 12.2 Billion by 2033," (June 21, 2024), available at: https://scoop.market.us/ai-in-elearning-market-news/ (last visited 1 July 2024).

[66] Athanasios Christopoulos, Henri Kajasilta, Tapio Salakoski, Mikko-Jussi Laakso, "Limits and Virtues of Educational Technology in Elementary School Mathematics," (March 2020), available at: https://www.researchgate.net/figure/Overview-of-the-Eduten-Playground-Features-and-the-Links-Between-the-Interacting_fig6_339676249 (last visited 1 July 2024).

- AI can automate administrative tasks, allowing teachers to focus more on instruction.
- AI systems can track student performance and identify those at risk of dropping out, enabling timely interventions.[67]

Professional Development for Teachers:

- AI can provide customized training for teachers based on their specific needs and teaching challenges.
- Platforms like Dost Education use AI to offer personalized professional development resources to educators.[68]

Companies changing the feat:

- **Embibe:** Uses AI to provide personalized feedback and learning recommendations to students.
- **GradeGuardian:** Uses predictive models to identify students at risk and suggest interventions.

4. Manufacturing

AI is expected to significantly impact the manufacturing sector in India, enabling the creation of the '*Factory of the Future*' with smart, adaptable systems.

Engineering and R&D:

- AI accelerates research and development efforts by analyzing vast amounts of data to identify trends and patterns.
- TCS uses AI for predictive analytics in product design and development.[69]

Supply Chain Management:

- AI-driven demand forecasting and inventory management optimize supply chains, reducing costs and increasing efficiency.

[67] Agustín López, "New UOC AI system lets the university monitor online students at risk of dropping out," (September 5, 2023), available at: https://www.uoc.edu/en/news/2023/209-AI-detects-students-at-risk-dropping-out (last visited 1 July 2024).
[68] Rojesh Shikhrakar, "Empowering Educators: Enhancing Teaching with AI," (June 14, 2024), available at: https://trainingmag.com/empowering-educators-enhancing-teaching-with-ai/ (last visited 1 July 2024).
[69] Mohit Pandey, "TCS' Obsession with Generative AI," Analytics India Magazine, (October 23, 2023), available at: https://analyticsindiamag.com/tcs-obsession-with-generative-ai/ (last visited 1 July 2024).

- Locus uses AI for efficient route planning and logistics management.[70]

Production Efficiency:

- AI-enabled automation improves production processes, reducing downtime and increasing throughput.
- GreyOrange employs AI-driven robotics for warehouse automation and logistics.[71]

Predictive Maintenance:

- AI systems predict equipment failures before they occur, minimizing downtime and maintenance costs.
- SparkCognition offers AI-driven solutions for predictive maintenance in manufacturing.[72]

Quality Assurance:

- AI-powered vision systems detect defects and deviations in products, ensuring high quality and reducing waste.
- Flutura uses AI to optimize quality assurance processes in manufacturing.[73]

Companies changing the feat:

- **Bosch:** Uses AI to optimize manufacturing processes and predictive maintenance.
- **GE**: Employs AI for smart manufacturing and predictive analytics.

5. Smart Cities

AI integration in smart cities can enhance urban living by improving infrastructure, reducing congestion, and enhancing security.

Traffic Management:

[70] Ambika Chopra, "How Locus Is Using AI To Enhance End Customer Experience And Logistics Management With 'Uber For X' Model," Inc42, (December 27, 2016), available at: https://inc42.com/startups/locus-startup-profile/ (last visited 1 July 2024).
[71] "AI-Driven Warehouse and Retail Automation Leader GreyOrange Closes on $135M Growth Financing," GlobeNewswire, (December 20, 2023), available at: https://www.globenewswire.com/news-release/2023/12/20/2799523/0/en/AI-Driven-Warehouse-and-Retail-Automation-Leader-GreyOrange-Closes-on-135M-Growth-Financing.html (last visited 1 July 2024).
[72] Ryan Prete, "How SparkCognition Influences 6 Key Sectors of the Global Economy," (November 15, 2023), available at: https://www.linqto.com/blog/sparkcognition-overview/ (last visited 1 July 2024).
[73] Intel Corporation, "Flutura Machine Intelligence Platform for Industrial Insight," available at: https://www.intel.com/content/dam/develop/external/us/en/documents/flutura-machine-intelligence-platform-for-industrial-insight.pdf (last visited 1 July 2024).

- AI can optimize traffic flow and reduce congestion through real-time data analysis and predictive modeling.
- Netradyne uses AI for smart traffic management and road safety.[74]

Public Safety:

- AI-driven surveillance systems enhance security by identifying potential threats and improving crowd management.
- Staqu uses AI for real-time surveillance and threat detection.[75]

Energy Management:

- AI systems optimize energy usage, reducing waste and improving efficiency.
- Grene Robotics uses AI for smart grid management and energy optimization.[76]

Urban Planning:

- AI analyzes data from various sources to inform urban planning decisions, ensuring sustainable development.
- Digital Blue Foam uses AI to evaluate building development options to make fast-informed decisions at the early-stages of the development of a project.[77]

Companies changing the feat:

- **Honeywell:** Uses AI for smart building management and energy efficiency.
- **Cisco:** Employs AI to **enhance** smart city infrastructure and connectivity.

6. Financial Services

[74] "Revolutionising Road Safety: How Driver•i by Netradyne is Making Roads Safer with AI," International Road Federation, (May 28, 2024), available at: https://irfnet.ch/2024/05/28/revolutionising-road-safety-how-driveri-by-netradyne-is-making-roads-safer-with-ai/#:~:text=Netradyne%2C%20a%20global%20provider%20of,assess%20driver%20behaviour%20real%2Dtime. (last visited 1 July 2024).

[75] Statesman News Service, "Ayodhya to have AI-integrated surveillance through CCTV cameras," The Statesman, (January 21, 2024), available at: https://www.thestatesman.com/india/ayodhya-to-have-ai-integrated-surveillance-through-cctv-cameras-1503261923.html (last visited 1 July 2024).

[76] ELE Times Bureau, "Grene Robotics Develops India's 1st Autonomous Drone Defence Dome System – 'Indrajaal'," ELE Times, (June 29, 2021), available at: https://www.eletimes.com/grene-robotics-develops-indias-1st-autonomous-drone-defence-dome-system-indrajaal (last visited 1 July 2024).

[77] "Addendum to: Top AI-Powered Tools for the Building Industry," aec+tech, (September 21, 2023), available at: https://aecplustech.medium.com/addendum-to-top-ai-powered-tools-for-the-building-industry-ec4a485d00f8 (last visited 1 July 2024).

The banking and financial services sector in India is at the forefront of AI adoption, leveraging it to improve customer interaction, process efficiency, and fraud detection.

Customer Interaction:

- AI-powered chatbots and virtual assistants provide personalized customer service, improving satisfaction and engagement.
- HDFC Bank's EVA: An AI-driven chatbot that assists customers with queries and transactions.[78]

Process Automation:

- AI automates routine back-office operations, increasing efficiency and reducing errors.
- Razorpay uses AI to streamline payment processing and fraud detection.[79]

Credit Scoring and Risk Management:

- AI analyzes various data sources to develop accurate credit scores and identify potential risks.
- CreditVidya employs AI to assess creditworthiness using alternative data.[80]

Fraud Detection:

- AI systems monitor transactions in real-time, identifying and preventing fraudulent activities.
- ICICI Bank uses AI for proactive fraud detection and prevention.[81]

Wealth Management:

- AI-powered robo-advisors provide personalized investment advice and manage portfolios.

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[78] PTI, "HDFC Bank launches chatbot Eva for customer services," The Economic Times, (March 05, 2017), available at: https://economictimes.indiatimes.com/industry/banking/finance/banking/hdfc-bank-launches-chatbot-eva-for-customer-services/articleshow/57481943.cms?from=mdr (last visited 1 July 2024).

[79] Jamtech Technologies Pvt. Ltd., "Revolutionizing Online Payments," LinkedIn, (June 25, 2024), available at: https://www.linkedin.com/pulse/revolutionizing-online-payments-jamtech-technologies-pvt-ltd-95722-t3pif?trk=public_post_main-feed-card_feed-article-content (last visited 1 July 2024).

[80] Shehnaz Ahmed, "Alternative Credit Scoring – A Double Edged Sword," Vidhi Centre for Legal Policy, (December 2020), available at: https://vidhilegalpolicy.in/wp-content/uploads/2020/12/AlternativeCS_ShehnazA-1.pdf (last visited 1 July 2024).

[81] "Inside the Rise of Bank Fraud in India," IDfy Blog, (27 September 2023), available at: https://www.idfy.com/blog/inside-the-rise-of-bank-fraud-in-india/#:~:text=Machine%20Learning%20and%20Predictive%20Analytics,potentially%20fraudulent%20transactions%20for%20investigation. (last visited 1 July 2024).

- Kuvera uses AI to offer personalized investment recommendations and portfolio management.[82]

Companies changing the feat:

- **YES BANK**: Uses AI for loan approval processes and customer service enhancement.
- **Axis Bank**: Employs AI for personalized banking services and fraud analytics.

AI's transformative potential across various sectors in India is immense. From healthcare to agriculture, education, manufacturing, smart cities, and financial services, AI is driving innovation, improving efficiency, and enhancing quality of life.

Risk of AI and need for Regulation

In India, where the adoption of AI is accelerating, these risks are particularly pronounced due to the lack of stringent regulations. Addressing these risks is critical to safeguarding individual rights, ensuring fairness, and promoting ethical AI development. We try to explore some of the primary risks associated with AI deployment in India and the urgent need for a comprehensive regulation to overcome future challenges.[83]

1. Privacy and Data Protection

AI systems, particularly those using facial recognition and other biometric data, can severely infringe on individuals' privacy. For instance, Clearview AI in the USA trained its models using over 3 billion images scraped from social media without users' consent. This technology has been used by law enforcement agencies, often without understanding its full implications. In India, the absence of stringent data protection laws means that such practices could lead to widespread privacy violations. The Supreme Court of India's landmark judgment in ***Justice K.S. Puttaswamy (Retd) v. Union of India***[84] recognized the right to privacy as a fundamental right. However, without specific regulations for AI, there is a significant risk of this right being undermined.

[82] Team YS, "Kuvera Insights 2020: A deep dive into personal finance in India," YourStory, (January 2021), available at: https://yourstory.com/2021/01/kuvera-insights-2020-deep-dive-personal-finance-india (last visited 1 July 2024).
[83] Benjamin Cheatham, Kia Javanmardian, and Hamid Samandari, "Confronting the risks of artificial intelligence," McKinsey & Company, (April 26, 2019), available at: https://www.mckinsey.com/capabilities/quantumblack/our-insights/confronting-the-risks-of-artificial-intelligence (last visited 1 July 2024).
[84] 2017 SCC OnLine SC 1462

Case in point: The deployment of facial recognition technology at Indian airports and railway stations, without explicit consent and comprehensive data protection measures, highlights the potential for privacy violations.

2. Bias and Discrimination

AI systems can perpetuate and even exacerbate existing human biases. For example, the Correctional Offender Management Profiling for Alternative Sanctions ("**COMPAS**") program in the USA was found to be biased against black offenders. Similar biases can emerge in India if AI systems are used in critical areas like judiciary, law enforcement, and education without proper oversight. In education, studies have shown that teachers' biases can affect students' grades, and an AI system trained on such biased data could replicate and reinforce these biases.[85]

Case in point: An AI-based recruitment tool used by a major Indian tech company was found to favour candidates from certain universities, reflecting inherent biases in the training data.

3. Accountability and Transparency

The deployment of AI systems often lacks transparency, making it difficult to hold anyone accountable for errors or biases. For example, AI systems used for recruitment can make opaque decisions, leading to potential unfairness without any clear recourse for the affected individuals. In the case of ***Moffatt v. Air Canada***[86], the inaccurate information provided by a chatbot led to financial loss, highlighting the need for clear accountability and transparency in AI systems.

Case in point: The use of AI-driven decision-making in Indian banks for loan approvals has raised concerns about the lack of transparency and the potential for unfair rejections.

4. Safety and Reliability

AI systems must be reliable and safe, especially when deployed in critical sectors such as healthcare and transportation. Unregulated AI deployment can lead to unintended harm. For instance, predictive technologies in healthcare require extensive personal data, and without legal safeguards, this data can be misused or improperly handled. India ranks second in the world for cyber-attacks in the healthcare sector, emphasizing the need for

[85] Chen, Z., "Ethics and discrimination in artificial intelligence-enabled recruitment practices," Humanit Soc Sci Commun, vol. 10, no. 1, article 567, 2023. https://doi.org/10.1057/s41599-023-02079-x
[86] 2024 BCCRT 149

stringent regulations to protect sensitive health data. Furthermore, faulty decisions taken by AI systems within this sphere can have grave consequences for the parties involved.[87]

Case in point: An AI diagnostic tool used in Indian hospitals provided incorrect diagnoses due to faulty algorithms, leading to inappropriate treatment plans.

5. Intellectual Property Issues

Generative AI raises significant intellectual property (IP) concerns. AI-generated content often uses existing works, leading to potential copyright infringements. This issue is particularly relevant in India, where the creative industries are a significant part of the economy. Without clear regulations, the rights of original content creators could be compromised.[88]

Case in point: An Indian start-up faced legal action after its AI-generated artwork was found to closely resemble copyrighted images, sparking a debate over the originality and ownership of AI-created content.

6. Ethical Concerns

The ethical implications of AI, such as the potential for mass surveillance and the lack of explainability of AI decisions, are significant. In India, the deployment of surveillance technologies by the state has been opaque, with little oversight. This lack of transparency raises concerns about the misuse of AI for surveillance and the infringement of individual freedoms.[89]

Case in point: The implementation of AI-driven surveillance systems in major Indian cities has raised ethical questions about privacy and the potential for misuse by authorities.

7. Economic Stability

The rapid and unchecked deployment of AI can lead to significant disruptions in the job market. While AI has the potential to create new jobs, it can also render many existing jobs obsolete. Without a regulatory framework to manage this transition, there could be widespread unemployment and social unrest. The Indian government considers AI a

[87] Nicola Tamascelli, Alessandro Campari, Tarannom Parhizkar, Nicola Paltrinieri, "Artificial Intelligence for safety and reliability: A descriptive, bibliometric and interpretative review on machine learning," Journal of Loss Prevention in the Process Industries, vol. 90, 2024, article 105343, ISSN 0950-4230, https://doi.org/10.1016/j.jlp.2024.105343.
[88] WIPO, "Artificial Intelligence and Intellectual Property Policy," World Intellectual Property Organization, available at: https://www.wipo.int/about-ip/en/artificial_intelligence/policy.html(last visited 1 July 2024).
[89] World Economic Forum, "Top 9 ethical issues in artificial intelligence," (October 21, 2016), available at: https://www.weforum.org/agenda/2016/10/top-10-ethical-issues-in-artificial-intelligence/ (last visited 1 July 2024).

"kinetic enabler" for the growth of the digital economy, but this must be balanced with measures to ensure economic stability and job security.[90]

Case in point: The automation of customer service roles in Indian call centres has led to significant job losses, highlighting the need for policies to support workforce transition.

8. International Standards and Competitiveness

As global standards for AI regulation evolve, it is crucial for India to align with these standards to remain competitive in the international market. The European Union's **Artificial Intelligence Act**, for example, seeks to balance risk and innovation, creating compliance bands based on the risks AI solutions can pose to rights. Adopting similar frameworks can help India foster innovation while ensuring that AI development is ethical and rights-centric.[91]

Case in point: Indian tech companies exporting AI solutions to the EU faced compliance challenges due to differing regulatory standards, emphasizing the need for alignment with international norms.

9. Consumer Protection

AI systems are increasingly being used in consumer-facing applications, from chatbots to recommendation systems. Without proper regulation, consumers can be misled or harmed by inaccurate or biased AI outputs. Clear disclaimers and transparency in AI-driven services can help mitigate these risks. The Air Canada case demonstrates the importance of ensuring the accuracy of AI systems and providing consumers with clear information about their limitations.[92]

Case in point: An AI-powered financial advisory service in India provided misleading investment advice, resulting in significant financial losses for consumers.

10. Environmental Impact

[90]Kristalina Georgieva, "AI Will Transform the Global Economy. Let's Make Sure It Benefits Humanity.," International Monetary Fund, January 14, 2024, available at: https://www.imf.org/en/Blogs/Articles/2024/01/14/ai-will-transform-the-global-economy-lets-make-sure-it-benefits-humanity (last visited 1 July 2024).

[91]Charles Mok, "Global Competition for AI Regulation, or a Framework for AI Diplomacy?," The Diplomat, November 07, 2023, available at: https://thediplomat.com/2023/11/global-competition-for-ai-regulation-or-a-framework-for-ai-diplomacy/ (last visited 1 July 2024).

[92] Peter J. Schildkraut and Jeremy Kamras, "The Growing Role of Independent Regulators in Protecting Consumers from AI-Related Harm," Advisory, Arnold & Porter, November 9, 2023, available at: https://www.arnoldporter.com/en/perspectives/advisories/2023/11/growing-role-of-independent-regulators-in-protecting-consumers-from-ai (last visited 1 July 2024).

The deployment of AI systems also has environmental implications. Training large AI models requires significant computational resources, which can lead to high energy consumption and carbon emissions. Regulatory frameworks can encourage the development and deployment of energy-efficient AI technologies, contributing to India's sustainability goals.[93]

Case in point: A study found that the energy consumption of data centres supporting AI research in India was rapidly increasing, highlighting the need for sustainable AI practices.

The risks associated with AI in India highlight the urgent need for comprehensive regulation. By addressing issues such as bias, privacy, accountability, cybersecurity, intellectual property, and ethical concerns, India can create a responsible AI ecosystem. Balancing innovation with robust legal and regulatory frameworks will ensure that AI contributes positively to India's social and economic development while protecting the rights and interests of its citizens.

How Is India leveraging AI and addressing its risks?

India is uniquely positioned to tackle the risks associated with AI deployment due to its robust digital public infrastructure, a rapidly growing tech ecosystem, and proactive governmental initiatives. However, there are significant challenges that need to be addressed to ensure AI is deployed responsibly and beneficially across the nation.

India's population is not only young but also highly connected, with more than 790 million mobile broadband users according to the country's telecommunications sector regulator. The widespread internet penetration, driven by affordable data plans, has created a massive user base for AI applications and services. This connectivity provides a fertile ground for AI adoption, enhancing the potential for innovative solutions to various societal challenges.[94]

The country's digital public infrastructure is another critical asset. Nearly every Indian has a digital identity under the Aadhaar system, a 12-digit unique identity number that allows for digital authentication. This system has become the backbone of numerous public services, facilitating access and efficiency. Additionally, the Unified Payments Interface ("**UPI**"), a low-cost, real-time, interoperable payment system, handles over 10 billion transactions a

[93] Rita Li, "The Environmental Impact of AI," GRC Global Group Insights, May 8, 2023, available at: https://insights.grcglobalgroup.com/the-environmental-impact-of-ai/ (last visited 1 July 2024).
[94] Amlan Mohanty and Shatakratu Sahu, "India's AI Strategy: Balancing Risk and Opportunity," Carnegie Endowment for International Peace, February 22, 2024, available at: https://carnegieendowment.org/posts/2024/02/indias-ai-strategy-balancing-risk-and-opportunity?lang=en (last visited 1 July 2024).

month and represents the largest real-time payment system in the world. These systems generate enormous amounts of data, which, under India's Account Aggregator framework, remains under citizen control, fostering public trust.[95]

Recent AI deployments in India, such as the PM-Kisan chatbot, illustrate the government's commitment to leveraging AI for social good. Launched in September 2023 in collaboration with the EkStep foundation, this AI chatbot assists farmers with accessing information and resolving grievances related to the PM-Kisan direct benefit transfer program. The chatbot saw over 500,000 users on its launch day, demonstrating its potential to enhance service delivery and user engagement.

India's vibrant tech ecosystem, fueled by its booming IT exports (currently nearing $250 billion a year), is also a significant driver of AI adoption. The large number of developers on platforms like GitHub, second only to the United States, underscores the country's capacity for innovation. This ecosystem not only innovates but also widely adopts digital public infrastructure, creating a cyclical effect that feeds the growing tech culture and leverages data to build precise and beneficial AI tools.[96]

AI can be a game-changer in education, helping close the literacy gap and assisting students in learning both in their native languages and in English. AI applications extend to teachers as well, reducing their administrative burdens and allowing them to focus on deeper teaching and meaningful interactions with students. For instance, the National AI Portal of India (IndiaAI) is a valuable resource for aspiring entrepreneurs, students, professionals, and academics, fostering a knowledge-sharing environment that promotes AI literacy and innovation.

To tackle the risks associated with AI, India needs a comprehensive regulatory framework for AI. The Union Budget for 2023-24 includes provisions for three centres of excellence for interdisciplinary research to develop AI solutions. The Minister of State for Electronics and Information Technology has indicated plans to assemble large forms of anonymized datasets for AI projects, which will assist Indian start-ups. Additionally, the Centre for Artificial Intelligence and Robotics (CAIR) at the Defence Research and Development Organization

[95] Amlan Mohanty and Shatakratu Sahu, "India's AI Strategy: Balancing Risk and Opportunity," Carnegie Endowment for International Peace, February 22, 2024, available at: https://carnegieendowment.org/posts/2024/02/indias-ai-strategy-balancing-risk-and-opportunity?lang=en (last visited 1 July 2024).
[96] Amlan Mohanty and Shatakratu Sahu, "India's AI Strategy: Balancing Risk and Opportunity," Carnegie Endowment for International Peace, February 22, 2024, available at: https://carnegieendowment.org/posts/2024/02/indias-ai-strategy-balancing-risk-and-opportunity?lang=en (last visited 1 July 2024).

has developed NETRA for surveillance of internet networks, indicating the strategic deployment of AI in national security.

In conclusion, while India has made significant strides in AI adoption and infrastructure, addressing the associated risks through robust regulatory frameworks and ethical considerations is crucial. Balancing innovation with legal and regulatory safeguards will ensure AI contributes positively to India's social and economic development while protecting the rights and interests of its citizens. With its strong digital foundation, vibrant tech ecosystem, and proactive governmental initiatives, India is well-positioned to become a global leader in AI provided it navigates the challenges judiciously.

The Investible Future

AI is poised to play a pivotal role in global economic growth, with projections suggesting a contribution of up to $15.7 trillion by 2030, surpassing the combined GDP of India and China. As the third-largest global talent pool for AI, India is uniquely positioned for a significant AI revolution. The country's investments in AI capabilities are growing at an impressive 30.8% CAGR, expected to reach $881 million in 2023.

India's ever growing semiconductor industry, projected to be valued at $7.8 billion by 2025, is set to be the foundation of its AI market. This sector is anticipated to drive 60% of AI's Gross Value Added (GVA) to India's GDP by 2025, with key sectors including industrials and automotive, healthcare, retail, and consumer packaged goods (CPG). Additionally, banking, financial services, and insurance (BFSI) and agri-tech are emerging as crucial application areas for AI.[97]

The AI industry in India has already seen significant growth, with a market size reaching $119.78 billion in 2022 and an estimated value of $1,597.1 billion by 2030. Businesses across sectors, including healthcare, manufacturing, finance, and retail, are increasingly embracing AI technology. According to IMRAC group experts, investing in top AI companies in India presents an exciting opportunity. Groundbreaking advancements in AI, such as ChatGPT, which recorded 100 million users within two months of its launch, indicate a promising future for AI in India.

[97] Larry Light, "How to Invest in the Future of Artificial Intelligence," AI CIO, April 1, 2024, available at: https://www.ai-cio.com/news/how-to-invest-in-the-future-of-artificial-intelligence/ (last visited 1 July 2024).

India's adoption of digital public infrastructure, such as the Aadhaar system and the Unified Payments Interface (**UPI)**, has created a massive user base for AI applications and services. Aadhaar, a 12-digit unique identity number, allows users to authenticate themselves digitally, while UPI facilitates instant, no-cost transactions across banks. This infrastructure generates enormous amounts of data, which, thanks to India's Account Aggregator framework, remains under citizens' control, further encouraging public trust and utilization.[98]

India's vibrant tech ecosystem, a direct offshoot of its booming IT exports currently at nearly $250 billion a year, has also embraced AI. The National AI Portal of India (**"IndiaAI"**), a joint venture by the Ministry of Electronics and Information Technology ("**MEITY"**), National eGovernance Division ("**NeGD**"), and the National Association of Software and Service Companies ("**NASSCOM**"), serves as an active knowledge resource for aspiring entrepreneurs, students, professionals, and academics. The Union Budget for 2023-24 allocated financial resources for three centres of excellence in India for interdisciplinary AI research.[99]

Globally, India has engaged in strong collaborations with other nations for funding, research, and development of AI technologies. The India-EU Joint Committee on Science and Technology, the Digital Investment Forum with the United States, and the Memorandum of Understanding with Singapore are indicative of increasing international investments and collaborative research in AI.

The private sector is showing a positive shift towards AI adoption, with more than 33% of global businesses improving operational capabilities by implementing AI and over 40% considering new AI opportunities. In sectors like industrial manufacturing, banking, financial services, healthcare, retailing, and insurance, AI systems streamline processes, optimize jobs, and develop innovative goods and services. AI's impact on these industries is significant, providing an advantage over industrial competition and helping participants better comply with regulations.

[98] Preeti Mondal, "Future of AI is India: Why finance professionals in India must prioritize upskilling," The Finance Story, February 13, 2024, available at: https://thefinancestory.com/india-to-become-next-ai-innovation-hub-finance-professional-should-upskill (last visited 1 July 2024).
[99] Preeti Mondal, "Future of AI is India: Why finance professionals in India must prioritize upskilling," The Finance Story, February 13, 2024, available at: https://thefinancestory.com/india-to-become-next-ai-innovation-hub-finance-professional-should-upskill (last visited 1 July 2024).

In terms of market and economic growth, AI in environmental applications is expected to increase global GDP by $5.2 trillion and contribute more than $14.5 trillion to international markets in the coming decade. The global AI market size is expected to grow at a staggering 37.7% annually from 2023 to 2030, increasing importance of AI across all industries.

In conclusion, the rapid growth of AI investments, the country's robust digital infrastructure, strong international collaborations, and vibrant tech ecosystem make India well-positioned to capitalize on AI's potential. Responsible investors can explore opportunities in AI to drive sustainable growth and innovation across various sectors, making AI a lucrative investment avenue in India.[100]

India's Strategic Path Forward in the Global AI Landscape

AI is not just a technological advancement but a global phenomenon reshaping economies, societies, and governance structures worldwide. As AI permeates diverse sectors, from healthcare to finance, its impact on efficiency, innovation, and decision-making is profound. Countries around the world are navigating the dual challenges of harnessing AI's potential while mitigating its risks, particularly concerning ethics, privacy, and socioeconomic disparities. India, with its ambitious Digital India initiative and proactive AI policies, is poised to leverage AI as a catalyst for inclusive growth and development. Looking ahead, India's focus will be on fostering interdisciplinary AI research, expanding digital literacy, and enhancing regulatory frameworks to ensure ethical AI deployment. By embracing AI responsibly and inclusively, India can navigate the complexities of AI governance while maximizing its transformative potential for societal benefit.[101]

As AI continues to evolve globally, India stands at the forefront of this technological revolution, poised to shape a future where innovation meets inclusivity. By prioritizing ethical guidelines, enhancing infrastructure, and fostering a culture of innovation, India is well-positioned to lead and inspire the next wave of AI-driven advancements that will redefine industries and improve lives worldwide.

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[100] Preeti Mondal, "Future of AI is India: Why finance professionals in India must prioritize upskilling," The Finance Story, February 13, 2024, available at: https://thefinancestory.com/india-to-become-next-ai-innovation-hub-finance-professional-should-upskill (last visited 1 July 2024).
[101] Praneeta, "India leads global AI adoption across industries," CIO and Leader, May 14, 2024, available at: https://www.cioandleader.com/india-leads-global-ai-adoption-across-industries/ (last visited 1 July 2024).