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GENERATIVE AI

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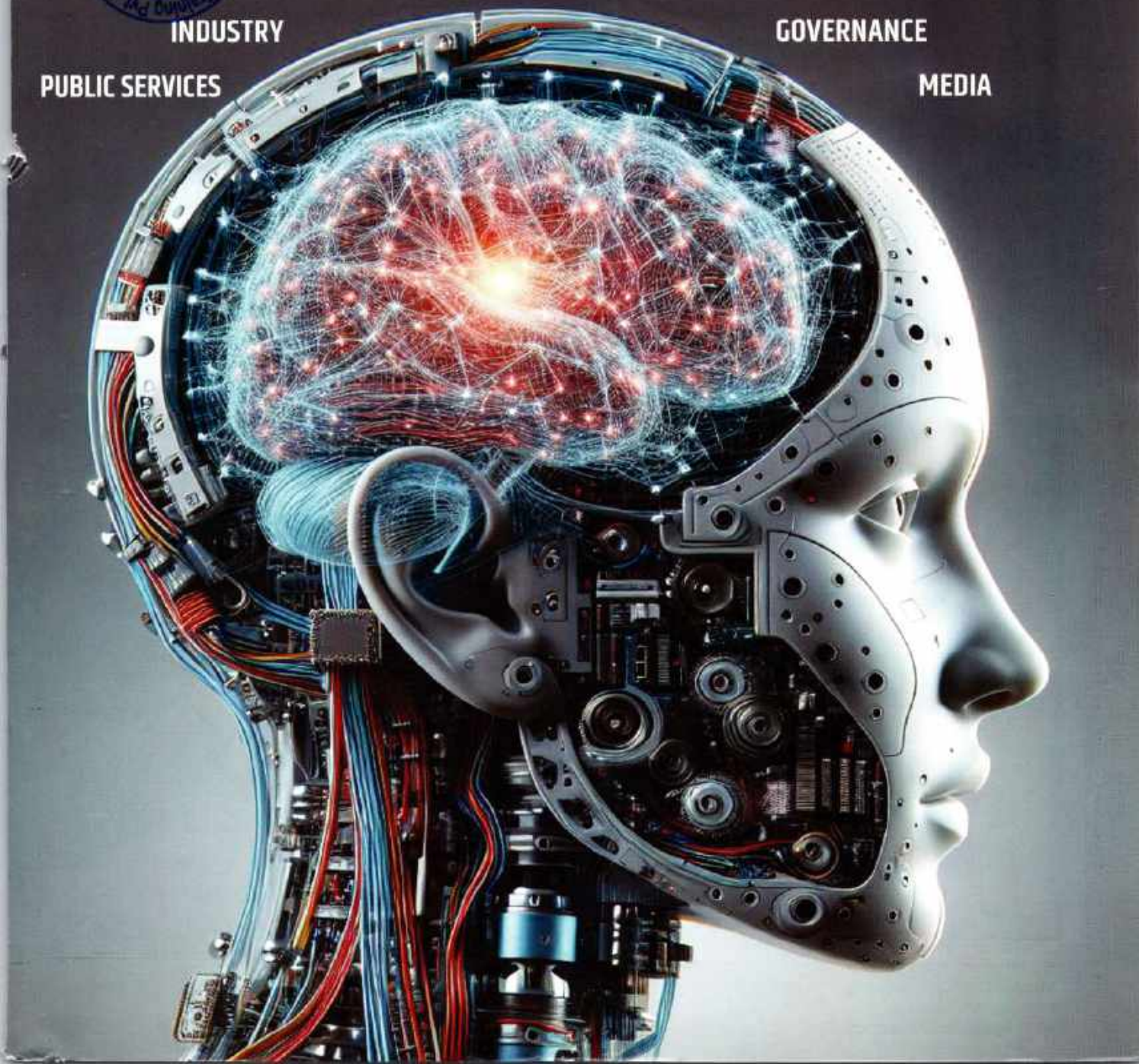

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Let noble thoughts come to us from all sides.
Rig Veda

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** The artist is a student of Digital Media at IIMC, New Delhi. The cover image is AI-generated.*

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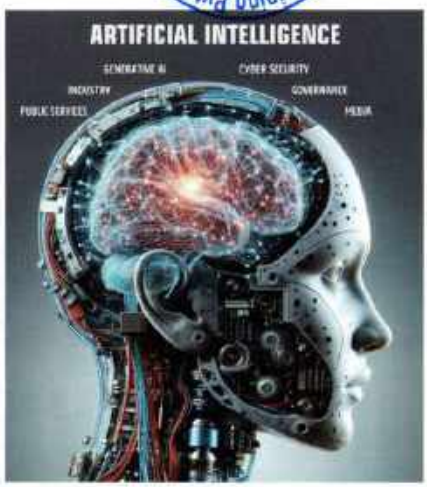
The AI Landscape



The economic landscape is poised for a profound shift with the increasing integration of AI. Recognised as a powerful force for transformation, AI is becoming a global driver of change across businesses, societies, and governments. This technology's adoption is escalating, promising improvements in productivity and efficiency. For India, standing as the fifth-largest global economy, navigating the challenges, and harnessing the potential of AI is crucial for sustained growth and societal betterment.

Estimates project that AI could contribute significantly to the Indian economy by 2035, potentially adding substantial value to the country's ambitious GDP target. The International Monetary Fund has said in a recent report that Artificial Intelligence (AI) might impact 40 per cent of jobs globally. While having a limited impact on emerging economies, it promises to boost human productivity in certain domains. The applications of AI span diverse sectors, including healthcare, education, agriculture, smart cities, and infrastructure. The Government's proactive stance in applying AI technologies in essential areas showcases a commitment to leveraging innovation for public service enhancements.

The Government of India, cognizant of AI's transformative potential, lays the groundwork for an economically robust future. Initiatives such as the National Programme for AI and the 'INDIAai' portal not only underscore commitment but envision India as a global AI leader.

Measures to foster AI growth include the provision of cloud-based platforms for AI services, the establishment of national AI portals, and initiatives to reskill and upskill the workforce for an AI-centric future. India's active participation in international collaborations, such as the Global Partnership on Artificial Intelligence, reflects a global commitment to navigating the complexities surrounding AI.

The integration of AI is manifesting in various sectors, from transportation to road safety and agriculture. AI-enabled systems are being employed in trains for efficient ticket allocation, while traffic management systems leverage AI for enhanced security and rule enforcement. Predictive AI in road safety is emerging as a vital tool for identifying potential risks and alerting drivers promptly, contributing to overall safety measures.

In the linguistic domain, the AI-led language translation platform, Digital India BHASHINI, represents a significant stride towards citizen engagement, fostering a multilingual digital ecosystem. This aligns with broader goals of facilitating easy access to digital services in Indian languages.

The responsible adoption of AI is an important area to look into, with a thrust on transparency, accountability, and ethical considerations with deepfake and other such unethical usage of AI are creating concern, initiatives like Responsible AI for Social Empowerment (RAISE) underscore a commitment to ensuring that AI technologies are deployed with societal welfare in mind. This balanced approach is not just a national endeavour but positions India as a contributor to the global discourse on responsible AI development.

This edition of Yojana seeks to encapsulate the dynamic landscape of AI adoption in India, exploring its potential benefits, challenges, and the imperative to foster a balanced and inclusive digital future, with important contributions from subject-experts across an array of topics. ❑

INDIA'S VISION FOR HARNESSING AI FOR GLOBAL GOOD

At the forefront of the transformative journey of Digital India is the pivotal role played by AI, a force that the Government is actively shaping through the comprehensive mission named 'IndiaAI.' IndiaAI's vision not only consists of support for the AI startup ecosystem but also the development of practical applications addressing real-world challenges in healthcare, agriculture, language translation, governance, and beyond. India's approach entails setting principles and an exhaustive list of harms and criminalities associated with AI. Instead of regulating AI at specific developmental stages, India is advocating for clear guidelines for platforms, addressing issues like bias and misuse during model training.

RAJEEV CHANDRASEKHAR | The author is Union Minister of State for Skill Development and Entrepreneurship, Electronics and Information Technology, and Ministry of Jal Shakti, Government of India. Email: mos-eit@gov.in

The discourse surrounding Artificial Intelligence (AI) has evolved from a theoretical concept to a tangible, life-transforming phenomenon. Over the past year, we've witnessed a rapid evolution in AI, now entering a new orbit featuring generative-AI, the availability of expansive language models, and multi-billion-parameter models poised to significantly impact people across various spheres. I believe that AI stands as the greatest invention of our era; it will continue to be a kinetic enabler for our already galloping digital economy, with the potential to be more disruptive than the advent of the Internet.

For decades, AI was a well-known challenge, marked by alternating cycles of optimism and despondency, with breakthroughs remaining elusive. The landscape shifted with the advent of GPUs, increased AI compute power, the emergence of large language models from industry leaders like DeepMind and OpenAI, and significant investments by tech giants such as Google, Meta, Microsoft, and Tesla.

We have officially entered the AI age, characterised by rapid and exponential progress. However, amidst the excitement of AI's capability to 'do more with less,' there is a growing discourse on the potential risks and harms associated with AI. The current debate revolves around how to harness AI's power while mitigating its negative impacts—ensuring AI is both safe and trusted.

India's approach, as articulated by our Hon'ble Prime Minister Narendra Modi ji leading up to the Global Partnership on Artificial Intelligence (GPAI) Summit 2023, is resolute. GPAI 2023, hosted by India, was a significant international event focusing on AI. This summit, held from 12-14 December 2023, in New Delhi, served as a multi-stakeholder initiative that brought together experts from 29 member countries with the aim to bridge the gap between AI theory and practice by supporting advanced research and practical activities in AI-related areas.

During GPAI, the Prime Minister Modi emphasised India's commitment to leveraging AI for the welfare of people, ensuring that nations in the Global South are not left behind in benefiting from these advancements. He also underscored India's resolve to establish a regulatory framework that ensures AI is safe and trusted, fostering collaboration among nations for widespread and long-term implementation. The Government of India is of the belief that rather than demonising AI, the focus should be on harnessing its potential for good.

Today, spearheaded by countries like India, discussions around AI have shifted from abstract concepts to real-world applications with tangible impacts. Recognising the ubiquitous and boundary-agnostic nature of the Internet and AI, there is a call for a global governance framework addressing the safety and trust of AI.

The 'India Techade' Vision

Our Prime Minister has woven the vision of 'India Techade,' where technology plays a key role as a catalyst in making India the fastest-growing innovation economy in the world. Over the past decade, Digital India's policies have not only created a vibrant digital economy and innovation ecosystem but have also given rise to an impressive landscape boasting over a lakh startups and 108+ unicorns.

The digital economy, currently outpacing GDP growth at 2.5-2.8 times, is poised to contribute a substantial 20% to the GDP by 2026, marking a significant surge from the modest 4.5% in 2014 and the current 11%. At the forefront of this transformative journey is the pivotal role played by AI, a force that the government is actively shaping through the comprehensive mission named 'IndiaAI.'

IndiaAI's vision not only consists of support for the AI startup ecosystem but also the development of practical applications addressing real-world challenges in healthcare, agriculture, language translation, governance, and beyond. With a dedicated focus on AI research, the mission involves creating indispensable infrastructure for AI computation and curating high-quality, diverse datasets crucial for honing Indian models. A common thread

woven through these aspirations is the reliance on the enterprise of young Indians, synergised with the supportive framework provided by the government and its policies, as championed by the Prime Minister.

Central to the growth and success of IndiaAI lies talent development, an aspect where India already stands out on the global stage. A recent report from Stanford University's AI index underscores India's leadership in skill penetration in AI, even surpassing the United States. Unyielding in its commitment, IndiaAI is laser-focused on ensuring that the academic and technological landscapes in India foster cutting-edge AI talent, individuals poised to play a pivotal role in shaping the future of AI both within the nation and on the international stage.

It is also important to highlight India's datasets programme. Being the world's largest connected democracy, our nation, through rapid digitalisation has generated unparalleled volumes and varieties of data. This strategic initiative is shaping up to be one of the world's most extensive and diverse collections, promising substantial advantages for both our research and startup ecosystems. Complementing this effort is the development of a robust policy and legal framework, intended to not only fortify our Datasets programme but also establish it as a crucial competitive edge for IndiaAI.

GPAI Summit 2023 New Delhi - A Landmark in Global AI Discourse

The GPAI Summit 2023 in New Delhi stands as a milestone in the ongoing global discourse on AI. Hosted under India's Chairmanship and attended by representatives from 28 nations, the summit solidifies international recognition of AI's impact and marks a pivotal moment in the Global AI conversation.

The summit underscored three key pillars: Inclusion, Collaborative AI, and Safe & Trusted AI. This declaration reflects India's commitment to inclusive technology, ensuring that nations worldwide, particularly those in the Global South, have access to the benefits of AI for the betterment of their citizens.

Contrary to the traditional dichotomy between market-led innovation and the more prescriptive European model centered on protecting citizens' rights, a new framework is emerging, spearheaded by India. This approach, influenced by the Prime Minister's vision, focuses on catalysing innovation while concurrently establishing guardrails and rules to ensure that it is safe and trusted. Over the past two years, India has diligently crafted this framework within the innovation and digital economy, exemplified by IT rules and other laws. Globally, the acceptance of this safety and trust framework, where platforms, including AI platforms, bear obligations, was affirmed at the GPAI Summit in New Delhi.

India's approach entails setting principles and an exhaustive list of harms and criminalities associated with AI. Instead of regulating AI at specific developmental stages, India is advocating for clear guidelines for platforms, addressing issues like bias and misuse during model training. The proposed framework outlines prohibited actions, backed by legal consequences for non-compliance.

In the Indian context, existing IT rules provide a foundation for addressing challenges related to AI-powered misinformation, such as deepfakes. The amended IT Act rules, implemented in February 2021, October 2022, and April 2023, prioritise platform obligations. Platforms are mandated to prevent the dissemination of misinformation, with specific rules outlining impermissible user harm content. Violating these rules exposes platforms to legal prosecution, emphasising a comprehensive regulatory approach to balance innovation with ethical AI use globally.

Looking ahead, IndiaAI will definitely play a pivotal role in shaping the future of Global AI, staying true to its mission. Over the past nine years, India has transitioned from a mere consumer to a producer of technology, devices, and solutions, positioning it as a trusted partner in shaping the future of the Internet and Technology. This trajectory aligns with the principles of 'Vasudhaiva Kutumbakam'—embracing inclusion, as demonstrated by India's accessible DPI solutions that benefit countries worldwide.

Living in these exciting times, India has evolved from the Fragile 5 economies to the Top 5, with aspirations to soon be among the Top 3. Achieving the status of a trillion-dollar digital economy and standing among the top innovators and digital economies is well within reach, marking a momentous chapter for India on the global stage. ❑

AI IN INDIAN GOVERNANCE AND PUBLIC SERVICES

ABHISHEK SINGH | The author is Additional Secretary, MeitY; President & CEO NeGD; MD & CEO DIC; CEO Karmayogi Bharat. Email: ceo@digitalindia.gov.in

Recognising the transformative potential of AI, the Government of India has undertaken concrete steps to encourage the domestic adoption of AI in a responsible manner and build public trust in the use of this technology, placing the idea of 'AI for All' at its very core. Large datasets may be utilised to harness the potential of AI to foster data-driven perspectives and facilitate the effective development and implementation of robust policies and schemes. As the proliferation of AI in citizen-centric public services accelerates, the imperative for establishing robust ethical guardrails becomes increasingly evident to safeguard against potential misuse and ensure responsible deployment. Towards these ambitions, the Government of India has also notified the Digital Personal Data Protection Act to protect citizens' privacy, safety, and trust concerning their personal data and enhance the accountability of entities collecting and processing personal data.

Artificial Intelligence has been around for a long time; the term 'Artificial Intelligence' was first used by John McCarthy in 1956. However, in the last year or so, with the advent of Generative AI and the launch of ChatGPT by OpenAI, AI has become a buzzword. This has also been enabled by the rapid expansion of data and computing capabilities. Today, AI can be harnessed to solve societal challenges in health care, education, and agriculture, build innovative products and services, increase efficiency, elevate competitiveness, and enable economic growth, contributing to an improved quality of life. Recent advances in AI have also significantly enhanced its potential to transform governance, public service delivery, citizen engagement, and catalyse large-scale socio-economic transformation.

In the past decade, India has formulated a distinctive approach to digital transformation through the 'Digital India' programme. Prioritising inclusivity and accessibility, the India Stack projects on digital identity (Aadhaar), digital payments (UPI), and Digilocker, among others, have helped drive the digital transformation that the whole world looks up to. Given this background, India is strategically poised to employ AI to transform public service delivery for efficiency in governance, innovation, and improved citizen engagement.

A recent industry report focusing on Generative AI (GenAI) suggests that GenAI holds the potential to contribute up to 1.5 trillion dollars to India's GDP by 2030. Reinforcing India's pivotal role in this transformative field, the Stanford AI Index 2023 also ranks the nation as the foremost country in AI skill penetration. The burgeoning AI landscape in India is further exemplified by a robust startup ecosystem, ranking 5th in the number of newly Funded AI Companies by geographic area and attracting significant investments exceeding $475 million in GenAI startups in the past two years. This signifies the confidence and interest from both domestic and international investors in India's AI capabilities and innovation. Leveraging this momentum, it becomes imperative for India to strategically incorporate AI in public service delivery, ensuring that the nation harnesses its AI prowess for equitable socio-economic development.

India's Approach

Recognising the transformative potential of AI, the Government of India has undertaken concrete steps to encourage the domestic adoption of AI in a responsible manner and build public trust in the use of this technology, placing the idea of 'AI for All' at its very core. The productivity gains offered by leveraging AI, as well as its potential to empower citizen participation in governance, have made it ubiquitous in India's approach to governance and public service delivery.

The Government of India's flagship initiative, the National Programme on Artificial Intelligence (NPAI), aims to nurture the building blocks of the domestic AI ecosystem through four key interventions:

- **National Data Management Office (NDMO):** Recognising data as the foundational element for AI innovation, the NDMO aims to enhance data quality, utilisation, and accessibility, modernising government practices to fully unlock the potential of data and the AI innovation ecosystem.
- **National Centre on AI (NCAI):** NCAI is envisaged as a sector-agnostic entity that identifies AI solutions for public sector problem statements and facilitates their nationwide deployment, aiming to drive large-scale socio-economic transformation.
- **Skilling for AI:** This pillar aims to revamp technical education infrastructure, particularly ITIs and polytechnics by building data labs that can help equip the workforce with AI-ready skills and mitigate the disruptions caused by the accelerated adoption of AI.
- **Responsible AI:** Emphasises the need to address potential biases and discrimination in AI adoption through the development of indigenous tools, guidelines, frameworks etc., and suitable governance mechanisms.

These concerted efforts of the Government towards leveraging AI for social good can be enhanced by augmenting public sector services through AI, leading to increased efficiency and improved outcomes. Large datasets may be utilised to harness the potential of AI to foster data-driven perspectives and facilitate the effective development and implementation of robust policies and schemes. The adoption of evidence-based decision-making, facilitated by AI, enables policymakers to access comprehensive data insights, ensuring that decisions and policies are anchored in evidence, ultimately leading to more targeted and impactful socio-economic benefits.

Further, AI integration in public service delivery enhances data analysis, automates repetitive tasks, and streamlines decision-making processes, unlocking new levels of efficiency, innovation, and citizen engagement across various sectors. This shift towards data-driven governance is also enhancing transparency and enabling participatory governance. Beyond efficiency, AI catalyses inclusive development, breaking traditional barriers and driving large-scale social transformation. Initiatives aimed at providing services to all, irrespective of geographical or socio-economic constraints, exemplify AI's potential to foster equitable access.

Key Government Initiatives Leveraging AI

The Government of India is pioneering the approach of harnessing the power of AI for social good, applying AI in education, healthcare, agriculture, languages, and other critical sectors. To illustrate the impact of AI, a few key initiatives that have reaped dividends with the integration of AI and related technologies have been detailed below:

UMANG (Unified Mobile Application for New-Age Governance)

UMANG serves as a unified platform, offering all Indian citizens a singular point of access to pan-India e-government services, spanning from central to local government bodies. The platform provides access to 1836 vital government services encompassing a wide spectrum of areas such as education, Covid-19 vaccinations, public transport, employment guidance, passport applications, utilities, cybercrime reporting, and more. Since its launch in 2017, UMANG has aimed to propel India towards mobile governance by enabling citizens to get access to all public services with one super app.

To eliminate technology and language barriers and enhance the long-term adoption of key Government programmes and initiatives, AI was leveraged to transform UMANG into a more inclusive solution. UMANG, the Government's citizen-centric app, has introduced a voice-based chatbot, or virtual assistant. Developed using conversational AI technologies, this chatbot enables users to inquire about various Government services in both Hindi and English using either voice or text inputs.

DigiYatra

The DigiYatra initiative, spearheaded by the Ministry of Civil Aviation, marks a revolutionary step towards leveraging artificial intelligence (AI) to enhance the air travel experience for citizens. DigiYatra is a biometric-based boarding system for Indian airports.

The DigiYatra initiative, implemented through the DigiYatra App, eases entry into airports, security checks, and boarding with a seamless registration process. Users verify their mobile numbers and integrate DigiLocker or offline Aadhaar for secure authentication. The app uses facial recognition technology, where users upload a selfie, enhancing security and expediting the boarding process. This initiative eliminates the need for passengers to present their boarding pass or identification at multiple checkpoints, significantly reducing queuing time. The security measures are strengthened through a system that maps each passenger to their Passenger Name Record (PNR), ensuring that only legitimate passengers gain entry at every checkpoint. Moreover, the real-time information on passenger load obtained by the airport operator facilitates improved resource planning. The streamlined process has enhanced airport throughput, providing a more efficient and secure travel experience for passengers while minimising queuing times and maximising the utilisation of resources.

Digital India Bhashini

Digital India Bhashini (National Language Translation Mission) is an initiative launched by the Ministry of Electronics and Information Technology that is building speech-to-speech machine translation systems for various Indian languages and dialects and evolving a Unified Language Interface (ULI). The mission is working towards creating a 'voice-based internet' that is accessible in vernacular Indian languages and building multilingualism as well by developing the next generation of 'conversational' government apps and websites. This will enable citizens to access digital services in their own language, further increasing digital inclusion and accessibility.

Bhashini leverages AI to establish its building blocks, such as language and speaker identification, precise speech-to-text conversion, accurate translation across multiple languages, transliteration, semantic comprehension for actions like responding to queries, and sophisticated speech synthesis, which includes the ability to produce speech output in the language of choice with options for selecting the preferred speaker gender (male or female). The Bhashini app is available on the Play Store and App Store for people to use. Bhashini has also enabled voice-based UPI transactions.

Applications of AI in Urban Governance

Several government departments across States– including municipal corporations and police, are using image recognition and AI for near-real-time monitoring of traffic and the infrastructure of the city. The solution deployed has demonstrated highly promising outcomes, detecting 1,000 violations per hour and reporting over 50,000 catastrophic issues.

The AI model for infrastructure and traffic monitoring employs advanced image recognition and sensor data analysis to detect and report issues such as potholes, damaged manhole covers, non-functional traffic lights, and streetlights. The model is also trained to detect traffic infractions, including overspeeding, rash driving, failure to wear a seatbelt, and issues such as broken taillights or headlights. The solution has been very innovatively deployed, wherein Cab and Food-delivery aggregator drivers are incentivised to provide video and image footage to the AI model when they are driving around cities. This has significant costs for municipal corporations and police, as they don't need to deploy surveillance cameras. By continuously monitoring civic infrastructure and traffic violations, this model facilitates timely intervention and maintenance, resulting in cost savings as well as safer and more efficiently managed urban environments.

Applications of AI in Health Care

DRDO's Centre for Artificial Intelligence and Robotics (CAIR) has developed ATMAN AI, an AI-based Covid detection application software using Chest X-rays (CXRs), which can classify the images into normal, Covid-19, and pneumonia classes using a limited number of sample images. This secure, web-based solution was developed to optimise Chest X-rays for rapid detection of Covid-19-triggered lung abnormalities. The ATMAN backend incorporates a specifically tuned Deep Convolutional Neural Network designed to accurately identify Covid-19, overcoming the challenge of a limited dataset of Covid X-ray images. Additionally, the software ensures image quality by automatically pre-processing images to address varying illumination levels, offering easy navigation and accessibility through a range of devices over the Internet.

The Ministry of Health and Family Welfare has also implemented projects wherein AI-based models are being used to analyse X-Ray and mammography images to detect tuberculosis and breast cancer. These solutions help address the challenge of a lack of trained radiologists in rural and remote areas.

AI-Based Pest Management System

CottonAce, an AI-driven early warning system, is aiding farmers in safeguarding their crops by offering timely, localised advice on pesticide application. Developed by Wadhwani AI, the AI system has undergone successful piloting. In collaboration with the Better Cotton Initiative and the Maharashtra Government. It is currently operational in Gujarat, Maharashtra, and Telangana, benefiting over 18,000 farmers. Following the integration of this AI system, farmers have witnessed a significant 25 per cent increase in cotton crop yields.

Lead farmers or extension workers install the CottonAce app, uploading photos of pests collected in commonly used pheromone traps. The AI algorithm identifies and counts the pests, determines the infestation level, and provides actionable advice to the farmer. This information is then shared with neighbouring 'cascade' farmers, who do not require additional tools, including smartphones. The app functions on a simple smartphone, even in offline areas with low network coverage, and is available in nine languages (English, Hindi, Marathi, Gujarati, Telugu, Kannada, Tamil, Odia, and Punjabi).

AI Applications in Agriculture

The Government of Telangana has deployed an AI solution that has the capability to leverage agricultural data and provide actionable inputs that can potentially increase crop yield. The initiative involves accurately delineating field boundaries for approximately 60,000 agriculture fields, providing precise data on acreage, forested areas, and irrigation structures with an impressive 85% accuracy. The solution is also enabling landscape monitoring and event detection models to deliver valuable information on crop types, sow and harvest schedules, as well as the identification of water bodies.

Another AI-based solution deploys sensors in crop fields that help estimate moisture content in the soil. Mapping it with weather data regarding rains and the stage a crop is in helps make predictions of the irrigation needed, and the farmer gets prompts on his mobile phone about when he should be switching on the submersible pump for irrigation and for how long. It is estimated that this simple solution can save up to 42% of water for paddy.

AI-Based Attendance Monitoring (Shiksha Setu)

The government of Assam has developed a mobile application called 'Shiksha Setu' for recording the digital attendance of both students and teachers. The application includes an AI-based facial recognition attendance system, which has been implemented across 44,000 schools in the state. The facial data of all students has been entered into the system, and all schools in the state have been geo-tagged and geo-fenced. The attendance is recorded in real-time, and analysis can be conducted on a group or individual basis.

Through this system, proxy attendance has been eliminated, and teachers who used to either not come to school or arrive late now attend punctually. The system has also identified and removed 4 lakh ghost students. This has resulted in significant cost savings for the Government in PM Poshan, school uniforms, and textbook supplies. However, the most significant advantage is that now concrete figures on absenteeism and dropout rates are updated daily. The system highlights how many children have not attended school for 1, 2, 3, 4, or more weeks, allowing authorities to contact the parents and inquire about the reasons for their prolonged absence. This has also helped reduce dropout rates.

There are many more such solutions, and the Ministry of Electronics and IT has published a compendium featuring 75 success stories that highlight the transformative use of AI in enhancing public service delivery in India. These can be accessed through: *https://www.meity.gov.in/writereaddata/files/75-75-India-AI-Journey.pdf*

Way Forward

As the proliferation of AI in citizen-centric public services accelerates, the imperative for establishing robust ethical guardrails becomes increasingly evident to safeguard against potential misuse and ensure responsible deployment. To ensure that adequate guardrails are in place to protect citizens, India is adopting a multi-stakeholder approach to designing and adopting voluntary frameworks, policies, and legal mechanisms for the development, deployment, and use of AI that is safe and accessible for all.

Towards these ambitions, the Government of India has also notified the Digital Personal Data Protection Act to protect citizens' privacy, safety, and trust concerning their personal data and enhance the accountability of entities collecting and processing personal data. The legislation is intended to bolster data protection in the country. India is also in the process of notifying the National Data Governance Policy to maximise the efficiency of data-led governance and public service delivery and catalyse data-based research and innovation by enabling data sharing in an ethical, safe, and secure manner. Efforts towards the development of Responsible AI frameworks are also underway through initiatives by the Bureau of Indian Standards (BIS), the Telecommunication Engineering Centre (TEC), and other organisations. Further, to aggregate and evangelise knowledge outputs on the latest developments in AI, the Ministry of Electronics and IT has launched the INDIAai portal *(https://indiaai.gov.in/)*.

India, as the largest Global South economy leading the AI race, stands in a unique position to lead efforts towards global cooperation on AI, ensuring that the global discourse around AI is more balanced and inclusive and takes into account the needs and priorities of the Global South. The Hon'ble Prime Minister's directive to the leaders of the G20 countries on creating a human-centred governance framework for harnessing the power of AI for Good and for All is aligned with this vision.

India has reiterated its commitment to promoting innovation while regulating the misuse of AI on various international forums, including as the Lead Chair for the Global Partnership on Artificial Intelligence (GPAI). In the Annual GPAI Summit, hosted in New Delhi in December 2023, the GPAI Ministerial Declaration was signed by 29 member countries, including the European Union. This came in the background of the G7 leaders' statements on the Hiroshima AI Process, the Bletchley Declaration, and the G20 New Delhi Leaders' Declaration, which all have highlighted the need for global collaboration, inclusively, to promote trustworthy AI that supports the good of all. ❑

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INDIA'S TECH SERVICES INDUSTRY

HARNESSING GENERATIVE AI FOR SCALABLE, SECURE, AND HUMAN-CENTRIC SOLUTIONS

DEBJANI GHOSH | The author is the President of NASSCOM (National Association of Software and Service Companies). Email: debjani@nasscom.in

Companies are now focusing on scaling AI solutions, understanding their real-world impact, ensuring robust security measures, and maintaining a human-centric approach. Scaling AI requires robust infrastructure, efficient algorithms, and a clear understanding of market needs. The journey ahead for India's tech services sector is not just about technological adaptation but also about leading the way in innovation and setting a global precedent in the effective and ethical use of Generative AI. India, with its robust tech services industry, able leadership, immense digital data, a strong STEM talent pool, and a thriving DeepTech startup ecosystem, has not just observed but actively participated in this technological renaissance. As Generative AI positions itself as a transformative force, its impact on India's technology services sector is becoming increasingly evident. Most of this value is likely to emerge from a few functions and industries that form the core of the Indian technology services industry. Distinctively, India's approach to digital transformation, grounded in principles of inclusivity and security, has set a global standard in the technological paradigm.

The year 2023 marked the beginning of rapid technological innovation, with Generative AI being heralded as the 'smartphone moment'. The year 2024 will likely see Generative AI transition from labs and proofs of concept to widespread applications with the promise of benefiting millions across sectors like healthcare, financial services, education, and entertainment. India, with its robust tech services industry, able leadership, immense digital data, a strong STEM talent pool, and a thriving Deep Tech startup ecosystem, has not just observed but actively participated in this technological renaissance.

According to a study with McKinsey, worldwide, Generative AI is estimated to yield an annual economic value of USD 2.6 to USD 4.4 trillion. Most of this value is likely to emerge from a few functions and industries that form the core of the Indian technology services industry. Indian tech companies have traditionally excelled in providing IT and business process management services. With the advent of Generative AI, they are now expanding their portfolios to include AI-driven analytics, intelligent automation, and personalised customer interactions. These companies are not just adopting AI; they are redefining their service offerings, creating more value for their clients, and setting new industry standards.

Embracing the Valley of Reality

While 2023 was more about creating proof of concepts and innovating on the art of the possible, in 2024 the industry is moving beyond the initial excitement of AI into a phase of practical application and value realisation. The journey from AI hype to reality involves navigating complexities around scalability, impact assessment, security, and maintaining a human-centric approach. Companies are now focusing on scaling AI solutions, understanding their real-world impact, ensuring robust security measures, and maintaining a human-centric approach.

Indian companies are investing to offer AI solutions that are not only innovative but also scalable and reliable. The impact of these solutions is seen in their ability to drive growth, improve customer satisfaction, and create new business opportunities.

Scaling AI Innovations

Scaling AI requires robust infrastructure, efficient algorithms, and a clear understanding of market needs. Indian companies are investing in these areas, aiming to offer AI solutions that are not only innovative but also scalable and reliable. The impact of these solutions is seen in their ability to drive growth, improve customer satisfaction, and create new business opportunities.

Potential Areas of Opportunity for the Industry

1) **Expansion in the Addressable Market:** Generative AI is poised to drive considerable market expansion in the next 5 years. This expansion includes new services and offerings that align with the evolving needs of the industry.

2) **Delivery Excellence:** The efficiency of service delivery processes is set to improve significantly. For example, in application development and BPM services, a 20 to 30 per cent productivity improvement is anticipated. This gradual improvement will begin with a 10 to 15 per cent gain in the first 12 to 18 months, potentially reaching 20 to 30 per cent in 2 to 3 years.

3) **Sales Excellence:** Generative AI will streamline the entire sales lifecycle, from lead generation to sales strategy formulation. This technology, especially applications running on Large Language Models backed by proprietary datasets, will optimise the sales process, increasing productivity, and reducing sales costs as a percentage of revenue.

4) **Productivity Gains:** In internal enabling processes like finance, legal, and HR, Generative AI can automate time-consuming tasks such as summarisation, workflow generation, and report preparation. Combined with sales productivity improvements, this could lead to a 40 per cent increase in SG&A productivity.

Key to this transition is understanding the technology's

dynamic nature, including its rapid updates and the evolving risk horizon with regulatory, technological, and social implications.

India's Unique Position in the AI Landscape

Distinctively, India's approach to digital transformation, grounded in principles of inclusivity and security, has set a global standard in the technological paradigm. Unlike conventional top-down innovation models, India has adopted a grassroots-first approach, ensuring economic growth and digital inclusion at every level. This strategy has positioned us uniquely in the global digital economy—not just as participants but as leaders in creating a truly inclusive, human-centric digital landscape, achieved at an unprecedented scale. Transitioning into the AI era, India must apply the same principles of opportunity and impact-oriented development, with a focus on recognising AI as an avenue for advancement rather than solely a source of risk and embedding safety and inclusivity within the core design principles of AI technologies.

Addressing AI Security and Ethical Considerations

As AI systems become more advanced and widespread, ensuring their security and ethical use is paramount. The Indian tech industry is proactively addressing these challenges by investing in secure AI development practices, robust data protection measures, and ethical guidelines. Companies are collaborating with academia, government, and industry partners to create standards and frameworks that ensure AI is used responsibly.

Security considerations include protecting AI systems from malicious attacks, ensuring data privacy, and maintaining the integrity of AI applications. Ethical considerations involve preventing bias, ensuring transparency, and maintaining human control over decision-making processes. By addressing these issues head-on, Indian companies are not only mitigating risks but also building trust with their clients and end-users, which is essential for the long-term success of AI applications.

Human-Centric AI: A Core Focus

Generative AI demands a fundamental shift towards a human-centred approach, prioritising transparency and human oversight. Algorithms must be thoroughly tested for unintended consequences and biases before deployment. Scrutinising data for implicit biases is crucial to preventing harm and distortion in outcomes. This perspective is vital to ensuring AI's ethical use for humanity's benefit.

Building AI safely from the outset is essential. This involves embedding safety measures throughout the AI development lifecycle, ensuring resilient systems that are safeguarded against potential risks. It demands a collective effort from researchers, developers, policymakers, and the public to ensure AI serves humanity's best interests.

Regulation is a shared responsibility. Industry self-regulation, emphasising transparency and accountability, is as crucial as national and international regulatory frameworks. These regulations should foster AI's positive impact while safeguarding against risks and maintaining ethical standards.

Conclusion

The journey of the Indian tech services industry from embracing the AI hype of 2023 to navigating the valley of reality in 2024 is a testament to its agility, innovation, and foresight. As Generative AI positions itself as a transformative force, its impact on India's technology services sector is becoming increasingly evident. This sector, a crucial pillar of India's economy, contributes significantly to GDP growth, employment, and livelihoods.

The AI technology landscape is rapidly changing, and its full potential remains largely untapped in the short term. This uncertainty necessitates a cautious yet proactive approach from providers. We must remain vigilant, consistently assess, and adapt to the ongoing developments in this field. This juncture represents a significant inflection point for the industry. It offers a divergence of paths, presenting unique opportunities that could either reshape the value proposition of technology services or simply act as another wave accelerating AI adoption within the sector. In either scenario, those who strategically embrace and integrate Generative AI early are likely to position themselves as front-runners in this dynamic and evolving industry. The journey ahead for India's tech services sector is not just about technological adaptation but also about leading the way in innovation and setting a global precedent in the effective and ethical use of Generative AI. ❑

UNLOCKING THE POTENTIAL AND CHALLENGES OF GENERATIVE AI

Generative AI is a subset of deep learning, which means it uses artificial neural networks, and can process labelled data using supervised learning methods. Generative AI is a type of artificial intelligence technology that can produce various types of content, including text, imagery, and audio. Generative AI is also used for many special-purpose chatbot tasks, like Government chatbots, can be used to help citizens and visitors get access to the right information on various schemes and policies. Generative AI has the potential to give society intelligent guidance on how to approach some of the biggest problems, like climate change and pandemics.

DR BINEET KAUR MAUNDER | The author is an officer trainee in Indian Information Service and holds Ph.D. in Artificial Intelligence
Email: bineetkaur91@gmail.com

Since ChatGPT's release, Artificial Intelligence (AI) specifically Generative AI has caught the attention of many governments, corporations, and businesses. AI is already pervasive in our lives, and many of us use it tonnes of times a day without even thinking about it. Every time one does a web search on Google, that's AI. Every time one goes to a website like Amazon or Netflix, it recommends products according to the history of one's preferences. The technology caught mainstream attention starting around November 2022, when

OpenAI released ChatGPT, and its momentum has continued unabated. As per various reports, the market for Generative AI is likely to double every two years in the coming decade.

Generative AI is a type of artificial intelligence technology that can produce various types of content, including text, imagery, and audio. Two very common questions asked are: what is artificial intelligence, and what is the difference between AI and machine learning? One way to think about it is that AI is a discipline, like physics. It is a branch of computer science that deals with the creation of intelligent agents, which are systems that can reason, learn, and act autonomously. Essentially, AI has to do with the theory and methods used to build machines that think and act like humans. In this discipline, we have machine learning, which is a subfield of AI. It is a programme that trains a model from data that is readily available through webpages, articles, books, and so on. That trained model can make useful predictions for new or never-before-seen data. The most common class of machine learning models is supervised learning. In the case of supervised models, we have labels. Labelled data is data that comes with a tag like a name, a type, or a number. For example, let's say one has historical data on the bill amount of a restaurant and how much different people tipped based on order type, like whether it was picked up or delivered. In supervised learning, the model learns from past examples to predict future values, in this case, tips. So here, the model uses the total bill amount to predict future tip amount based on whether an order was picked up or delivered.

Now, let's briefly explore where deep learning fits as a subset of machine learning methods. Deep learning is a type of machine learning that uses artificial neural networks, allowing them to process more complex patterns. Artificial neural networks are inspired by the human brain. They are made up of many interconnected neurons that can learn to perform tasks by processing data and making predictions. Deep learning models have many layers of neurons, which allows them to learn complex patterns. Now we finally get to where Generative AI fits into this AI discipline. Generative AI is a subset of deep learning, which means it uses artificial neural networks and can process labelled data using supervised learning methods. ChatGPT has been trained on a large collection of web pages, books, and articles. This large-scale supervised learning technology is termed the Large Language Model (LLM). When one trains a very large AI system on hundreds of billions of words, one gets a Large Language Model that predicts answers to various questions that are prompted by it. Other examples that use Generative AI include Bard, Bing Chat, and Dall-E.

So, what is Generative AI good for? Generative AI is a powerful technology with a wide range of applications across various industries. Here are some of the key areas where it's making a significant impact:

1. **Writing:** Generative AI can be used as a brainstorming companion. For instance, if one is trying to name a product, one can ask it to brainstorm some names, and it will come up with some creative suggestions. LLMs can also be good at answering questions, and if given access to information specific to a company, they can help employees find information like the availability of parking at the office. They can also be useful for writing press releases. However, by providing them with details of the event, Generative AI creates a detailed and insightful press release specific to the event. In fact, some of the LLMs are even better at language translation than the dedicated machine translation engines.
2. **Reading:** In addition to writing, Generative AI is also good at reading tasks. For example, an online shopping e-commerce company gets a lot of different customer emails. Generative AI can read customer emails and help quickly figure out whether an email has a complaint or not. The complaints can then be routed to the appropriate department. LLMs are also being used for summarising long articles and proofreading them for grammatical errors.
3. **Chatting:** Lastly, Generative AI is also used for many special-purpose chatbot tasks, like government chatbots, can be used to help citizens and visitors get access to the right information on various schemes and policies.

In a short time, access to generative AI has spread around the world and given many people

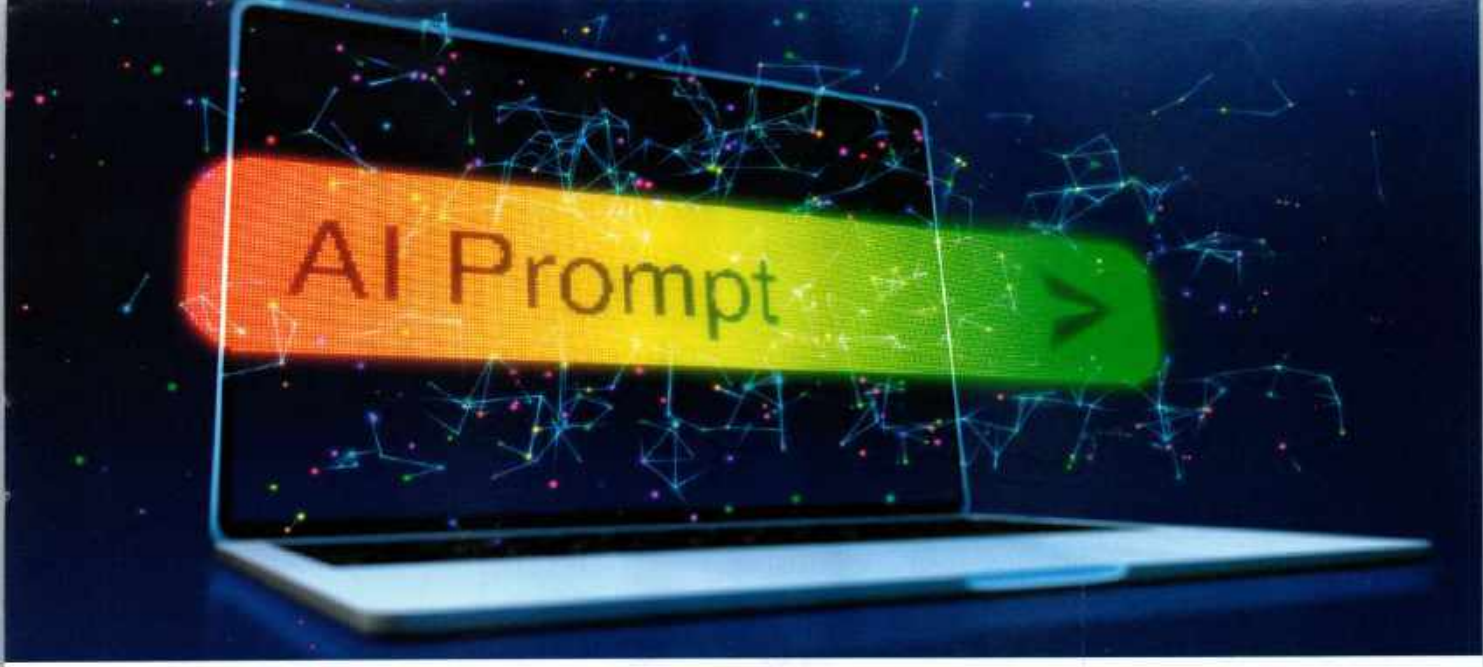
the ability to generate high-quality essays, pictures, and audio. With these amazing capabilities have also come many concerns about AI.

1. **Gender-Bias:** One widely held concern about AI is whether it might amplify humanity's worst impulses. LLMs are trained on text from the internet, which reflects some of humanity's best qualities but also some of its worst, including some of our prejudices, hatreds, and misconceptions. If one asks an LLM after its initial training to fill in the blank. The blank was a CEO, many models would be prone to choosing the word 'man' i.e., The man was a CEO. And, of course, this is a social bias that distorts the fact that people of all genders can successfully lead companies.
2. **Job Losses**: A second major concern is who will be able to make a living when AI can do our jobs faster and cheaper than any human can? To understand whether this is likely to happen, let's look at radiology. As per various reports, some five years ago, it was said that AI was becoming so good at analysing X-ray images that in five years, it could take radiologists' jobs. But we're now well past five years since this statement, and AI is far from replacing radiologists. Radiologists do a lot more than just interpret X-ray images. They operate imaging hardware, communicate exam results with patients, respond to complications during procedure, and so on. For AI to completely automate all of these tasks, the future is still far away.
3. **Hallucinations and Misinformation:** Another concern is that it can sometimes 'hallucinate' inaccurate information with complete confidence. It can even invent its own references, sources, and deep fakes that are non-existent.
4. **Plagiarised Content:** LLMs sometimes output plagiarised content. If any enterprise uses that in their operations, only they are held accountable when the plagiarism is discovered, not the Generative AI model.
5. **Transparency and User Explainability:** Generative AI models give a disclaimer that the data they have presented may be inaccurate. Thus it seems such models obey transparency rules, but the reality is that many end users do not read the terms and conditions and do not understand how the technology works. This results in the perception that anything that LLMs say is accurate.

Lots of governments, businesses, and developers care about such concerns and have been working to make sure that AI is built and used responsibly. Some of the key dimensions of implementing responsible AI are:

1. **Fairness** of information to ensure that AI doesn't perpetuate or amplify gender biases.
2. **Transparency** of information is vital to ensuring ethical decision-making. Users should have accessible, non-technical explanations of Generative AI, its limitations, and the risks it creates.
3. **Privacy** is another dimension for implementing responsible AI by protecting user data and ensuring confidentiality.
4. **Safeguarding** the AI systems from malicious attacks.
5. **Ethical use** of data, ensuring that AI is used only for beneficial purposes.

Because of all the attention on responsible AI, many governments have been publishing frameworks for it. For example, NITI Aayog publishes discussion papers on 'Responsible AI for All', presenting a unique framework for implementing AI responsibly. It's important to build a culture that encourages discussions and debates on ethical issues. Brainstorming with a broader group of stakeholders on how things could go wrong helps identify potential problems and allows the technical team to mitigate them in advance. A checklist for brainstorming could be the five dimensions of fairness, transparency, privacy, security, and ethical use. For example, for building systems in healthcare, talking to patients and doctors results in new ideas and perspectives that change the direction of the projects, ultimately benefiting people and society at large. Generative AI has the potential to give society intelligent guidance on how to approach some of the biggest problems, like climate change and pandemics. In the coming times, AI will contribute to longer, healthier, and more fulfilling lives worldwide if used responsibly. ❑



USE CASES OF GENERATIVE ARTIFICIAL INTELLIGENCE IN GOVERNANCE

PROF YOGESH K DWIVEDI | The author is a Professor of Digital Marketing and Innovation and Director of Digital Futures for Sustainable Business & Society Research Group at the School of Management, Swansea University, UK. Email: y.k.dwivedi@swansea.ac.uk

PROF ARPAN KUMAR KAR | The author is a Chair Professor at the Department of Management Studies and School of Artificial Intelligence, Indian Institute of Technology Delhi, India. Email: arpankar@iitd.ac.in

Intelligence in AI applications stems from having a strong ability to solve problems through reasoning, learning, and subsequently incorporating diverse human functions. Governments may embrace AI in general and GAI in particular in their activities. One way to do that may be through undertaking capacity enhancement programmes in areas like Data Science and Decision Science where government employees may develop a better understanding of AI in general and GAI as well. GAI, like other AI tools, could play an important and critical role in the digital transformation of governments and public sector undertakings. This technology will help governments to be nimbler and more agile in their decision-making and connect with stakeholders more effectively.

Artificial Intelligence (AI) is considered to be one of the emerging technologies for nations' industrial and economic development. Thinking back to the way a steam engine and electricity played their roles in shaping the first industrial revolution and gradually becoming infrastructural transformational assets, AI will also play a key role in the next industrial revolution and likewise gradually become embedded across industries. Every industry and its employees will have to embrace AI and leverage it across functions. Alan Turing, the British computer scientist, introduced the Turing Machine and highlighted that any problem could be solved as

long as it could be represented and decoded by an algorithm. Furthermore, we can now look back and see that his attention subsequently moved towards research in AI when he proposed the 'imitation game' where he tested if a computer was a thinking machine or not.

Ever since then, while AI was in its infancy phase, the focus of researchers working within this discipline has been on real-life applications. In the early phase, these researchers were mostly mathematicians and computer scientists, but this evolved when information systems researchers started exploring the usage and impacts of this technology in socio-technical and industrial settings. In the early days, developments in AI drew inspiration from biological organisms and the physical characteristics of nature to solve data-intensive problems. In fact, intelligence in AI applications stems from having a strong ability to solve problems through reasoning, learning, and subsequently incorporating diverse human functions such as thinking, memorising, communicating, and planning. Models like 'supervised learning' and 'unsupervised learning' emerged, which tried to replicate the way natural intelligence in biological systems operates (Kar, 2016). However, over time, newer models of artificial intelligence evolved like 'deep learning', 'reinforcement learning', 'federated learning', and many other models, which gradually started gaining importance in industrial applications (Kar et al., 2022). An extension of these AI algorithms is Generative Artificial Intelligence (GAI).

GAI is currently being discussed across different platforms very elaborately. It can be thought of as an extension of existing models of artificial intelligence that harness advances in the architecture of deep learning and have led to the creation of very effective chatbots. In the background, GAI operates on Large Language Models, which have been trained on much larger datasets (such as texts and information garnered from an enormous world-wide web corpus) than in the past, leading to high-quality performance in an extensive variety of natural-language tasks (including language generation, translation, question answering, creating logical essays), and even algorithmic code for computer programmes.

Reviews of the scientific literature indicate that there are different models of GAI that are now deployed in different business settings (Dwivedi et al., 2023; Kar et al., 2023). However, in recent times, there have been a lot of concerns surrounding the capabilities and disruption this rapidly evolving technology may create in the larger socio-economic fabric of the ecosystem. In this context, we discuss how governments can use GAI and leverage its technology effectively. In the rest of this article, we will briefly explore the following three questions:

Q1: What are the different types of GAI applications available today?

Q2: How can governments use these GAI applications?

Q3: How should governments plan to counter adverse impacts of GAI use?

Overview of Current GAI Technologies

There are many GAI technologies currently available (see Table 1). While ChatGPT continues to draw most attention and has brought this technology into everyone's consciousness, there are quite a few other tools with similar capabilities. In this section, we provide an overview of these existing AI tools.

For a more detailed review of these technologies, please refer to Kar et al. (2023). While many of these technologies are already integrated into our daily lives, we may not always recognise them as explicitly GAI applications.

Generative AI Use Cases for Governments

GAI presents lots of opportunities to governments when it comes to automating internal processes and enhancing the experiences of stakeholders through faster resolutions. For example, a platform for query resolutions could be created where citizens are able to see the status of their service requests (rather than having to speak with a government employee to find out). Furthermore, governments and public sector organisations could bring about a dramatic transformation in terms of their responsiveness and flexibility by leveraging GAI language models that have been extensively used to comprehend different stakeholder wants, successfully target them with suitable services, and request resolution in a timely manner. Moreover, GAI has the ability to

Table 1: Emerging Generative AI Technologies

Type of tool	Nature of data	Overview of outcome it produces
ChatGPT, Replika, Jasper, YouChat, Sudowrite, Copy.ai, Writesonic	Mostly text	Can provide answers to complex queries based on public information
DALL-E, DALL-E 2, Google's Imagen, Stable Diffusion, Make-A-Scene by Meta AI, Craiyon, Midjourney and MiP-NeRF	Text and Images	Produces realistic photos based on text input
Amper Music, Aiva, Amadeus Code,Google's Magenta, Ecrett Music, Humtap, Boomy, Melodrive, Mubert & Sony's Flow Machines	Music	Produces music based on textual prompts
GitHub's CoPilot, Tabnine, DeepCode, Intellicode by Microsoft, Replit's Ghostwriter, Ponicode, SourceAI, AI21Labs' Studio and Amazon's Code Whisperer	Software programmes	Generates lines of code based on text input
Google LaMDA and Bard, Apple Siri, Microsoft Cortana, Samsung Bixby, IBM Watson Assistant, SoundHound's Hound, Mycroft, Amazon Alexa, and Facebook's Wit.ai	Audio	Responds to audio prompts and generates actions like starting an application, playing music, etc.

improve several aspects of citizen interactions with platforms, such as citizen engagement platforms like MyGov. This could be achieved by creating communication documents on the initial phases of a citizen's engagement process as well as the detailed interactions users may have, along with a tailored approach to each user in the post-interaction space and potential longer-term associations.

Additionally, another area of GAI application could be to provide real-time analytical reports to decision-makers. Governments often need to handle and read large amounts of data from which to make inform their decision-making. GAI could be harnessed here to analyse the huge stream of documents that government departments work tirelessly to process to generate real-time insights, enabling faster and more efficient decision-making. Thus, the capability that GAI has when it comes to analysing large volumes of text, summarising them, or generating specific reports could become a very useful government tool. GAI can also present high-quality visualisation outputs, which makes it easier to comprehend complex data from multiple sources.

It would be important here for the decision-makers to be competent when it comes to the natural language 'Prompts' that they may require to generate meaningful reports, which otherwise may require complex querying and analysis. GAI presents an opportunity to train manpower to use technology through English prompts. This may automate and reduce time drastically for many activities like preparing notes of meetings, creating abstracts of documents, creating emails, and many other language generation activities. It can significantly reduce the time spent developing documentation in simple, readable language. It would also be possible to correct the grammatical errors of formal documents very easily using GAI.

Artificial Intelligence, including Generative AI has already started transforming government operations, as evidenced by the following innovative applications:

- The governments of both the United States and Singapore have initiated the integration of ChatGPT into their administrative systems.
- Similarly, in Japan, the Yokosuka City Government has begun employing ChatGPT to support its office operations (Yang and Wang, 2023).
- The government of Estonia has been piloting several AI-related initiatives.[1] For example, it has tested machine learning software to match job

seekers with employers, developed a machine vision AI solution for better traffic management, and piloted a programme under the Ministry of Justice to integrate GAI for processing judgements in small claims disputes where the payment amounts to a maximum of 7000 Euros.[2] Estonia has also introduced 'Suve', a digital assistant developed to offer precise and trustworthy answers to queries from the public.[3]

Like any other AI technology, GAI systems need to establish how they can address the principles of FATE, namely Fairness, Accountability, Transparency, and Ethics in AI.

- In Singapore, the Smart Nation initiative utilises AI to optimise traffic management, improving urban planning and public transportation. Some elements of service generation is used for recommending traffic flow and control through the use of mobile crowdsensing.[4]
- The US FEMA employs AI for critical satellite imagery analysis to bolster disaster response and resource allocation.[5]
- The UK's NHS leverages AI to inform healthcare policies and manage resources effectively. Further NHS will soon deploy GAI on top of existing AI tools for diagnosis and recommending possible treatments for critical illnesses, which require complex detections to be made quickly like heart disease and strokes. This initiative of UK is funded by the government's new AI Diagnostic Fund.[6]
- In the US, a lot of AI is already being used across government functions. The City of Seattle has released its GAI Policy to signal opportunities as well as highlight possible concerns with strong guardrails to ensure GAI applications are used responsibly and accountability. The seven overarching goals are Transparency and Accountability, Explainability and Interpretability, Innovation and Sustainability, Bias and Harm Reduction and Fairness, Validity and Reliability, Privacy preservation, Security and Resiliency.[7]

Challenges for Governments

Several studies have examined the ethical side of GAI, like ChatGPT, in terms of how ethically it responds to specific issues. With these in mind, there are a few challenges that governments will also have to tackle if they are to harness the capabilities of GAI mindfully and safely (Yang and Wang, 2023).

One challenge of using GAI is the veracity of its outputs. The quality of the data it ingests plays a large role in the credibility of the outputs it prepares. Furthermore, the responses of GAI to factual prompts are relatively accurate. However, for prompts that require subjective deliberation, GAI applications often fail to provide satisfactory responses. While for factual queries, responses could have high reliability, deliberative queries may need greater specification of the context and extensive training of the models based on relevant datasets.

Similarly, the use of GAI requires organisations to expose their data to GAI systems. This activity has to be done carefully so that the internal information assurance protocols and privacy of the data do not get breached. Cases have been witnessed when the internal data of organisations was exposed during external queries because the data lakes and data warehouses were onboarded to GAI platforms. Privacy preservation protocols may also have to be developed before exposing the government's data to these large language models.

Like any other AI technology, GAI systems need to establish how they can address the principles of FATE, namely Fairness, Accountability, Transparency, and Ethics in AI. Addressing these FATE principles requires investment in the governance of these platforms. However, addressing these platforms has been seen to have significant positive impacts on stakeholder experiences when interacting with them (Malik et al., 2023).

For example, New Zealand's government has adopted AI tools extensively to analyse public feedback, ensuring citizen-centric policymaking. However, an advisory policy has also been

developed for GAI applications, whereby the government has highlighted guidance for how GAI tools may be used without compromising governance. For example, an advisory surrounding the usage of GAI as Shadow IT is provided. Further, any information under the purview of the Official Information Act should not be onboarded in GAI. An advisory is also provided on how government departments should avoid using GenAI for business-critical information, systems, or public-facing channels.

Further, the government needs to employ both automated and human surveillance mechanisms to protect against illegal content and misuse. Misinformation is increasingly becoming difficult to detect. Deepfakes, for instance, become very difficult to detect by a normal, untrained person ignorant of the nuances and capabilities of AI.

Implications for Practice and Policy

Governments need to embrace AI in general and GAI in particular in their activities. This means governments need to sensitise their employees towards upskilling, where the employees understand how to act on data and how to leverage these GAI platforms for operational activities. Facilitating and creating the appropriate and supportive conditions required to empower public service employees to be embedded in an organisational learning environment whereby they are able to embrace AI and other digital technologies in this journey towards digital transformation (Patre et al., 2023). One way to do that may be through undertaking capacity enhancement programmes in areas like Data Science and Decision Science where government employees may develop a better understanding of AI in general and GAI as well. Skill enhancement through exposure to prompt engineering would also be helpful to cater to this fast-evolving ecosystem. Governments can partner with academia to upskill their employees to leverage AI platforms and applications better.

Conclusion

GAI, like other AI tools, could play an important and critical role in the digital transformation of governments and public sector undertakings. This technology will help governments to be nimbler and more agile in their decision-making and connect with stakeholders more effectively. The public sector and governments can benefit immensely in productivity, efficiencies, and effectiveness through the adoption of GAI. While the benefits are immense, the journey needs to be planned carefully to avoid disruptions from adverse outcomes. ❑

Endnotes

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2023 in Focus: A Year of Unprecedented Strides and Achievements

Humara Sankalp Viksit Bharat

JANUARY

PMGKAY extended for 5 years to provide

Free ration to 80 crore people

ensuring food security for everyone

Historic move by Modi Govt - Islands in Andaman & Nicobar named after

Param Vir Chakra Awardees

FEBRUARY

1300 railway stations being modernized

under Amrit Bharat Station Scheme to create a new atmosphere for development in the country

Cheetahs return to India

at their new home - Kuno National Park

MARCH

Bengaluru to Mysuru in 75 minutes

with the inauguration of new Access controlled Highway, improving connectivity between the twin cities

APRIL

India at the forefront in responding to crisis, evacuating 3,862 Indians from Sudan through

Operation Kaveri

MAY

Inauguration of New Parliament building

as a symbol of democratic strength and progress that blends tradition with modernity

JUNE

Yoga showcased at world-level

with PM Modi leading yoga session at U.N. HQ in New York

> "This is an India that is working hard to make its resolutions a reality. This India is unstoppable, this India is tireless, this India does not gasp and this India does not give up."
>
> - *Prime Minister Narendra Modi*

JULY

India becomes a hub for global exhibitions with the inauguration of

Bharat Mandapam

Sickle Cell Anaemia Elimination Mission

launched for better health of tribal communities

AUGUST

Chandrayaan-3 lands on the moon

making India the 1st country to touch the moon's south pole.

SEPTEMBER

India's G20 Presidency

becomes an epitome of success; Delhi Declaration adopted unanimously

Nari Shakti Vandan Adhiniyam ushers in a new era of inclusive governance with

33% reservation for women

in Lok Sabha and State Legislative Assemblies

OCTOBER

NaMo Bharat Train

India's first Rapid Rail Service launched, ensuring high-speed intercity regional connectivity

Access to affordable healthcare expanded with distribution of

Ayushman Cards crossing 26 crores

NOVEMBER

Viksit Bharat Sankalp Yatra

flags off with 'Modi Sarkar ki Guarantee Vans' ensuring 100% coverage of welfare schemes

DECEMBER

Ayodhya Airport inaugurated

ensuring seamless connectivity to Ram Janmabhoomi - a new era in Airport excellence

India gets new

Criminal justice laws

replacing three colonial-era laws

#ModiSarkarKiGuara

Every Promise Backed by Action

DIGNITY & EMPOWERMENT FOR WOMEN

- 33% representation for women in Lok Sabha
- Access to clean tap water with 13 crore+ connections under Jal Jeevan Mission
- Hygiene and dignity for women with 11 crore+ toilets under Swachh Bharat Mission
- 100% smokeless kitchens with 10 crore LPG connections under Ujjwala Yojana

> **Social justice is only realized when everyone receives the benefits of government schemes with equality and equal consideration.**
>
> *Prime Minister Narendra Modi*

EASE OF LIVING FOR POOR & MIDDLE CLASS

- 100% villages in India electrified under Saubhagya Scheme
- Free treatment of up to ₹ 5 lakh for poor under Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB PM-JAY), 28 Crore Ayushman Cards issued till now
- Pucca houses for over 4 crore families under PM Awas Yojana
- Free ration for over 80 crore poor under PM Garib Kalyan Anna Yojna

Hamara Sankalp Vikasit Bharat

ntee

MODERNIZED AGRICULTURE & PROSPERITY FOR FARMERS

- ₹ 6,000 direct benefit transfer to 11 crore farmers without middlemen under PM Kisan Samman Nidhi
- Low premium rates on crop insurance cover to farmers under PM Fasal Bima Yojana
- State-of-the-art agricultural hubs located at 1.60 lakh PM Kisan Samriddhi Kendras
- Improved soil productivity with 23 crore Soil Health Cards

GROWTH OPPORTUNITIES FOR YOUTH

- 15 AIIMS, 7 IITs, 7 IIMs and 260 medical colleges established for world-class education
- India among the top 3 start up ecosystems in the world with over 1 lakh new startups
- Over 43 crore collateral-free loans amounting to ₹ 23 lakh crore under Pradhan Mantri Mudra Yojana
- "Can-Do" spirit of youth makes history at Tokyo 2021 Olympics & Paralympics

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ARTIFICIAL INTELLIGENCE AND FUTURE OF MEDIA

AI journalism, resulting in the automated generation of news stories and combing through large volumes of data in real quick time employing pattern recognition and arranging them using specific algorithms for human-readable production, is going to be a massive win for the media houses. Contrary to popular sentiment and perception, AI has become a powerful tool for media houses when it comes to news. So, how relevant are news media, including print and electronic outlets, in an age where every minute is flooded with a large amount of news and in which everyone has, so to speak, more data than what is required at one's fingertips?

K SREENIVASARAO | The author is a Former Member, Press Council of India; Secretary, Sahitya Akademi. Email: secretary@sahitya-akademi.gov.in

Traditionally, the role of media in society is perceived as a medium to inform, educate, and entertain. When there were only print media and radio, or when television joined them, the focus and objective of media outlets and the perception of outsiders remained the same – media is there to inform, educate, and entertain in different ways depending on the audience.

There is nothing wrong with that conventional understanding and estimation of media's place and role in human societies. In fact, that is what they are supposed to be. But conventional approaches and understandings do not hold or account for other possible modes of content curation and platforms for dissemination of that content.

Before proceeding to the contemporary and present scenario as far as dissemination of information is concerned, one should do well to remember that it is not mere technological advances of the 21st century that would lead to tectonic changes in the function and role of media.

People have been disseminating and consuming information and news for ages using the technology of the day. This has been happening uninterruptedly ever since humans started settling down in communities. Whether it is the use of copper plates or paintings, or when ink and paper were invented, or the use of pigeons, or the use of a printing press, or the internet, societies have always adapted. What has happened in recent times, in the past decades or so, is that many possible means of content generation and propagation have emerged, and therefore, 'media' has become one of the many mediums of generating news or information and disseminating the same. This has both pros and cons, with the upside being a reduction or doing away with the distance between the creator of information and the reader or consumer of that information. Digital platforms have simply demolished the distance, without any doubt whatsoever. The downside is that the information or news does not go through the processes of curation, editing, and publishing – print, electronic, or digital.

So, these mediums, following algorithmic models generated by Artificial Intelligence networks, put a premium on one that is distinctly different from the traditional media; they try to reach the mark of 100% interactive in nature, and at every step, money is spent striving to be visually appealing. That is by very nature, and potentially everything in the future, to be personalised— not only entertainment but every bit of information.

Ten years ago, people loved aggregators, especially subject-specific aggregators. But the choice of aggregators depended on the individual, and even in the automated architecture, the aggregators pooled would depend on the areas of interest selected beforehand by the individual.

Now, there is no necessity for human intervention in terms of selecting the area of interest or opting for a specific aggregator; simply by virtue of browsing history and all other data available, aggregators are placed before the individual.

The same holds true for advertisements that we are all becoming aware of. A decade ago, there were targeted ads, and then that progressed to targeted influencing of specific groups— age, religious, or community-related groups— for a particular outcome in a chosen action, say, elections.

But today, no need to target anything or anyone. AI-powered engines have all the information they need about everyone and everything. There are attempts in the direction of even providing personalised health services, including treatment protocols and diet and fitness regimens. Personalised books, personalised education, personalised medicine, personalised information, personalised music or cinema, and other entertainment services— future promises to push everyone into living in specialised compartments or into the swirl of chaos and decimation. Only time will tell us which direction this AI will take us.

So, what is the role of media in a society completely driven by algorithms, automation, machine learning, neural networks, large language models, holograms, augmented reality, virtual worlds, fiction and poetry filled with the Skynet, and what not?

First is the primary content, information, or news. How relevant are news media, including print and electronic outlets, in an age where every

minute is flooded with a large amount of news and in which everyone has, so to speak, more data than what is required at one's fingertips?

Contrary to popular sentiment and perception, AI has become a powerful tool for media houses when it comes to news. Empowered by ML-based recommender systems, news and media outlets can fact-check and cross-verify large amounts of data in real time. This is something that is not possible with human journalists.

Increasingly and without any doubt, AI is setting a benchmark for journalism, and AI has empowered media houses with the generation of large amounts of data and accurate digital storytelling. Such a level of accuracy and expression that is enabled by large language models is going to be very difficult for human journalists to match.

AI journalism, resulting in the automated generation of news stories and combing through large volumes of data in real quick time employing pattern recognition and arranging them using specific algorithms for human-readable production, is going to be a massive win for the media house. Data journalism, Algorithm journalism, and Automated journalism are going to be the salient features of future journalism when it comes to the production and dissemination of news.

AI-enabled data labelling and data annotation are going to make news posts reliable, easily retrievable, and deployable for any future use. This is a win not only for the media houses but also for the readers. So, possibly AI will surely, but in the long run and not in the near future, put an end to 'post-truth' times, and readers need not be left out in the lurch trying to separate chaff from the grain.

Second, not merely in news-related contents, but allied fields such as music, entertainment, book publishing, etc. are getting boosted by super-efficient AI tools.

Deep Learning (DL) generative models are already revolutionising, arranging, and distributing music records, and personalised music is already a hit as those models access genres, languages, and time to produce the results.

In the same way, AI promises to alleviate publishers of age-old headaches like production, content vetting, and distribution. Digital storytelling may be the future of the industry, but completely automated book publishing is already underway, and tech-smart tools-enabled publishing houses are going to be powerful in the near future.

Pattern recognition, speech-to-text synthesis and vice versa, content synthesis, sign language production-enabled text and image description, plus automatic subtitling, are slowly but surely revolutionising visual arts, movie industry, and audio-visual components for media houses.

People would remember, 'A robot wrote this entire article. Are you scared yet, human?' that appeared in The Guardian three years ago[1] and in the in-between period of three years, much water has flown under the bridge.

It is easy to paint an apocalyptic picture in the context, but a measured and neutral understanding is what is required for the benefit of all the stakeholders.

Here are a few concerns, problems, and issues with AI-enabled media, for some of which there are no clear and direct answers at the moment:

- Content generators and aggregators are the tools that make

content verification and fact-checking easy for media houses, but the very same tools are used by those who want to spread misinformation. The advantage for these groups of people is that not everything has been recorded through history, and much of human expression has not yet made it through World Wide Web spaces. Of course, automated generators and recommenders are useful at present and are going to be so in the near future, but it is a long way from where the media houses can rely on them with mathematical certainty.

AI promises to alleviate publishers of age-old headaches like production, content vetting, and distribution. Digital storytelling may be the future of the industry, but completely automated book publishing is already underway, and tech-smart tools-enabled publishing houses are going to be powerful in the near future.

- With large data at its disposal, surely AI tools can generate news stories or even novels and short stories in perfect language, but what about IPSs for the ideas attributed or used, or for that matter, who can check the context of the original and the intent of the author? Derridean 'fusion of the horizons' may not be possible, but still, dishing out something completely out of context, or worse, in the wrong context, are some of the mistakes committed by ML models – be they literary creations, information, or visual arts.
- In the same way, Statistical Language Processing (SLPs) are far from being relied upon, even to the extent of 50%, let alone full percent. That is because human expressions are not static but dynamic. The same expression can be used in a variety of circumstances, and similar expressions in similar circumstances tend to convey widely different meanings across languages. So, that is going to be one massively problematic area for accessibility and interpretation of smart tech solutions.
- Pattern recognition and facial recognition tools have impacted security and privacy issues massively, but not all in a bad way. Human beings have also learned a lot in the process, and that has also led to a better understanding (though not complete) of the cognitive faculties of human beings. But the point is that these AI tools are a long way from being certainties, and deepfakes are definitely the point in question.
- AI may perfect religious language and probably create religious schools and they may also create atheistic schools. However, human beings are past masters of stratagems beautifully captured by Arthur Schopenhauer[2] and it is almost impossible for machines to learn the ways in which these are used by human beings in daily life, from family to on the road to work spaces, and calculation of any number of permutations and combinations is going to suffice.

Like this, there are doubts, assumptions, concerns, issues, and problems across disciplines and areas of human endeavour. But that doesn't call for summarily dismissing the influence and impact of AI on human existence.

Thomas Kuhn showed us that paradigm shifts always and inevitably take place outside or on the edge of the universe of discourse. So, when it comes to media in the era of artificial intelligence, one thing that can be stated with certainty is that we have already entered the era of synthetic media. Augmented Reality and other tools are going to enrich this synthetic experience, almost bordering on a synesthetic experience. That augurs well for the producers and consumers of expressions of all kinds. ❑

(Source: Media in the Era of Artificial Intelligence 2023, Press Council of India)

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TRANSFORMATIVE ROLE OF AI IN MEDIA

Technological advances have a paradox associated with them; Man creates technological advances and these advances brought about by man have the potential of being detrimental to man himself. Artificial Intelligence, more commonly referred to as AI has a similar story. It is permeating every aspect of human work including Media.

PROF (DR) SANGEETA PRANVENDRA | The author is Course Director – Radio and Television Course, Head – Community Radio, Head – Community Radio Empowerment Resource Centre, Indian Institute of Mass Communication, New Delhi. Email: sangeeta.pranvendra@gmail.com

The talk in newsrooms and all aspects related to Media has an undercurrent about AI taking over Media. The visible invasion in form of AI anchors stokes the fires.

Let's take a tour through how AI has altered the landscape of media.

It was in June 2023 that Germany's largest tabloid Bild announced that it was laying off a third of its staff and their functions would be taken over by machines. Almost 200 people were laid off in a go even as Bild's editor-in-chief sent a mail to the staff that read, "The functions of editor-in-chief, layout artist, proof-reader, publisher and photo editor will no longer exist in the future as we know them today".

The move towards a huge shift from manpower to AI was brisk as it was in just spring that the idea was first floated as Mathias Döpfner, the CEO of Axel Springer, the owner of Bild, claimed in an internal letter, "Artificial intelligence has the potential to make independent journalism better than it ever was – or simply replace it".

Bild however went on to deny the reports and said its announcements were related to the restructuring of its regional offices and moving operations to headquarters Berlin.

These are visible shifts, but there are many aspects of Media that AI has transformed to the point of no return. It cannot be denied that some

Source: Nasscom

transformations may be considered positive too. The powerful algorithms that power the AI can decipher data at a speed no human can match. This has been the harbinger of emergence of Big Data Journalism. The crunching through data in big leaks or examining mountains of data to examine consequences of climate change are through AI. Journalists can now successfully and speedily comb through mountains of data and decipher statistical patterns, using them to tell compelling and useful stories.

Media organisations are increasingly adopting the use of AI for many back-office jobs like transcribing interviews, subtitling videos, analysing audience preferences and engagement patterns and also to boost SEO ranking. The jobs related to analysing audience preferences engagement and also boosting SEO ranking are vital tasks in any media organisation and an indication of how AI is directly influencing Media landscape. Search engines and social media channels are gatekeepers and by default content curators. Thus, having a profound effect on the flow of revenue to the media outlet. This says enough for their increasing importance over humans and its capability to transform media.

Meanwhile there are more avenues of Media that are being transformed by AI. The capability to speak, write, communicate and tell stories in sophisticated language is an intrinsic human quality and the most defining feature of being a journalist. The release of sophisticated large language models marks the moving out AI out of side-lines and peripheries on to the heart and soul of journalism – i.e., content creation.

There are other newsroom tasks that are increasingly being taken over by AI. These include:

- Content discovery
- Document analysis
- Translations (in multiple languages)
- Processing tips (verifying tips, moderating story ideas)
- Social media content creation (generating optimised posts of pictures and videos for various platforms in various formats)
- Automated writing (from structured data) e.g., school, college events, natural events, business, real estate and community calendars
- Automated writing (from unstructured data) e.g., obituaries, press briefs, event previews
- Newsletters (personalised with optimised delivery time)
- Text summarisation
- Comment moderation
- Content transformation and reuse (format articles to enable reuse in different platforms, formats and platforms)
- Search Engine Optimisation
- Push-alert personalisation

The slow infiltration or rather invasion of AI in media has been the cause of cutting down of the human workforce and rendered many jobs as redundant. While there is no accurate data available

for most countries including India; the US Bureau of Statistics has cited a decline of 60% employees in media over a span of around 25 years. As per their data - in 1990 the American newspapers employed close to half a million people (4,58,000) and by 2016 the number had dropped to 1,83,000 which is a decline of more than 60 per cent. On the other hand, there has been an exponential increase in their workload and a sizeable drop in their salaries. The changing work scenario has caused unjustified pressure, burnout, and threat to job security.

Despite all the hype about AI taking over media – media organisations are still broaching the issue of letting machines taking over media - with trepidation. They may play footsie with the algorithm, but replacing its workforce with AI? This is one bus media organisations are in no hurry to board. What makes Media so off bounds for AI to capture and rule. A simple answer is - Humans – their intrinsic qualities linked with journalism that AI would find difficult to replicate. These are:

1. **Emotions** – Data definitely plays an important role in driving a story, but what truly drives a story is the underlying emotion that connects to the audience to the story. It touches their hearts, rouses their curiosity, compels them to cheer for the underdog or the winner and also reinforces the difference between good and bad, between right or wrong. AI – at least in its current iteration – runs on data and algorithm not emotions.
2. **Adaptability** – It took man millions of years to evolve from the Australopithecus afarensis to Homo sapiens. Every step of this journey required immense adaptability and the strength to survive adverse situations. The homo sapiens species lives up to the Darwinian adage of 'Survival of the Fittest'. Media takes this game a notch higher; the toughest among the tough survive in the profession that puts forth daily challenges, necessitates daily adapting to changed situations and also requires an immense will to not just survive but thrive; that too while being 'me first, me best'. AI engines are yet to reach this optimisation.
3. **Branding and Connect** – Journalism in its present form isn't just about the medium, but also the messenger. People flock to a particular media outlet or person because they have followed their career for years and consider them an authority in that particular subject. Journalists have spent years building a brand and it's almost impossible for AI to do that with no time and earn the audience's trust.
4. **Ethics** – While new generation AI, can follow a basic paradigm of ethical behaviour laid down by its creators, there's only so far machine learning can go. It is yet not programmed discern what is morally correct or acceptable. There are more aspects to ethical concerns; AI can create fake images, video and audio. It can be used to create deepfake content. Further, AI works on data available, but if an AI algorithm works on data that is ridden with bias then the content produced would carry them forward. Media outlets would have to take a call on who bears the legal responsibility of such moral mistakes.
5. **Ground Connect** – Boots on the ground is what makes stories by

reporters believable and when stories are covered from where they are unfolding they have a definite edge over the DTPs (desk top productions). If this were not the case then media houses would not be allocating large budgets for coverage of - elections, disasters, events, and even wars in far-away lands. A report with a perspective makes it interesting, relatable, and factual. AI is doing a fine job of creating stories from sourced data, but it is not reaching ground zero anytime soon.

6. **Limited Ability to Take Decisions** – Another reason why AI will not completely take over human jobs in media is that AI is still limited in its ability to make decisions based on context. AI systems are designed to work within specific parameters, but they are not capable of considering all the nuances of a situation and making decisions that take into account the context and ethics of the situation. Human media persons can understand the complexity of media interactions and respond accordingly.

7. **Social and Environmental Consequences** – There is a rapid and unstudied dash to deploy AI in the media but chatbots consume vast amounts of energy – is it justifiable.

There is no denying that the human factor is an absolute essential for Media; AI is actually moving in to make transformative changes in Media. The SEO optimised revenue benefits and expenditure cuts are a sure shot attraction for adopting AI in Media. But, the faith that democracies place in Media, makes it absolutely essential that the fourth pillar of Democracy – the Media is not transformed to the point that AI takes over newsrooms. ❑

(Views expressed are personal opinion of the author)

ROLE AND SCOPE OF ARTIFICIAL INTELLIGENCE FOR CITIZEN SERVICES

DR VISHAL SINGH | The author is Principal, A D Patel Institute of Technology (ADIT), The CVM University. Email: principal@adit.ac.in

DR DINESH PRAJAPATI | The author is an Associate Professor & Coordinator, Artificial Intelligence (AI) and Data Science Department, A D Patel Institute of Technology (ADIT), The CVM University. Email: coordinator.ai@adit.ac.in

Artificial Intelligence (AI) is making a significant impact on healthcare services, transforming various aspects of the industry to enhance efficiency, improve diagnostics, and provide personalised care. AI is increasingly playing a significant role in power management, contributing to improved efficiency, reliability, and sustainability in the energy sector. It has the potential to significantly transform learning and skill development in India, addressing various challenges and contributing to a more inclusive and effective education system. AI algorithms analyse historical data, weather patterns, and other relevant factors to predict future energy demand accurately. Farmers can gather real-time data on soil conditions, crop health, and weather patterns, allowing for targeted interventions and optimised resource use. This article provides an overview of the impact, uses, and challenges associated with the role and scope of AI in citizen services.

AI in the Digital India Initiative

AI is a key component, with initiatives focused on e-governance, digital infrastructure, and increasing the use of technology in various public services. By integrating AI with Aadhaar-enabled services, the Government can ensure a more efficient and secure delivery of various public and private services while maintaining the privacy and integrity of individuals' identity information. Incorporating AI into DigiLocker can significantly improve the user experience, security, overall efficiency of the platform. It can also contribute to the Government's larger vision of a digital and paperless ecosystem by making document management more intelligent and user-friendly. By integrating AI into Government mobile applications, administrations can create more intelligent, responsive, and citizen-centric platforms that streamline processes, improve service delivery, and foster better communication between the Government and its citizens. By leveraging AI in telecom network analysis, operators can achieve better network performance, deliver higher-quality services, reduce operational costs, and enhance the overall customer experience.

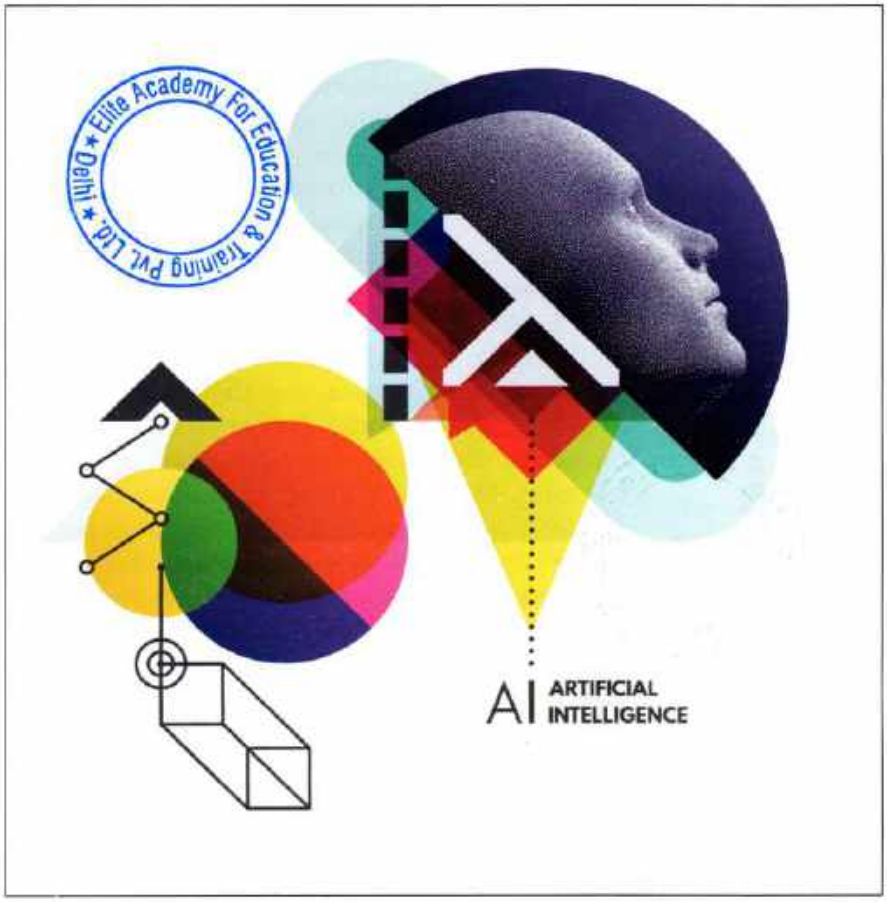
AI in Public Safety and Security

AI is employed in public safety initiatives such as predictive monitoring, emergency response optimisation, disaster management, video surveillance, and threat detection. Surveillance systems powered by AI can enhance security measures and help in the early detection of potential risks. AI technologies, including facial recognition and video analytics, are employed for public safety and security. AI can aid in monitoring public spaces, detecting anomalies, and improving emergency response systems.

AI in Healthcare Services

AI can play a significant role in healthcare-related citizen services, from diagnostic tools to personalised health recommendations. Remote monitoring and telehealth services with AI support can improve access to healthcare for citizens. Artificial Intelligence is making a significant impact on healthcare services, transforming various aspects of the industry to enhance efficiency, improve diagnostics, and provide personalised care. These challenges require a multi-stakeholder approach concerning government bodies, healthcare providers, technology developers, and the public. Collaboration, ongoing education, and a commitment to ethical and responsible AI use are essential for realising the full potential of AI in healthcare in India. AI is utilised in analysing medical imaging data, such as X-rays, MRIs, and CT scans. Machine learning algorithms can assist in identifying anomalies, detecting diseases like cancer, and providing more accurate and timely diagnoses. AI is used in the drug discovery process by analysing huge datasets to recognise potential drug candidates. Machine learning models can predict the effectiveness of certain compounds, speeding up the research and development phase. This personalised approach enhances treatment effectiveness and minimises adverse effects. Virtual health assistants and chatbots powered by AI provide patients with instant support, answer medical queries, and offer information about symptoms and treatments. These systems can also assist in appointment scheduling and medication reminders. AI enables predictive analytics to forecast patient outcomes and identify individuals at risk of certain conditions. This information helps healthcare providers intervene early, leading to better management of chronic diseases and improved patient outcomes. AI facilitates remote monitoring of patients, especially those with chronic conditions. Wearable devices and sensors collect real-time health data, allowing healthcare providers to track patient status and intervene when necessary. AI facilitates remote patient monitoring, making healthcare services more accessible, especially in rural areas where

By integrating AI into Government mobile applications, administrations can create more intelligent, responsive, and citizen-centric platforms that streamline processes, improve service delivery, and foster better communication between the Government and its citizens.



access to medical facilities is limited. AI is used in robotic-assisted surgery, where robots equipped with AI algorithms assist surgeons in performing procedures with precision. These systems can enhance surgical outcomes and reduce recovery times. AI-powered applications can assist in monitoring mental health conditions by analysing user behaviour, speech patterns, and social media data. Virtual mental health assistants and chatbots provide support and resources. AI contributes to healthcare governance by analysing health data, predicting disease outbreaks, optimising resource allocation, and supporting decision-making during health crises. During the Covid-19 pandemic, AI has been used for contact tracing, monitoring quarantine compliance, and analysing healthcare data to make informed decisions.

AI in Financial Inclusion

AI is employed in the financial sector to enhance inclusion and accessibility. Mobile banking, digital payments, and AI-driven credit scoring are notable examples. Financial inclusion, or access to affordable and reliable financial services, is a critical aspect of economic development and poverty reduction. Despite advancements in the financial sector, a significant portion of the global population still lacks access to traditional banking services. Artificial Intelligence has emerged as a powerful tool to address the challenges associated with financial inclusion. Machine learning algorithms analyse alternative data sources, such as mobile phone usage and utility payments, to assess creditworthiness. This enables more accurate and inclusive credit scoring, allowing underserved populations to access loans. Advanced fraud detection algorithms influence AI to monitor transactions in real-time, identifying unusual patterns and preventing fraud activities. This enhances the security of financial transactions. AI-driven mobile banking applications enable individuals to access basic financial services through their smartphones. This reduces the dependency on physical bank branches, particularly in rural and underserved regions. AI algorithms consider non-traditional data, such as social media behaviour and online activities, to build alternative credit scoring models. This expands the pool of individuals eligible for financial services. AI can also be combined with blockchain technology to enhance security and transparency in financial transactions. This can foster trust in financial systems, especially in regions where trust is a significant barrier to financial inclusion.

AI in Smart Agriculture

AI plays a crucial role in agricultural innovation, offering solutions to enhance crop yield, sustainability, and overall efficiency in farming practices. AI is used to analyse agricultural data and provide farmers with real-time information on weather patterns, crop health, and best farming practices. This helps in improving crop yields and optimising resource usage. AI technologies, including sensors, drones, and satellite imagery,

enable precision farming. Farmers can gather real-time data on soil conditions, crop health, and weather patterns, allowing for targeted interventions and optimised resource use. AI algorithms analyse historical and current data to predict crop yields, pest and disease outbreaks, and optimal planting times. This helps farmers make informed decisions and plan for potential challenges. AI helps optimise irrigation by analysing soil moisture levels, weather forecasts, and crop water requirements. Smart irrigation systems ensure water is applied efficiently, reducing waste and conserving resources. AI models analyse weather patterns to provide accurate and timely forecasts. Such information can be used to improve farming.

AI in Education and Skill Development

Artificial Intelligence has the potential to significantly transform learning and skill development in India, addressing various challenges and contributing to a more inclusive and effective education system. AI is being used in the education sector for personalised learning experiences, adaptive assessments, and skill development initiatives. Virtual classrooms and online learning platforms leverage AI to meet diverse learning needs. AI can adapt educational content based on individual student needs and learning styles, providing personalised learning experiences. This customisation helps students progress at their own pace and focus on areas where they need more assistance. AI-powered platforms can identify the strengths and weaknesses of each student, offering personalised exercises and content to address specific learning gaps. This adaptability enhances the effectiveness of educational interventions. AI technologies support the development of online and remote learning platforms, enabling broader access to education, especially in remote or underserved areas. This has become particularly crucial during situations like the Covid-19 pandemic. AI can enhance the gamification of educational content, making learning more engaging and interactive. Gamified elements can motivate students, making the learning experience enjoyable and effective. AI-driven tools and technologies can enhance the traditional classroom setting. Smart classrooms equipped with AI-powered interactive whiteboards, virtual reality (VR), and augmented reality (AR) tools can make learning more interesting and dynamic.

AI in Smart City Development

Smart Cities and Artificial Intelligence play an essential role in shaping urban planning for sustainable development. By using AI technologies, cities can enhance efficiency, improve resource management, and create more comfortable environments. The Smart Cities Mission involves the integration of AI and IoT technologies to enhance urban living. AI can analyse data from various sources, such as sensors and IoT devices, to optimise infrastructure use. This includes traffic management, waste management, energy distribution, and water supply, leading to reduced congestion, energy savings, and more efficient resource allocation. AI can improve waste collection and recycling processes by optimising collection routes, identifying areas with higher waste generation, and promoting recycling initiatives. This contributes to reducing environmental impact and promoting a circular economy. AI contributes to the design of energy-efficient buildings and urban spaces. Smart building systems can optimise heating, ventilation, and lighting based on occupancy, leading to reduced energy consumption and environmental impact.

AI in Tourism

Artificial Intelligence has a significant impact on the tourism industry, transforming various aspects of travel planning, booking, and experiences. AI algorithms help users plan their trips by suggesting optimal itineraries based on preferences, budget constraints, and time constraints. These systems can dynamically adjust plans based on real-time factors like weather or events. AI analyses weather patterns and provides real-time travel alerts, helping travellers plan for weather-related disruptions and make adjustments to their itineraries. The integration of AI into the tourism industry not only enhances the efficiency of operations but also provides travellers with more personalised and seamless experiences, contributing to the growth and evolution of the global tourism sector.

AI in Power Management

Artificial Intelligence is increasingly playing a significant role in power management, contributing to improved efficiency, reliability, and sustainability in the energy sector. AI algorithms analyse historical data, weather patterns, and other relevant factors

to predict future energy demand accurately. This enables utilities to plan and allocate resources more efficiently, avoiding overloads and reducing the risk of blackouts. AI helps optimise energy consumption in various applications, from industrial processes to residential buildings. Machine learning models can learn patterns of energy use and suggest strategies for minimising consumption during peak times. Predictive modelling helps manage the variability of these sources, ensuring a stable and reliable power supply. By leveraging AI in power management, utilities and energy operators can create more intelligent, responsive, and sustainable energy systems, contributing to a more efficient and resilient power infrastructure.

AI in Logistic Management

Artificial Intelligence plays a transformative role in logistic management, contributing to increased efficiency, reduced costs, and improved decision-making in the supply chain. AI algorithms analyse historical and real-time data, considering factors like traffic conditions, weather, and road closures, to optimise delivery routes. This leads to reduced transit times, fuel consumption, and transportation costs. AI optimises air traffic management by predicting congestion, suggesting optimal routes, and assisting air traffic controllers in managing airspace more efficiently. AI supports automated train operation systems, enabling precise control, efficient energy use, and improved safety in railway transportation. AI facilitates smart toll collection systems, allowing for automated and efficient tolling processes, reducing congestion at toll booths, and improving the overall traffic flow. AI helps to incorporate predictive infrastructure planning for the 'GatiShakti' Project.

AI in Automation of Routine Tasks

AI can automate repetitive and routine tasks in citizen services by reducing the workload on government employees and allowing them to focus on more complex issues. Automated processes can lead to faster response times, improved accuracy, and increased overall efficiency.

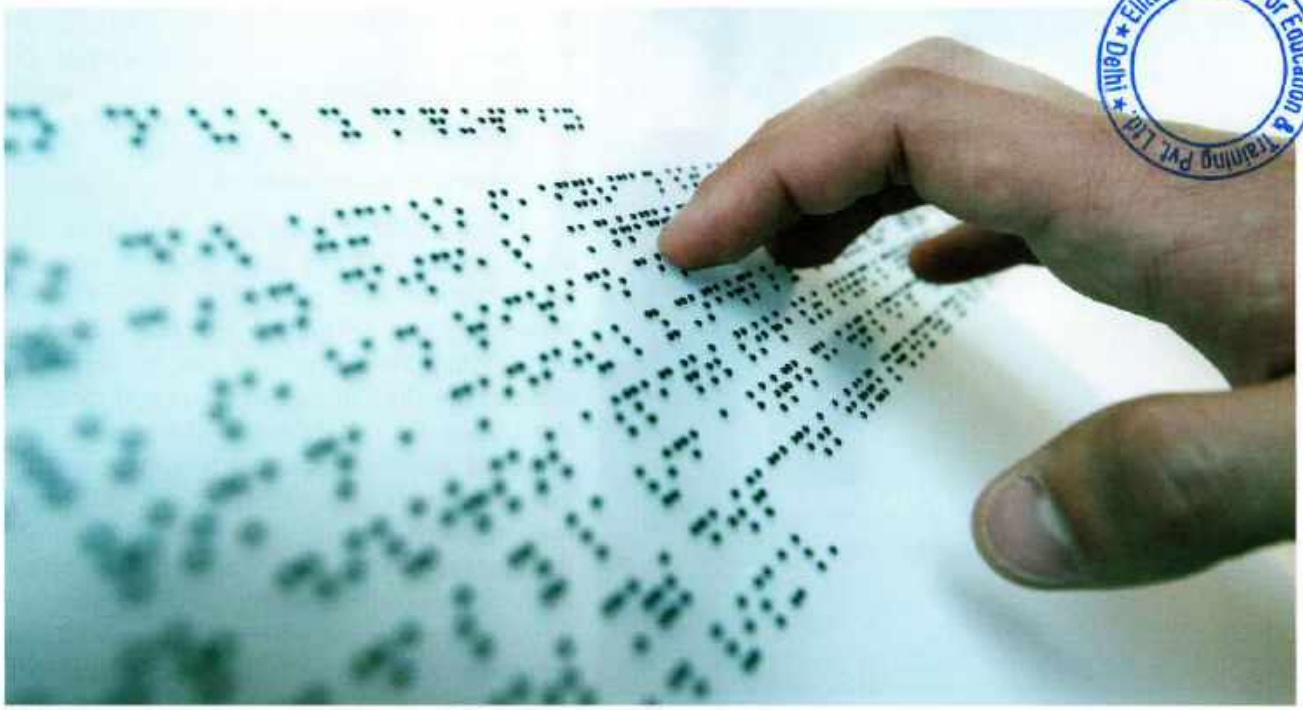
AI in Customer Service and Interaction

AI-based chatbots and virtual assistants are useful in improving interaction with citizens by providing prompt responses to queries, guiding users through processes, and offering information on government services. These systems can operate 24/7, ensuring continuous availability and accessibility for citizens.

AI in Personalised Services

AI enables the customisation of citizen services based on individual preferences, needs, and historical interactions. This personalisation enhances the user experience and increases citizen satisfaction. Personalised recommendations and notifications can be delivered to citizens, keeping them informed about relevant services and updates.

While AI offers numerous benefits, it's essential to address concerns related to privacy, bias, and ethical considerations when implementing these technologies in citizen services. ❑

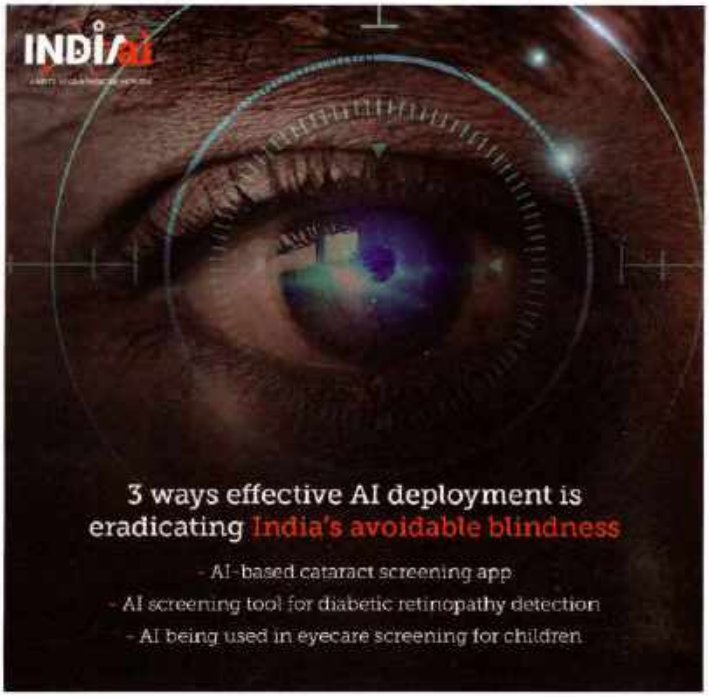


ARTIFICIAL INTELLIGENCE AND THE EASE OF LIFE FOR VISUALLY CHALLENGED

DR JITHENDRAN S | The author is an Assistant Professor in Commerce, Government Arts and Science College, Ambalapuzha. Email: jithenair@gmail.com

AI is replacing the centuries-old standardised operational procedures in almost every branch of knowledge and discipline. The present analysis is addressing the extent to which Artificial Intelligence can improve the lives of *divyangs*. For an inclusive society, the digital governance terminals for the citizens need to be recalibrated or progressively redesigned to incorporate mode selection options in which adequate audio input cues can be intelligently sewn by Artificial Intelligence. There is evidence of such initiatives from Indian metro rail services where AIs are progressively incorporated to reduce risk due to clear audio communications for the *divyangs*.

The advancement in the field of science and technology is breathtaking to all of us; it has relentlessly surprised us with new gadgets and applications that can make human life easy and worth living, as if from a magician's bag. Now, from downtown, a visually challenged can walk towards his home independently without a white cane. Sensing the owner when the door opens, an intelligent goggle helps with the verification and all the movements with Artificial Intelligence. This is not from a Hollywood movie or science fiction.



It is a reality that greets us with a meaningful smile. AI has seemingly improved the quality of life of marginalised in manifold ways.

Technology and Development

The present analysis checks the implications of AI on human life and on visually challenged objectively. There are gadgets and applications designed for the visually impaired: specs, cellphone software, etc. This analysis is directed towards the role and scope of AI in improving the quality of life of the visually challenged. Social systems and codes have always been designed to address the needs of the mainstream masses, who are fit with all senses of cognition for transacting the deals of social order. Around 250 million people on the globe are visually impaired. They are either struggling to have a decent or independent life. Many of them are not even in the visible layer of society. Few decades ago, as in the case of hearing impairment, the function of SMS on a cell phone brought priceless smiles, not just among such children but even their parents (as they are aloof from the world of sound). They could not have attended a call had it not vibrated close to their body. A tiny improvement in the make-up of contemporary phones could alter their ease of life in spite of their challenges. A minor advancement in technology has opened an entire vista of communication to the hard-of-hearing population. Therefore, technology, if it does not cater to the needs of marginalised people, cannot be labelled as real development.

Visually Challenged and AI

1. Detection of impairment

If you cannot negotiate and react to visual inputs like any other person, you are technically termed as Visually Impaired (VI). Whether you are legally or not is a subject of State policy. The life of a VI can be improved right at the time of its diagnosis and locating the means for rehabilitation. Early detection using AI assistive technology can invariably interfere with the medication or other management process right from the womb. Regular examination for locating the blindness at the infant stage itself is now made possible by AIs. Google Accelerated Science (GAS) combined research with Indian Eye Hospitals to develop an AI to detect the antecedents of biomarkers from a high-definition image of an eye behind the retina. It was a perfect skill-set match for the scientist, who had earlier worked on hand gestures and developed an AI with deep learning to find solutions for billions of people with diabetic retinopathy. Around 70 million people in India and 418 million in the world are ailing with such conditions. AI can be a game changer in the field of early detection and management of visual impairment. The AI Model has been vouched for by more than 100 ophthalmologists round the globe (Diagnosing DR with AI - About Google).

2. Education

AI is changing the entire landscape of education. AI-driven learning platforms that are interactive and capable of customising according to the needs of learning units. All is intended towards a human-centred approach with AI as technology for all with reduced tech-divide. The Beijing Consensus by the agency delineates the guidelines for policymakers in this context. This is vouching for the global commitment to vetting AI in the policy initiatives of member countries. Siri, Alexa and chatbots have all altered the learning ecosystem. Visually impaired students have wide voice maneuverability interfaces with such AI learning models, which is unveiling the fantastic world of knowledge at their fingertips. Machine learning programmers

can certainly change the destiny of conventional education, but the virtue of meeting the special requirements of persons with disabilities can make the learning meaningful.

3. AI and Social Life

Every visually impaired person wants to be independent and would like to move freely to perform their personal and social commitments. An AI device has been carefully tailored in the spectacles to meet the specific requirements of blind or low-vision people by socially committed developers (Envision). The familiar faces can be fed into the devices, like the menu cards of hotels, contents of medicines, products, GPS, and things that can be described in words like gender and the approximate age of strangers, which can add to the psycho-social competence of visually impaired persons. Besides, there are digital magnifiers to assist the low-vision category of VIs in reading print materials with assistive technology developers. Constant research and development initiatives and better ways of logistics and communication can ensure the availability and awareness of such AI-assisted gadgets around the globe. In fact, we are improving the cognitive competencies or bridging the gap between the mainstream social systems and the special requirements of the visually challenged with AI. The innovation and diffusion theory (Everett Roger, 1962) in social science validates the gradual spread of ideas and technology over time by adapters among participants. Contextually, the adapters are the assistive and progressive system developers among participants with visual impairments. It is noteworthy that many smartphone developers have meticulously included features in their gadgets that use AI to improve the quality of life in many ways. Be My Eyes, Audio GPS, Digital magnifier, scanners, screen readers, and Text-to-speech applications are a few of them. Undoubtedly, affordability is a concern where the State or NGOs, together with social entrepreneurs, can evolve a solution.

> **AI is changing the entire landscape of education. AI-driven learning platforms that are interactive and capable of customising according to the needs of learning units. All is intended towards a human-centred approach with AI as technology for all with reduced tech-divide.**

4. AI and Governance

On a regular basis, every individual, irrespective of their physical status, needs to interact with several portals, which are often internet-based. Many of them test whether you are a robot, but alas, a visually impaired person has to prove it with a lot of struggle or help. AI can help with biometric verification and thereby relieve a 'acid' test on existence. Another expanse where they inescapably encounter many hassles is while interacting with the public-utility infrastructure on a regular basis. Positively for all sorts of inclusions, the digital governance terminals for citizens need to be recalibrated or progressively redesigned to have mode selection options in which adequate audio input cues can be intelligently sewn by Artificial Intelligence. With the Unique Disability Identity cards in India, it can certainly reshape the entire landscape. On all the platforms of public utility driven by AI, it will be easy to validate the individual's locus standi for an automated mode shift. The State administrative mechanisms can also make use of AI in locating the pivots in which such terminals need to be dispensed with.

5. AI and Accessibility

Visually impaired persons are susceptible to risking themselves by collision; a State is largely held responsible for creating a hassle-free physical atmosphere wherein the mobility of such persons is challenged. Buildings with public funds, transportation systems, financial institutions, and educational centres of all types can make effective use of Artificial Intelligence to impart security. Indirectly, such makeovers in social security systems can help the elderly citizens too, who otherwise lost their visual faculties owing to ageing or illness. In either case, social security systems are regarded as a modality for inclusive development. AI cameras placed in public places

can help the security systems reach tailor-made assistance for visually challenged persons. There is evidence of such initiatives in Indian metro rail services where AIs are progressively incorporated to reduce risk due to clear audio communications for the visually impaired (VI).

Conclusion

It goes without saying that machines for decision-making by a logical algorithm with deep learning from clouds can dismiss the entire subjectivity error and human biases. AI is replacing the centuries-old mechanisms in almost every branch of knowledge and discipline, so much so that the extent to which AI is improving the lives of people with visual impairments is a subject of social significance. The scope and practices of using Artificial Intelligence to make the planet Visually Impaired friendly are humane and equity-driven, are exercised from the diagnosis of impairment to the launch of social security systems. AI has undoubtedly influenced or is capable of serving the lives of marginalised in manifold ways. The life of a *divyang* can be improved right from the time of pregnancy through AI and rehabilitation. An AI with deep learning to find solutions for billions of people with diabetic retinopathy is an instance of such a breakthrough with biomarkers. Reduced accidents, better monitoring of health care, AI-assisted governance infrastructure, and affordable AI-digital gadgets can enhance the gross happiness of the visually impaired. Recently-developed gadgets are an attempt to meet the specific requirements of blind or low-vision people by socially committed developers. It has strategic implications for an egalitarian, inclusive society: the digital governance accessibility by mode selection options in which adequate audio input cues can be intelligently sewn by Artificial Intelligence. ❑

(The author is a divyang with visual challenges)

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THE RISE OF INDIA'S DRONE INDUSTRY

The rise of unmanned flight technology over the last few years has sparked the imagination of innovators across the country, and today, India is building an ecosystem to become a global drone hub by 2030. Predominantly used for warfare in earlier times, drones have emerged as a transparent, efficient, and cost-effective tool for a tech-powered India. Active efforts by the Government towards making drone services easily accessible while encouraging industries to embrace drone innovation to leverage the benefits of this technology are touching the lives of every citizen. The impact of this was observed during the Covid-19 pandemic when drones were used to deliver vaccines and medicines, for sample collection or delivery, spraying disinfectants, and lockdown patrolling. They are set to have a definite impact on education, agriculture, weather forecasting, healthcare, disaster management, defence, and other sectors. Also, with their agility and ability to reach inaccessible places, drones are helping the Government and various organisations expand their horizons.

From 'Kisan Drones' for crop assessment and spraying insecticides, to 'i-Drones' to develop an ecosystem for healthcare drone deliveries, to drones being used for Kedarnath reconstruction and the Namami Gange Programme, they have already been ushered in for the country's overall development. For India's defence, drones are playing a crucial role in monitoring and combat. Today's modern, pathbreaking drone capabilities are being utilised to meet the requirements of frontline troops as well. 'PM SVAMITVA Yojana' is an example of how drone technology is becoming the basis of a major revolution. Under this scheme, for the first time, the country's villages are being digitally mapped, and digital property cards are being given to the people.

To support and promote Drone-as-a-Service (DrAAS) among emerging drone start-ups, Mission 'Drone Shakti' has been announced. Besides, youth-led initiatives implementing drone technology are aiding the Government in reaping the benefits of this technology. Even young minds are engaged in learning drone technology through the Atal Innovation Mission network (especially Atal Tinkering Labs). The introduction of the landmark liberalised Drone Rules 2021 to promote and streamline the commercial and industrial use of drones through the DigitalSky platform is a testament to India's swift adoption of drones. Not just that, in order to make India a global hub for the R&D, testing, manufacturing, and operation of drones under 'Atmanirbhar Bharat Abhiyan' and 'Make in India', the Government also launched a PLI Scheme for drones and drone components with a total incentive of Rs 120 crores.

Additionally, the Government of India has carried out a series of reforms to make India a self-sufficient and globally competitive drone hub, which include the publication of the Drone Airspace Map 2021, which opens nearly 90% of Indian airspace as a green zone up to 400 feet; UAS Traffic Management policy framework 2021; the Drone Certification Scheme 2022 to simplify the process of obtaining type certificates for drone manufacturers; the Drone Import Policy 2022, which bans the import of foreign-made drones; and the setting up of drone schools to train pilots and providing licences for drone operations. India's timely action to tap the potential of drone technology in terms of innovation, technology, and engineering, along with incentives and corroborative policies, will indeed make India the drone capital of the world.

(Source: Mann ki Baat)

CYBER SECURITY CHALLENGES IN THE ERA OF AI

As India, a rapidly growing digital economy, embraces AI, it faces unique vulnerabilities and requires a proactive approach to address emerging cyber threats. Integrating AI responsibly into cyber security solutions can be a game-changer. The government, private sector, academia, and civil society must come together to build a robust cyber security ecosystem, promote responsible AI development and empower individuals to navigate the digital world safely.

VAMSHI KRISHNA PALAKURTHI

The author is associated with CDAC for the past 17 years now and presently designated as Joint Director with CDAC Hyderabad. He has been working in application of Information & Communication Technologies (ICT) in various domains along with emerging and niche areas, with Artificial Intelligence (AI) being one of them. Email: vamshi.palakurthi@gmail.com

The rise of Artificial Intelligence has revolutionised numerous aspects of our lives, from healthcare and finance to entertainment and transportation. However, this technological advancement also presents a new set of challenges, particularly in the realm of cyber security.

Understanding the Landscape

India's digital landscape is rapidly evolving, with internet users exceeding 800 million and the government actively promoting digital initiatives like Aadhaar and Digital India. This growth, however, attracts malicious actors who exploit vulnerabilities in critical infrastructure and personal data. In 2023 alone, India witnessed over 1 billion cyberattacks, highlighting the urgency of robust cyber security measures.

AI-Powered Threats

The integration of AI in cyber security presents both opportunities and vulnerabilities. On the one hand, AI can automate threat detection and response, analyse vast amounts of data to identify anomalies, and even predict future attacks. However, AI-powered tools can be manipulated by attackers to launch sophisticated cyberattacks, create deepfakes for social engineering, and automate malware development.

Unique Challenges for India

India faces several unique cyber security challenges due to its specific socio-economic context:

- **Large digital divide:** A significant portion of the population lacks access to digital literacy and awareness, making them vulnerable to phishing attacks and online scams.
- **Fragmented cyber security infrastructure:** The responsibility for cyber security is often distributed across various government agencies and private entities, leading to a lack of coordination and comprehensive strategies.
- **Data privacy concerns:** Data security and potential misuse of personal information may be a cause of concern for digital payments.
- **Skill shortage:** India faces a shortage of qualified cybersecurity professionals, hindering effective threat detection and response capabilities.

Addressing the Challenges

To overcome these challenges, India needs a multi-pronged approach:

- **Building a robust cyber security ecosystem:** This includes strengthening government agencies like CERT-In, promoting public-private partnerships, and fostering collaboration among stakeholders.
- **Investing in AI-powered cyber security solutions:** While AI can be misused, it also holds immense potential for proactive threat detection and response. Investing in research and development of secure AI solutions is crucial.
- **Promoting digital literacy and awareness:** Educating the public about cyber hygiene, online scams, and data privacy practices is essential to build a resilient digital society.
- **Developing a strong legal framework:** India needs robust cyber security laws and regulations to deter cybercrimes, protect critical infrastructure, and ensure data privacy.
- **Investing in cyber security training and skills development:** Addressing the skill shortage by providing training programs and attracting talent to the field is essential for long-term cyber security preparedness.

Focus on AI Integration

Integrating AI responsibly into cyber security solutions can be a game-changer for India. Here are some key areas of focus:

- **Threat detection and response:** AI-powered systems can analyse network traffic, user behavior, and system logs to identify anomalies and potential threats in real-time, enabling faster response times and minimising damage.
- **Vulnerability management:** AI can automate vulnerability scanning and patching, ensuring systems are constantly updated and protected from known exploits.
- **Fraud prevention:** AI can analyse financial transactions and identify suspicious patterns to prevent online fraud and financial theft.
- **Cybercrime investigation:** AI can assist in analysing forensic data, identifying attackers, and predicting future attack patterns to improve cybercrime investigations.

A Call to Action

Cyber security in the era of AI requires a collective effort. The government, private sector, academia, and civil society must come together to build a robust cyber security ecosystem, promote responsible AI development, and empower individuals to navigate the digital world safely. By addressing the unique challenges and leveraging the potential of AI, India can ensure a secure and prosperous digital future for its citizens.

Additional Considerations

- The ethical implications of AI in cyber security need careful consideration. Transparency, accountability, and human oversight are crucial to prevent misuse and bias.
- International cooperation is essential for combating cyber threats that transcend borders. Sharing information, best practices, and expertise will strengthen global cyber security preparedness.
- Continuous research and development are critical to stay ahead of evolving cyber threats and develop new AI-powered solutions to protect our digital infrastructure and personal data.

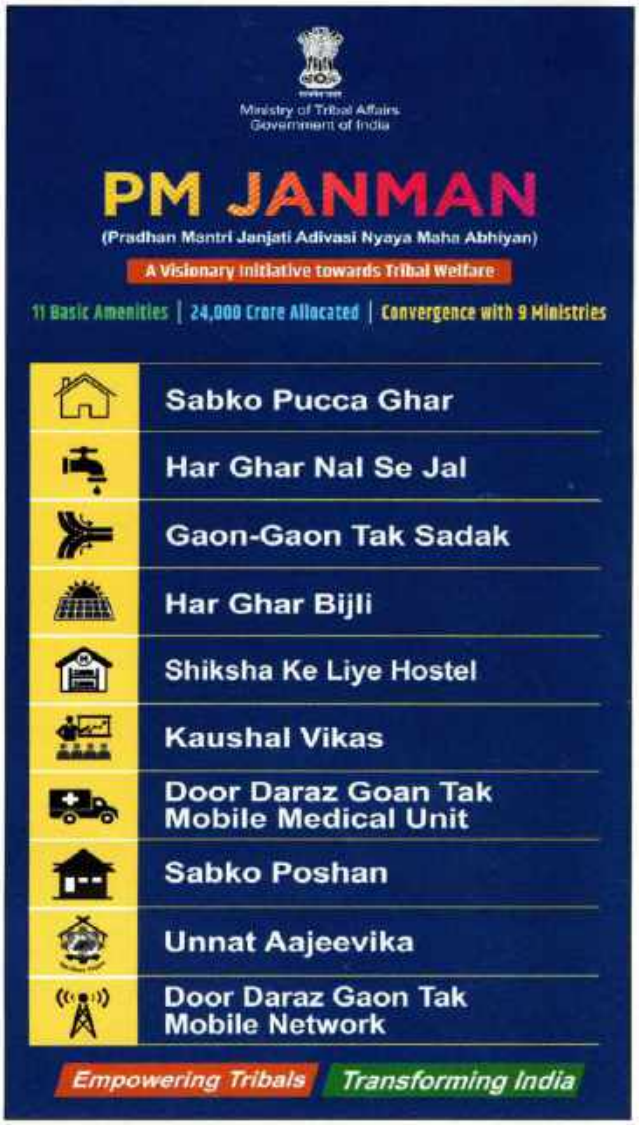
Cyber security in the era of AI is a complex challenge, but by proactively addressing the vulnerabilities and leveraging the opportunities, India can create a secure and resilient digital future for its citizens and contribute to a safer global digital landscape. ❑

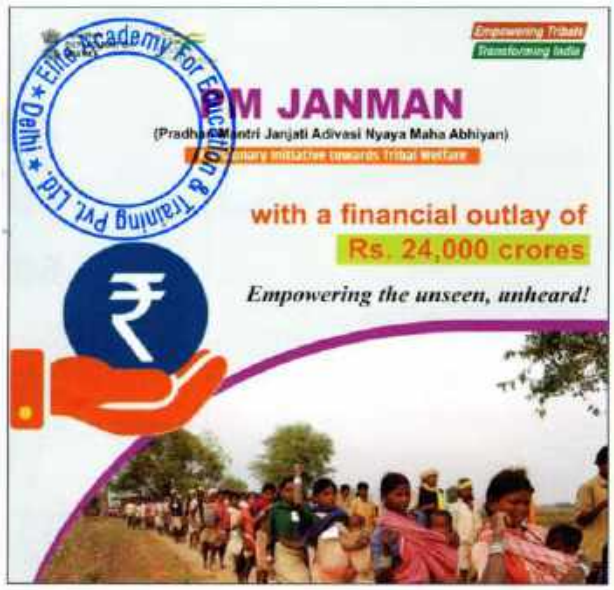
PM-JANMAN: Empowering Tribals

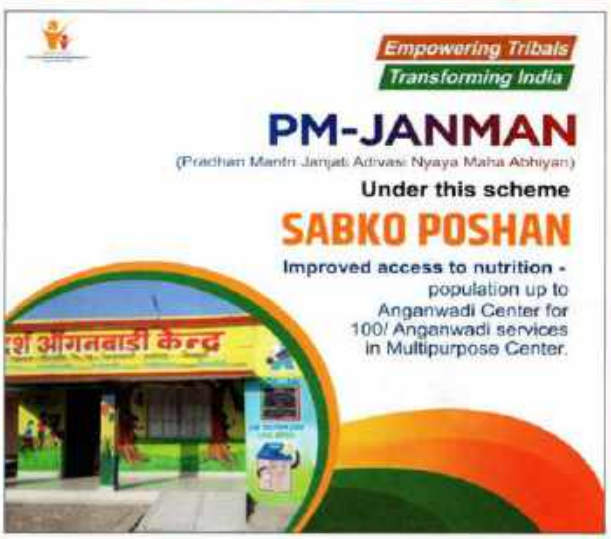
Pradhan Mantri Janjati Adivasi Nyaya Maha Abhiyan (PM-JANMAN) is aimed towards the vision of Antyodaya to empower the last person at the last mile. The initiative for the socio-economic welfare of Particularly Vulnerable Tribal Groups (PVTGs), PM-JANMAN, with a budget of approximately Rs 24,000 crores focuses on 11 critical interventions through 9 Ministries and is aimed to improve socio-economic conditions of the PVTGs by saturating PVTG households and habitations with basic facilities such as safe housing, clean drinking water and sanitation, improved access to education, health and nutrition, electricity, road and telecom connectivity, and sustainable livelihood opportunities.

There are 75 PVTGs across 18 States & UTs who are living in 22,544 villages (220 districts) with a population of around 28 lakhs. These tribes stay in scattered, remote & inaccessible habitations, often in forest areas and hence a mission is planned to saturate PVTG families and habitations with basic facilities such as road and telecom connectivity, electricity, safe housing, clean drinking water and sanitation, improved access to education, health and nutrition and sustainable livelihood opportunities.

Source: PIB







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