INDIA FUTURE FOUNDATION

Freedom of Expression, Trust and Safety on the Internet

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As the world that we live in gets digitized at an alarming pace and especially with this process expected to intensify further, the decisive role that artificial intelligence (AI) is expected to play cannot be undermined. Even in the present day, AI continues to play an important role not only in the lives of ordinary individuals but has also shown that it has enough potential to increase the efficiency and effectiveness of organisations and governments alike. While there is no denying the fact that adoption of AI powered systems and process has opened the door of benefits, for governments and organisations adopting it, it is gradually coming to light that AI too has its own share of drawbacks and that too pretty serious ones, especially in this hyper-digitized world. In latest news that is doing the rounds, tech giant Microsoft has warned of China's potential use of AI to disrupt the impending Lok Sabha elections, in India, in 2024.[1]

The negative effects of AI, especially when used by malicious actors has some very serious repercussions. The graveness of the situation can be fathomed by the fact that no less than Narendra Modi, Prime Minister of India, himself flagged the dangers of AI especially in the creating deepfakes. In a move towards regulating AI the Government of India too has been walking the talk. However, in the present day, there is no specific law governing the realm of AI but the necessary laws, in this regard is in the works and should see the light of day soon. The nodal agency, responsible for framing the necessary laws, in the matter, has been issuing the necessary advisories, especially with the impending union elections, which are just a few weeks away. This is quite in contrast to the stand of Government of India (GoI), which on 5 April 2023 had told the Parliament that it was not planning to regulate AI.[2]

However, things have come a long way since then. The Government of India is looking forward to regulating AI and we also have the EU AI Act which is the first law to regulate AI globally. Hopefully, India too should soon have a new law to regulate AI. This paper deals with the latest policy developments in the realm of IT and most importantly reforms carried by the Government of India on the matter.

[1] https://economictimes.indiatimes.com/news/elections/lok-sabha/india/china-may-disrupt-elections-in-india-using-ai-warns-microsoft/articleshow/109135055.cms?from=mdr

[2] https://www.thehindu.com/news/national/no-plan-to-regulate-ai-it-ministry-tells-parliament/article66702044.ece#:~:text=Agreeing%20that%20there%20were%20ethical,responsible%20AI%20development%20have%20begun&text=The%20government%20on%20April%205,Intelligence%20(AI)%20in%20India.

BACKGROUND

To understand the policy landscape, in India, there are few things one needs to be kept in mind. The policy landscape needs to be understood in the backdrop of these developments. Some of them are as follows. Even though the Government of India, had in April 2023, had stated in the Parliament that it is not planning to regulate AI, it has been working towards regulating AI for a while now, the origins of which can be traced to as far back as 2018. The GoI had, in 2018, entrusted the NITI Aayog, the apex think tank of the GoI, with the task of preparing the guidelines and policies for the development and use of AI. It in this regard, the NITI Aayog published the National Strategy for Artificial Intelligence. Among other things this paper featured research and development guidelines focussed on sectors like healthcare, agriculture, education smart cities and infrastructure, and smart mobility and transformation.[3]

Further the NITI Aayog published Part 1-Principles for Reasonable AI #AIFORALL, in February 2021, which is an approach paper that explored the ethical considerations and societal considerations of deploying AI solutions in India.[4]

The NITI Aayog, in August 2021 also released Part 2-Operationalizing Principles for Reasonable AI, which focusses on operationalizing principles for reasonable AI.[5]

Apart from these developments, global partnerships and international collaborations too are paving the way for promotion of AI, in the country. India is a member of the Global Partnership on Artificial Intelligence (GPAI). India hosted the GPAI summit in New Delhi, in 2023.

[3] https://www.morganlewis.com/blogs/sourcingatmorganlewis/2024/01/ai-regulation-in-india-current-state-and-future-perspectives

[4] https://www.morganlewis.com/blogs/sourcingatmorganlewis/2024/01/ai-regulation-in-india-current-state-and-future-perspectives

[5] https://www.morganlewis.com/blogs/sourcingatmorganlewis/2024/01/ai-regulation-in-india-current-state-and-future-perspectives

POLICY DEVELOPMENTS ATTENDING TO INTERNAL DEVELOPMENTS

Even though India has been gradually taking the necessary steps towards regulating AI, concerns about its misuse was raised by none other than Narendra Modi, Prime Minister of India. Mr Modi has in the recent past has regularly expressed his concerns about the misuse of AI.

During the virtual G20 summit on 22 November 2023 Prime Minister Modi spoke about the emergence of deepfakes on social media, calling for "global regulations for AI". He had stated that AI should be safe for society.[6] Prime Minister Modi's raised his concerns over misuse of AI at many fora. On 17 November 2023, he called deepfakes one of the biggest threats that the Indian system was facing, in the present times, and said that they could cause chaos in society. He also urged the media to educate people about the rising problem. Further addressing journalists at the BJP's Diwali Milan programme at the BJP headquarters in Delhi, in November 2023, PM Modi cited a deepfake video of him doing Garba, calling the video "very real. He further stated that he had not "played Garba" since he was young.

RECENT ADVISORIES ISSUED BY MEITY

While there is no specific law to regulate to AI, in the present day, the Ministry of Electronic and Information Technology (MeitY), Government has in the recent times issued advisories to regulate the use of AI. To a great extent these advisories were issued in a bid to curb the misuse of AI in the upcoming Lok Sabha elections.

As per the advisory issued by MeitY on 15 Marcg 2024, the ministry has "revoked the requirement for platforms to seek government approval for AI models under development".[7]

[6] https://www.indiatoday.in/india/story/pm-modi-deepfakes-videos-photos-smart-india-hackathon-rashmika-mandanna-kajol-2478140-2023-12-20

[7] https://www.businesstoday.in/tech-today/news/story/new-advisory-of-meity-ai-platforms-dont-need-government-permission-focus-on-deepfakes-421703-2024-03-n
16#:~:text=models%20under%20development.-,As%20per%20the%20fresh%20advisory%20issued%20on%20March%2015%2C%202024,calling%20it%20a%20bad%20move.

As per the advisory issued, the Ministry has emphasised on the importance of labelling AI-generated content, particularly those susceptible to misuse in deepfake technology. It needs to noted that the earlier advisory of the Ministry that was issued on 1 March 2024, on the matter was severely criticized, especially with some of the stakeholders calling it a bad move.

The key highlight of the advisory issued on 15 March 2024 are as follows:

1. Intermediaries are no longer required to submit an action taken-cum-status report but are still required to comply with immediate effect.
2. The fresh advisory highlights the concerns over the negligence of intermediaries and platforms implementing due diligence, as mandated by the Information Technology Act, 2000.
3. Evey intermediary and platform is now mandated to ensure that AI generated content, and especially that content which is susceptible to manipulation through deepfakes, is labelled accordingly.
4. Platforms are instructed to deploy AI models that prevent users from posting unlawaful content.
5. The new advisory retains MeitY's emphasis on ensuring that all deepfakes and misinformation are easily identifiable. The Ministry has advised intermediaries to either label or embed the content with unique metadata or identifier.
6. The Ministry also wants this label, metadata or unique or unique identifier to identify content as artificially generated/modified/created, and that the intermediary's computer res has been used to make such identification.[8]

[8] https://www.businesstoday.in/tech-today/news/story/new-advisory-of-meity-ai-platforms-dont-need-government-permission-focus-on-deepfakes-421703-2024-03-16#:~:text=models%20under%20development.-,As%20per%20the%20fresh%20advisory%20issued%20on%20March%2015%2C%202024,calling%20it%20a%20bad%20move.

STEPS IN THE RIGHT DIRECTION

While there is no specific law, in the country, to regulate It, the GoI has been taking the right steps towards having the necessary laws in the concerned domain. Among the first steps in this direction was creating a conducive environment that contributes towards not only building but nurturing the AI ecosystem in the country.

#AIFORALL

The initiative, launched in 2018, encapsulated by the #AIforAll branding, aimed to create a comprehensive framework for AI development focused on inclusive technology leadership. It was designed to leverage AI for India's economic growth, societal development and to serve as a model for emerging and developing economies.[9]

This initiative dealt on the following areas:

1. **Government Initiatives:** The GoI launched numerous initiatives, including the National AI Strategy and the AI Task Force, to foster AI adoption. These measures were aimed at establishing India as a global AI leader and utilizing the technology for inclusive and societal growth.
2. **Startup Ecosystem:** The startup landscape in India was and is rapidly evolving, with a surge in AI-driven startups crafting innovative solutions across sectors such as healthcare, finance, e-commerce, and agriculture.
3. **Research and Development:** Premier educational institutions like the Indian Institutes of Technology (IITs) and the Indian Institutes of Information Technology (IIITs) are at the forefront of AI research and development.
4. **Industry Adoption:** Indian industries are progressively incorporating AI to enhance their efficiency, decision-making, and customer service.

Apart from the areas mentioned above the #AIFORALL initiative also focused on skills and talent development.

[9] https://www.niti.gov.in/sites/default/files/2023-03/National-Strategy-for-Artificial-Intelligence.pdf

THE IndiaAI INITIATIVE

In 2020, MeitY had formed seven expert groups to define the vision and strategy for IndiaAI, resulting in a comprehensive report that outlined India's AI ambitions as inspired by Narendra Modi, Prime Minister of India. This holistic strategy, under the IndiaAI programme, aimed to address the AI ecosystem's needs that included areas like infrastructure, data, financing, research, innovation, and skill development. The first edition of the IndiaAI report,[10] published in October 2023, suggested setting up Center's of Excellence and a framework for data management by the National Data Management Office (NDMO), advocating for enhanced AI skills dissemination and infrastructure development through public-private partnerships. IndiaAI, serves as a knowledge hub and collaborative platform, that hosts extensive AI resources, news, analysis, and insights to support professionals, students, and leaders in navigating the AI landscape.[11]

[10] https://www.meity.gov.in/writereaddata/files/IndiaAI-Expert-Group-Report-First-Edition.pdf

[11] https://www.meity.gov.in/content/indiaai-2023-expert-group-report-%E2%80%93-first-editionthe-ministry-electronics-and-information; https://indiaai.gov.in/

Some of the key aspects of the IndiaAI initiative are as follows:

- Recognising the need for adequate guardrails, the safe and trusted AI pillar will enable the implementation of 'Responsible AI' projects including the development of indigenous tools and frameworks, self-assessment checklists for innovators, and other guidelines and governance frameworks.
- The 'FutureSkills' initiative is conceptualised to mitigate barriers to entry into AI programmes and will increase AI courses in undergraduate, masters-level, and PhD programmes.
- Data and AI labs will be set-up in tier 2 and 3 cities across the country to impart foundational-level courses.
- The IndiaAI compute pillar will build a high-end scalable AI computing ecosystem to cater to the increasing demands from India's rapidly expanding AI startups and research ecosystem.
- The ecosystem will comprise AI compute infrastructure of 10,000 or more Graphics Processing Units (GPUs), built through public-private partnership.
- "An AI marketplace will be designed to offer AI as a service and pre-trained models to AI innovators. It will act as a one-stop solution for resources critical for AI innovation," according to MeitY.
- The next component is the IndiaAI Innovation Centre that will undertake the development and deployment of indigenous Large Multimodal Models (LMMs) and domain-specific foundational models in critical sectors.
- Another key aspect of the mission is the IndiaAI Datasets Platform which will streamline access to quality non-personal datasets for AI Innovation. A unified data platform will be developed to provide a one-stop solution for seamless access to non-personal datasets to Indian Startups and Researchers.
- The IndiaAI Application Development Initiative will promote the AI applications in critical sectors for the problem statements sourced from Central Ministries, State Departments, and other institutions.
- "The initiative will focus on developing/scaling/promoting adoption of impactful AI solutions with potential for catalysing large scale socio-economic transformation," said the ministry.
- Last but not the least, the 'IndiaAI Startup Financing' pillar is conceptualised to support and accelerate deep-tech AI startups and provide them streamlined access to funding to enable futuristic AI projects.[12]

[12]https://www.sarkaritel.com/indiaai-mission-know-all-about-the-7-key-pillars/#:~:text=Another%20key%20aspect%20of%20the,to%20Indian%20Startups%20and%20Researchers.

THE DIGITAL PERSONAL DATA PROTECTION ACT 2023

The Digital Personal Data Protection (DPDP) Act, 2023 is pivotal for nurturing a responsible and innovative AI ecosystem in India. It ensures the ethical use of data, fundamental to advancement of AI, by having in place strict guidelines for data protection and privacy. This fosters public trust, encouraging wider adoption of AI technologies. Moreover, the Act aligns India with global data protection standards, thereby enhancing the international competitiveness of Indian AI ventures. By mandating consent for data usage and providing individuals with control over their personal information, the DPDP Act safeguards against the misuse of AI, ensuring its development and application serve both economic growth and societal well-being.[13]

There are a host of legislations which are under different stages of legislation which when they see the light of day will further strengthen the AI ecosystem in the country.

[13] https://tsaaro.com/blogs/the-impact-of-the-dpdp-act-on-artificial-intelligence-and-machine-learning/

THE DIGITAL INDIA BILL

The upcoming Digital India Bill emphasizes a forward-looking approach to AI, advocating for an open Internet that boosts AI/ML innovation and ensures secure, non-discriminatory digital access. It calls for regulating high-risk AI systems via a stringent legal framework, demanding algorithmic accountability and privacy. The upcoming Act seeks to have in place ethical AI use, proposing transparent algorithms and risk assessments to protect user rights. Moreover, it recognizes the evolving role of AI intermediaries, suggesting tailored regulations for responsible technology use. This underscores India's commitment to fostering a secure, innovative, and ethical digital ecosystem.[14]

[14] https://tsaaro.com/blogs/the-impact-of-the-dpdp-act-on-artificial-intelligence-and-machine-learning/

NEW AI LAW TO SAFEGUARD INTERESTS OF NEWS PUBLISHERS AND CONTENT CREATORS

In an interaction with the media, Ashwini Vaishnaw, Union Minister for Electronics and Information Technology, Railways and Communications, Government of India announced plans for a new AI law to safeguard the interests of news publishers and content creators, prioritizing user safety. The law, either independent or part of the Digital India Bill, aims to ensure a smooth transition without disrupting livelihoods. Mr Vaishnaw stressed respect for creativity and proposed legislative regulation over self-regulatory bodies. Consultations with the industry have already begun, with formal processes to follow post-elections. This initiative responds to the global demands for publisher rights protection amidst increasing AI copyright disputes.[15]

[15] https://economictimes.indiatimes.com/tech/technology/exclusive-new-ai-law-to-secure-rights-of-news-publishers-ashwini-vaishnaw/articleshow/109043916.cms

SECTOR SPECIFIC REGULATIONS

While a Central policy on AI is awaited, there are different government agencies, more importantly sector regulators who have issued guidelines on use of AI within their specific sector. This section deals with different regulations that regulators have put in place for their specific sector.

THE RESERVE BANK OF INDIA

The banking regulator, the Reserve Bank of India, issued guidelines for regulating the use of AI in the banking sector, focusing on responsible innovation and risk management. The guidelines emphasize on the potential of AI in the financial space, with its ability to transform productivity, jobs, and income distribution. However, the RBI also acknowledges the risks and concerns associated with use of AI, such as bias, governance, and transparency. The RBI recommends that financial institutions conduct regular fairness audits of AI algorithms and outcomes, ensure accuracy in training data and provide clear explanations for the factors influencing decisions. The RBI also advocates for the establishment of comprehensive governance frameworks that include regular audits, internal reviews, and external assessments to ensure accountability and robustness. Furthermore, the RBI is planning to extensively use advanced analytics, AI, and ML to analyse its huge database and improve regulatory supervision of banks and NBFCs.[16]

THE SECURITIES AND EXCHANGE BOARD OF INDIA

The Securities and Exchange Board of India (SEBI) has issued a discussion paper emphasizing on the importance of transparency and investor protection in algorithmic trading involving AI. This initiative aims to regulate the use of AI in financial markets, particularly in algorithmic trading, to safeguard investors and ensure fair practices. SEBI's focus on transparency and investor protection underscores the need for responsible and ethical use of AI technologies in trading activities, aligning with global efforts to enhance regulatory frameworks in the financial sector.[17]

[16] https://indiaai.gov.in/news/rbi-to-use-ai-and-ml-for-regulatory-supervision; https://www.medianama.com/2024/01/223-ai-use-financial-entities-rbi-deputy-governor-speech/

[17] https://www.unitedbreweries.com/pdf/SEBI_Circular_Choice%20of%20Nomination_December%2027,%202023.pdf; https://www.msei.in/SX-Content/Circulars/2023/May/Circular-13497.pdf

ETHICAL CONSIDERATIONS

One of the most important considerations to keep in mind are the ethical considerations when developing an AI framework. There is a growing recognition of the need for ethical development and deployment of AI.

The NITI Aayog, the apex government think tank in India, has recognised the need for ethical AI development and deployment guidelines. In response, they have released a discussion paper on a "Workable AI Ethics Framework". This paper proposes the establishment of an independent, multi-disciplinary advisory body at the apex level to oversee AI ethics. It suggests reinforcing existing peer-review mechanisms within institutions with reviewers from the humanities and social sciences. The paper emphasizes on the importance of responsible AI practices in government procurement and recommends mandating the classification of responsible AI practices in public sector procurement to create a demand for such systems.[18]

These frameworks aim to address issues like bias, fairness, and accountability in AI systems. The need for ethical guidelines around AI development and deployment is growing due to the increasing recognition of issues such as bias, fairness, and accountability in AI systems. These frameworks aim to address these concerns by ensuring that AI development and use align with ethical and industry standards that prioritize human safety and well-being. Ethical considerations in AI development and deployment include accessibility, usability, fairness, and the ability to address a wide range of societal and cultural contexts.

Regulations and governance play a crucial role in ensuring that AI is utilized ethically and responsibly. These rules should include accountability, algorithmic decision-making, data gathering and storage, and ethics. Creating guidelines, standards, and norms for creating and using AI systems is part of the governance of AI, and setting explicit rules and regulations is crucial to guarantee that AI is utilized ethically and responsibly.[19]

[18] https://www.niti.gov.in/sites/default/files/2021-08/Part2-Responsible-AI-12082021.pdf

[19] https://cointelegraph.com/explained/ethical-considerations-in-ai-development-and-deployment;
https://www.sensedia.com/post/responsible-ai-what-is-the-need-for-ethical-ai-deployment

FOCUS AREAS FOR AI INTERVENTION [20]

The National Strategy for Artificial Intelligence (AI) published by NITI Aayog identified five sectors, which in the present-day face challenges, but effective use of AI in these sectors could positively impact India. These sectors include healthcare, agriculture, education, smart cities and infrastructure, and smart mobility and transportation. These sectors are essential in the development of a nation. The healthcare sector faces major challenges in terms of quality, accessibility, and affordability for a large section of the population.

HEALTHCARE

Healthcare is one of the most dynamic, yet one of the most challenging sectors in India na dholds a bright future. Yet, it faces major challenges of quality, accessibility and affordability for a large section of the population, which is evident from the facts mentioned below:

1. Shortage of qualified healthcare professionals and services like qualified doctors, nurses, technicians and infrastructure: as evidenced in 0.76 doctors and 2.09 nurses per 1,000 population (as compared to WHO recommendations of 1 doctor and 2.5 nurses per 1,000 population respectively) and 1.3 hospital beds per 1,000 population as compared to WHO recommended 3.5 hospital beds per 1,000 population.
2. Non-uniform accessibility to healthcare across the country, with physical access continuing to be the major barrier to both preventive and curative health services and glaring disparity between rural and urban India.
3. Affordability remains a problem with private expenditure accounting for ~70% of healthcare expenses, of which ~62% is out-of-pocket expenditure, probably one of the highest in the world. Significant portion of hospital costs in both rural (~47%) and urban India (~31%) are financed by loans and sale of assets. Poor and marginalised are hit the most, and as per the Government estimates, a sizeable part of the population (~63 million) is faced with poverty every year because of their healthcare expenditure.

A reactive approach to essential healthcare is largely due to lack of awareness, access to services and behavioural factors implies that the majority of patients approach a hospital/physician only when a disease has reached an advanced stage, thus increasing the cost of care and reducing the chances of recovery. The Government of India has been making a series of large-scale interventions to address India's healthcare challenges, viz. transformation of 1.5 lakh Health and Wellness Centres, development of district hospitals to cater to long-term care for non-communicable diseases, Ayushman Bharat Mission, promoting e-Health etc.

AGRICULTURE

While India has come a long way from being categorised as purely an agrarian economy, the agriculture and allied sectors still account for a major portion of India's workforce, 16% of the country's gross domestic product (GDP) and ensure food security to roughly 1.3 billion people.

Agriculture and allied sectors are critical to India's growth story. To achieve and maintain an annual growth rate of 8 –10% for the Indian economy, the agriculture sector must grow at a 4% or higher rate. The Government of India has recently prioritised Doubling Farmers' Income as a National Agenda, putting considerable focus on supply chain perspectives in agriculture and market development in addition to productivity augmentation.

Despite making impressive progress and receiving government attention, the sector continues to be dependent on unpredictable variables, has a weak supply chain and low productivity.

India has not been able to completely remove its exploitative dependence on resource intensive agricultural practices. Degradation of land, reduction in soil fertility, increased dependence on inorganic fertilizers for higher production, rapidly dropping water tables and emerging pest resistance are some of the several manifestations of India's unsustainable agricultural practices. As the global climate becomes more vulnerable and unpredictable, dependence on unsustainable and resource-intensive agriculture will only heighten the risks of food scarcity and agricultural distress.

The sector suffers from poor resource utilisation, with the production quantum and productivity still being quite low. For example, the yield of cereals, comprising a major share of food grain production, in terms of magnitude is significantly lower than that of China and the USA. Technology adoption and efficient resource usage in these two countries are far higher, thus resulting in higher yields.

Similarly, the use of water in agriculture continues to be high and sub-optimal. The practice of growing water-intensive crops and inefficient water management makes India a net exporter of water and puts India's long-run agronomic sustainability in question. Despite having just one-third of the gross cropped area under irrigation, agriculture consumes 89% of our extracted groundwater.

AI will have a significant global impact on agricultural productivity at all levels of the value chain. An estimate by Markets and Markets Research valued AI in agriculture to be USD432 million in 2016 and expects it to grow at the rate of 22.5% CAGR to be valued at USD2.6 billion by 2025.

EDUCATION

A progressive education sector has the ability to transform a country through the development of human resources and increased productivity. In the context of emerging countries particularly, levels of education and literacy of the population play an important role in development and overall transition to an advanced economy.

In India, the importance of a developed education sector is amplified by a large population that is young. Estimates indicate that currently, over half the population of the country is below the age of 25. As the adoption of digital means of gathering data increases, it is important that these methods are effectively leveraged to deliver improved education and teaching.

The adoption of technology in education is improving, though not at the pace required. It is estimated that schools globally spent nearly USD160 billion on education technology, or 'EdTech', in 2016, and spending is forecast to grow in double digits going forward. Private investment in educational technology, broadly defined as the use of computers or other technology to enhance teaching, grew 32% annually from 2011 through 2015, rising to USD 4.5 billion globally. Adoption of new technologies is still lacking, however, often attributed to unwillingness of teachers and students to adopt technology.

School education in India has seen substantial progress in recent decades, with efforts at both the Central and State levels, and substantive gains in enrolment have been achieved – Gross Enrolment Ratio (GER) is 97% at the elementary level and 80% at secondary level, as per recent figures. However, low retention rates and poor learning outcomes mar the impact of gains in enrolment.

SMART CITIES AND INFRASTRUCTURE

India is currently in the midst of a surge in urbanisation. While the percentage of the population living in urban areas was estimated to be 31% in 2011, recent research on satellite data indicates that this figure is close to 45% in the present day and is predicted to rise to up to 60% by 2050. Though seen as an important aspect of a country's economic growth and a major step in the overall development of the country, unplanned urbanisation presents challenges such as congestion, over-pollution, high crime rates, poor living standards, and can potentially put a huge burden on the infrastructure and administrative needs of existing Indian cities.

To tackle these challenges, the Government of India has embarked on an ambitious initiative to set up Smart Cities across India, aimed at driving economic growth and improving the quality of life by harnessing IT solutions. As part of the Smart Cities Mission, 99 cities have been selected with an expected investment of INR2.04 lakh crore. The strategic components of these smart cities include city improvement (retrofitting), city renewal (redevelopment), and city extension (greenfield development), in addition to a pan-city initiative in which smart solutions are applied to cover large parts of the city. The Atal Mission for Rejuvenation and Urban Transformation (AMRUT) is another related initiative which targets improving the infrastructure of existing cities.

SMART MOBILITY AND TRANSPORTATION

Mobility and transportation form the backbone of the modern economy due to their linkages with other sectors and their importance in both domestic and international trade. Today's society demands a high degree of mobility of various kinds so as to enable efficient and safe transportation of both people and goods. As a major contributor to overall emissions, this sector must also be sensitive to ideas of environmental sustainability.

In India, majority of both passenger and freight traffic is carried through roads and railways. As of 2007 –08, roads and railways accounted for almost 87% of total freight traffic in the country and almost 90% of total traffic as of 2011-12. As the economy grows, it is expected that this reliance on these modes of transport shall continue unless there are major shifts in the policy initiatives in the area. The fact that these modes of transport are particularly pollution intensive compared to shipping and air transport further increases the need to implement smart practices in their deployment.

INSURANCE [21]

The journey of AI in the insurance sector, has not been a bed of roses; there are myriad challenges. Most insurers admit that data privacy and security concerns about sensitive customer information remain the primary challenge. The insurance provider needs to strictly adhere to regulatory compliances while innovating and simultaneously leveraging AI.

Upskilling the existing workforce on all the facets of AI and, more importantly, maintaining post-AI implementation can be another possible bottleneck for the insurance industry. While AI presents significant opportunities, the initial costs of integration can be a prohibitive barrier for many insurance providers.

[21] https://apacnewsnetwork.com/2024/04/ai-in-insurance-ensuring-efficiency/

GOVERNMENT AGENCIES AND REFORMS

As AI continues to transform the manner in which governments and organisations, across the globe function, governments play a crucial role in driving adoption of AI, fostering innovation and ensuring ethical development. In India, government agencies led by the Indian Space Research Organisation (ISRO), academia and think tanks like NITI Aayog are at the forefront of integrating AI into various sectors, including space exploration, national security and governance. With ambitious plans to launch AI-powered satellites and promote AI initiatives across different domains, India is poised to become a global leader in AI technology.

The Government of India (GoI), through agencies like the NITI Aayog and the Ministry of Electronics and Information Technology (MeitY), has launched several initiatives to harness the potential of AI for social and economic development. These initiatives focus on research and development, talent development, and regulatory frameworks to promote responsible adoption of AI. Recent reforms aim to address challenges such as skill shortages, data privacy concerns and the ethical deployment of AI technologies.

HELPING HAND FROM ISRO

Artificial intelligence (AI) rapidly transforms numerous industries, and space exploration is no exception. The Indian Space Research Organization (ISRO) has emerged as a global leader in integrating AI into its space missions. This innovative approach enhances the efficiency and accuracy of space exploration and unlocks new possibilities for scientific discovery.

- The Indian Space Research Organization (ISRO) is a frontrunner in using AI for space exploration.
- The role of AI in the Chandrayaan-3 mission is a prime example, where the spacecraft communicates with the lander regarding safe landing, navigation and resource tracing.
- AI algorithms and deep learning models empower astronauts with better decision-making and data analysis for geological studies and other celestial discoveries.

ISRO has unveiled an ambitious plan to launch 50 new AI-powered satellites further to strengthen its space exploration capabilities and national security. This significant investment in AI technology signifies ISRO's commitment to staying at the forefront of space exploration.

- ISRO plans to launch 50 new AI-powered satellites over the next five years.
- These satellites will work together to gather intelligence and improve border surveillance.
- The S Somanath, Chairman, ISRO, highlighted the need for improved data analysis using AI to gain insights and make data-driven decisions.
- This new generation of satellites will be able to communicate with each other, providing round-the-clock intelligence gathering.

THE BRAINS BEHIND AI

Recognising the immense potential of AI to revolutionise various sectors and drive economic growth, the GoI has launched many initiatives to promote AI research, development, and adoption across the country. These initiatives aim to equip India with the necessary infrastructure, talent pool and regulatory framework to become a global leader in AI.

- Recognizing the potential of AI, various government agencies are actively involved in AI initiatives.
- The GoI has launched several ambitious projects to promote AI usage across sectors. Below mentioned are some examples. The list is not exhaustive but indicative.

NITI Aayog: A Guiding Force: NITI Aayog, the apex think tank of the GoI, plays a crucial role in shaping the country's AI strategy. Through initiatives like the National Mission on Artificial Intelligence (NMAI), NITI Aayog promotes research and development in AI, fosters collaboration between academia and industry, and identifies.

Applied AI Research Centre, Hyderabad, Telangana uses AI to address healthcare and smart mobility challenges.

The US-India AI Initiative, New Delhi aims to strengthen collaboration and explore R&D opportunities in AI between the two countries.

The MCA 3.0 portal by the Ministry of Corporate Affairs, Government of India uses AI and machine learning to streamline business regulatory filings.

MeitY's Responsible AI for Youth programme equips students with AI skills to address social challenges.

The AI portal (https://indiaai.gov.in/indiaaiportal) is a central ecosystem for information and updates on AI developments in India.

The National Research Foundation (NRF), New Delhi, aims to strengthen collaboration between R&D, industry, and academia to boost AI research.
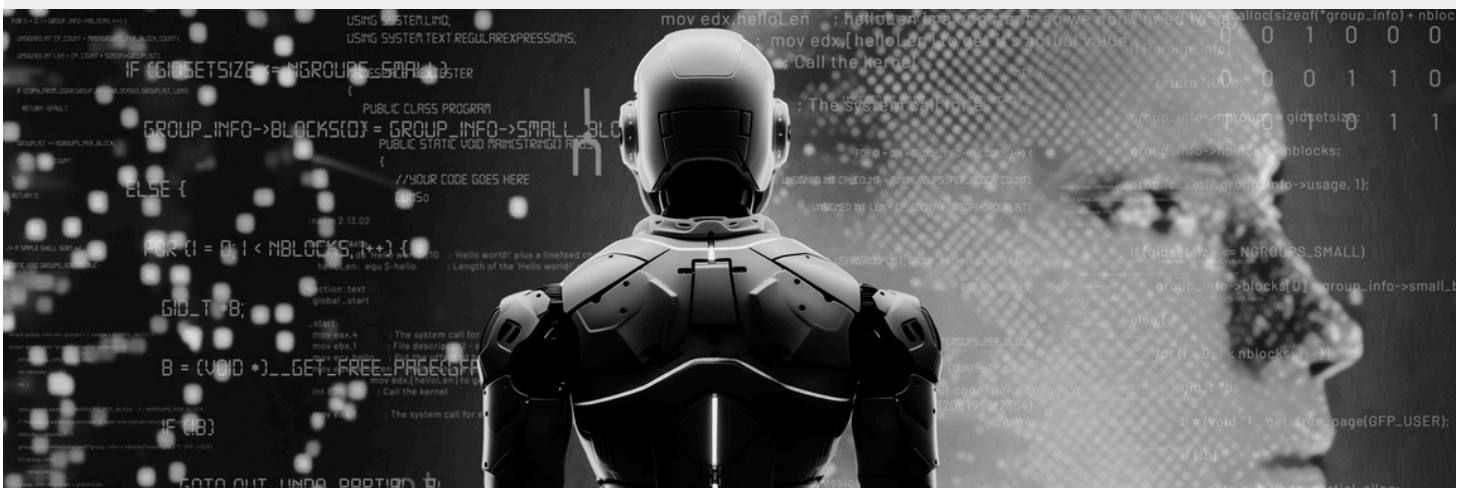
REFORMS: PAVING THE PATH FOR AI ADOPTION

While India has made significant strides towards adoption of AI, challenges must be addressed to realise its full potential. These challenges include a lack of skilled professionals, data privacy and security concerns, and the need for a robust regulatory framework to ensure ethical AI development and deployment.

- The GoI's National Strategy for Artificial Intelligence (#AIforAll) focuses on utilising AI for social good and inclusive growth.
- The strategy identifies five key sectors that can benefit the most from AI: healthcare, agriculture, education, smart cities, and intelligent mobility.
- The government acknowledges the challenges of AI adoption, including lack of expertise, data privacy concerns, and resource limitations.
- The strategy proposes solutions like establishing Centres of Research Excellence (CORE) and International Centers of Transformational AI (ICTAI) to focus on AI research and development.
- To ensure ethical considerations are addressed, the strategy recommends setting up Ethics Councils and establishing data protection frameworks.

ACADEMIA AND RESEARCH

India's academic landscape is brimming with innovation, and its pre-eminent institutions like the Indian Institutes of Technology (IITs) and the Indian Institute of Science (IISc) are at the forefront of AI research. These institutes produce groundbreaking research and actively collaborate with the private sector to nurture talent, foster cutting-edge advancements, and bridge the gap between theoretical knowledge and practical applications.

ACCENTURE INNOVATION LAB, HYDERABAD

Accenture's Innovation Lab in Hyderabad is a hub for AI innovation, focusing on areas such as security, automation, and blockchain. With a team of over 2,000 professionals, this lab is dedicated to developing cutting-edge solutions to address industry challenges. The Nano AI Lab, serving the Asia-Pacific region, provides various use cases for extended reality and artificial intelligence, enabling clients to interact with international researchers through immersive sessions and workshops.

SiMa.ai's DESIGN CENTRE IN BENGALURU

SiMa.ai, a machine learning company based in California, has established a design center in Bengaluru, India. This center aims to create job opportunities and develop high-performance computing solutions for embedded edge applications. SiMa.ai provides efficient computing at low power, particularly in critical areas such as robotics, medical devices, and autonomous vehicles.

ROBERT BOSCH CENTRE FOR DATA SCIENCE AND AI, IIT Madras

The Robert Bosch Centre for Data Science and AI at IIT Madras is equipped with state-of-the-art tools for research in AI and data science. This center focuses on various projects spanning network analytics, natural language processing (NLP), and deep learning. To position India as a global hub for AI research, the center aims to drive innovation and economic growth through its initiatives.

DRDO Young Scientist Labs across India

The GoI has established five DRDO Young Scientist Labs across different cities, including Bengaluru, Mumbai, Chennai, Kolkata, and Hyderabad. These labs are dedicated to research in AI, quantum technologies, and cognitive technologies, aiming to foster innovation and make India self-reliant in AI. These labs strengthen India's technological capabilities by focusing on creating cutting-edge technologies.

Intel AI Research Centre, IIT Hyderabad

The Intel AI Research Centre at IIT Hyderabad uses AI to address various challenges in healthcare and intelligent mobility. Through collaboration with Intel India and IIT Hyderabad, the center aims to train students in AI fundamentals and drive digitization in India. With cutting-edge research, this center aims to create innovative solutions that benefit society.

IIT Kharagpur Innovation Hub (AI4ICPS)

IIT Kharagpur has established the AI4ICPS hub, a technological center dedicated to machine learning (ML) and artificial intelligence advancements. With significant funding support, this hub conducts research and training projects for commercial production, focusing on machine vision, natural language processing, and the Internet of Things. The hub aims to drive fundamental research in AI and contribute to India's technological growth.

Wipro AI Research Lab in collaboration with IISc, Bengaluru

The Wipro AI Research Lab collaborates with the Indian Institute of Science (IISc), Bengaluru to develop cutting-edge solutions in healthcare diagnostics and digital interfaces. The lab aims to enhance patient outcomes by leveraging AI in medical imaging and diagnostics through this collaboration. With a focus on innovation and research, this lab contributes to advancing healthcare technology in India.

NVIDIA AI Lab, IIT Hyderabad

NVIDIA has established an AI lab in collaboration with IIT Hyderabad to accelerate research and innovation in AI adoption. This lab, equipped with NVIDIA's advanced systems, focuses on creating solutions for India-specific challenges, such as crop-yielding and intelligent cities. This lab aims to drive positive societal impact by leveraging AI technologies and strengthening India's AI capabilities.

SCAI by Microsoft Research India

Microsoft Research India has established the Centre for Societal Impact through Cloud and Artificial Intelligence (SCAI) to develop technologies that significantly impacts India. Microsoft Research collaborates with other corporate departments through this center to drive research and innovation in AI. With a focus on societal impact, this center aims to address critical challenges faced by India through cloud and AI technologies.

Impact of AI on Sectors like Healthcare, Agriculture and Space Exploration

Artificial Intelligence (AI) has become a transformative force across various sectors, revolutionising industries and even reshaping how we live, work, and interact. AI's impact is profound and far-reaching from all the sectors of the economy particularly, healthcare to agriculture, space exploration to entertainment. In this age of technological advancement, AI is driving innovation and efficiency, offering solutions to complex challenges and unlocking new opportunities for growth and development.

AI is driving unprecedented changes across diverse sectors such as education, healthcare, finance, entertainment, transportation, retail, manufacturing, agriculture, energy, and human resources. It enables personalised learning experiences, improves patient care, detects fraudulent activities, enhances entertainment experiences, revolutionises transportation, optimises supply chains, increases crop yields, manages energy resources efficiently, and streamlines recruitment processes.

Education Sector: AI has brought significant advancements in the field of education. Intelligent tutoring systems and adaptive learning platforms use AI algorithms to personalise the learning experience, tailoring educational content to the needs and abilities of individual students. AI-powered chatbots provide instant assistance, answering student queries and enhancing the accessibility of educational resources. Additionally, AI-based assessment tools streamline grading processes, offering faster and more objective evaluations.

Space exploration: AI plays a crucial role in space exploration and travel by assisting crews and ground operations. It facilitates activities like analysing cosmic occurrences, operating machinery, charting stars and black holes, and other activities that people cannot carry out in space. Several organisations use AI to discover and advance life for all astronauts. Scientists and governments worldwide have long been fascinated by space travel because it contains the key to understanding human history and many cosmological hypotheses, including the potential of extraterrestrial life.

Healthcare Industry: In healthcare sector, AI has emerged as a powerful tool for diagnostics, drug discovery, and patient care. Machine learning algorithms can analyse vast amounts of medical data, aiding in the early detection of diseases and suggesting appropriate treatment plans. AI-powered robotic assistants assist surgeons during complex procedures, increasing precision and reducing the risk of errors. Virtual nurses and health monitoring systems with AI algorithms offer personalised healthcare guidance and remote patient monitoring.

Financial Sector: AI has significantly transformed the financial industry, introducing automation, fraud detection, and predictive analytics. Intelligent algorithms can analyse large datasets, detect patterns, and make accurate predictions for investment strategies. AI-based chatbots provide customer support and automate routine financial tasks, enhancing efficiency and improving customer experience. Moreover, AI-powered systems can help detect fraudulent activities, minimising risks and ensuring the security of financial transactions.

Entertainment and Media: The entertainment and media industry has embraced AI to enhance user experiences and create personalised content. AI algorithms analyse user preferences, behaviour and historical data to recommend movies, TV shows, music, and other forms of entertainment. Virtual reality (VR) and augmented reality (AR) technologies, coupled with AI, create immersive experiences in gaming and storytelling. AI-generated content, such as automated news articles or computer-generated art, is also emerging as a unique aspect of this industry.

Transportation and Logistics: AI has revolutionised the transportation and logistics sector, paving the way for autonomous vehicles, smart traffic management, and efficient supply chain systems. Self-driving cars and trucks equipped with AI algorithms offer the potential for safer and more efficient transportation. AI-based optimisation algorithms help streamline logistics operations, reducing costs and improving delivery timelines. Additionally, AI-enabled route planning and predictive maintenance enhance overall efficiency and customer satisfaction.

Retail and e-commerce: AI is transforming the retail industry by enabling personalised shopping experiences, optimising inventory management, and improving customer service. Recommendation systems powered by AI algorithms analyse customer preferences and browsing patterns to suggest relevant products. AI-powered chatbots assist customers with inquiries, provide product recommendations, and facilitate seamless transactions. Additionally, AI-based inventory management systems help retailers predict demand, optimise stock levels, and reduce waste.

Manufacturing and Industrial Automation: AI plays a crucial role in streamlining manufacturing processes and enhancing productivity. Industrial robots equipped with AI capabilities can perform repetitive tasks with precision and speed, reducing human error and increasing efficiency. AI-powered quality control systems identify defects and anomalies in real-time, ensuring high product standards. Predictive maintenance powered by AI algorithms minimizes equipment downtime and optimizes maintenance schedules, leading to cost savings.

Agriculture and Farming: AI is revolutionising the agricultural sector by improving crop yields, monitoring soil conditions, and optimising resource usage. AI-powered drones and satellite imaging analyse crop health, enabling farmers to detect diseases, pests, or nutrient deficiencies at an early stage. Machine learning algorithms predict optimal planting and harvesting times, leading to better yield predictions. Smart irrigation systems, driven by AI, optimise water usage, conserving resources and reducing costs.

Energy and Utilities: The energy sector benefits from AI by optimising energy generation, improving grid management, and enhancing resource efficiency. AI algorithms analyse data from smart meters and sensors to forecast energy demand, enabling utilities to optimise energy generation and distribution. AI-based predictive maintenance systems monitor energy infrastructure and detect anomalies, reducing downtime and improving maintenance efficiency. Additionally, AI helps identify energy-saving opportunities and supports the integration of renewable energy sources.

Human Resources and Recruitment: AI is transforming the HR and recruitment processes by automating repetitive tasks, enhancing candidate selection, and improving employee engagement. AI-powered applicant tracking systems analyse resumes, screen candidates, and identify the best fit for specific roles. Chatbots and virtual assistants assist employees with HR-related queries, policies, and benefits. AI-driven sentiment analysis tools help gauge employee engagement and satisfaction, enabling organisations to take proactive measures for retention and development.

CONCLUSION

As highlighted in this document, the landscape of AI in India presents a transformative journey marked by significant advancements, strategic initiatives, and robust policy frameworks aimed at fostering an inclusive and sustainable AI ecosystem. The IndiaAI initiative, underpinned by the visionary #AIforAll philosophy, exemplifies India's commitment to leveraging AI for societal benefit and economic growth, positioning the country as a beacon for emerging and developing economies. The collaborative efforts of government agencies, academia, and the private sector underscore a collective endeavour to harness AI's potential across pivotal sectors such as healthcare, agriculture, education and space exploration.

The forthcoming AI legislation and the Digital India Bill are pivotal to ensuring a balanced approach between innovation and protecting individual rights, emphasising the importance of ethical considerations and data privacy in advancing AI. The focus on creating a robust infrastructure and the emphasis on skills and talent development ensures India's readiness to navigate the challenges and opportunities AI presents.

Furthermore, sector-specific regulations, such as those issued by the RBI and SEBI, demonstrate a nuanced understanding of the complexities of integrating AI into diverse industries, ensuring responsible innovation and risk management. The initiatives led by the Indian Space Research Organisation (ISRO) and various educational institutions represent a forward-thinking approach to AI, highlighting India's aspiration to lead in AI-powered space exploration and academic excellence.

As we progress, we must continue fostering an environment that encourages innovation, respects ethical boundaries, and promotes collaboration across sectors. India's AI journey, characterised by its strategic initiatives, policy reforms, and emphasis on ethical considerations, not only paves the way for a future where AI catalyses socio-economic transformation but also sets a global benchmark for responsible AI development and deployment. This narrative is not just about technological advancement but about crafting a future that is equitable, inclusive, and sustainable, leveraging AI's power for humanity's greater good.

INDIA FUTURE
FOUNDATION

Contact Us

+91-1244045954, +91-9312580816

Building no. 2731 EP, Sector 57, Golf
Course Ext. Road, Gurugram,
Haryana, India – 122003

helpline@indiafuturefoundation.com

www.indiafuturefoundation.com