Contemporary Issue
(Artificial Intelligence)

Overview of the Issue

India's AI landscape faces issues like bridging the significant skill gap, ensuring data privacy & security, addressing algorithmic bias in diverse populations, building robust digital infrastructure (compute, internet), and creating relevant ethical frameworks, while simultaneously leveraging AI for massive growth in sectors like agriculture, healthcare, and governance, supported by initiatives like the **IndiaAI Mission.**

Timeline of Key Events

Early Development (1960s–2000s)

- **1960s:** AI concepts first arrived in India through the work of Professor H.N. Mahabala.
- **1970s:** The first AI and pattern recognition courses were introduced at institutions like IIT Kanpur and the Indian Institute of Science.
- **1986:** The Knowledge-Based Computing Systems (KBCS) project, backed by the United Nations Development Programme (UNDP), marked the beginning of major, coordinated AI research programs in India.
- **1990s:** Software firms began exploring AI for business process automation, and the Language Technologies Research Center was founded in 1999 to advance natural language processing.

The AI Boom and National Strategy (2010s–2020s)

- **Mid-2010s:** The number of AI startups began to grow exponentially. Global tech giants like Google and Microsoft also started investing heavily in India's AI ecosystem.
- **2018:** NITI Aayog released India's first comprehensive plan, the "#AIforAll" National Strategy for Artificial Intelligence, which focused on using AI for socio-economic challenges in areas like healthcare, agriculture, education, and smart mobility.

- **2020:** The government launched INDIAai, a national portal and collaborative initiative for AI development, and the "Responsible AI for Youth Program" to foster skills.
- **2023:**
  - The AIRAWAT-PSAI supercomputing machine, India's largest and fastest AI supercomputer, was deployed.
  - India hosted the GPAI (Global Partnership on Artificial Intelligence) Summit in New Delhi, emphasizing responsible AI globally.
  - The Digital Personal Data Protection Act was enacted, addressing some privacy and security concerns related to AI platforms.

Recent and Future Milestones (2024–2026)

- **March 2024:** The Union Cabinet approved the comprehensive IndiaAI Mission, allocating over ₹10,300 crore (US$1.2 billion) to empower AI startups, boost compute infrastructure, and promote R&D.
- **October 2024:** The homegrown, multilingual foundational model BharatGen (formerly BharatGPT) was formally introduced to reduce reliance on foreign AI models and capture India's diverse linguistic context.
- **November 2024:** MeitY unveiled the India AI Governance Guidelines to ensure the safe and responsible adoption of AI.
- **2025 (Feb):** PM Modi co-chairs the AI Action Summit in Paris.
- **2025 (Mar):** MeitY launches AIKosha, a platform for AI datasets and models.
- **2025 (May):** India crosses 34,000 GPUs, expanding national compute capacity.
- **2025 (Ongoing):** Focus on AI in Judiciary (e-Courts), defense, and upskilling (FutureSkills PRIME).
- **February 2026 (Projected):** India is set to host the AI Impact Summit to showcase its capabilities and encourage further innovation.

Note Points to understand the Issue

➢ What is Artificial Intelligence?

Artificial Intelligence (AI) is the simulation of human intelligence in machines, enabling them to learn, reason, solve problems, perceive, and understand language to perform tasks that usually require human intellect, like recognizing patterns, making decisions, and adapting behavior to achieve goals. It involves computers learning from vast amounts of data to recognize trends, make predictions, and even generate creative content, as seen in virtual assistants (Siri, Alexa) or recommendation engines (Netflix).

➢ How does Artificial Intelligence work?

Artificial Intelligence (AI) works by using massive amounts of data, powerful algorithms, and iterative training to find patterns, learn from them, and make decisions or predictions, mimicking human intelligence without explicit programming for every task, primarily through methods like Machine Learning (ML) and Deep Learning (DL). It involves collecting data, processing it with models (like neural networks) to recognize patterns, making predictions, and refining performance through feedback loops, essentially teaching itself to improve over time.

➢ What is the Artificial Intelligence Workflow??

The process of an AI system, particularly one using machine learning, can be broken down into several general stages:

- **Data Collection and Preparation:** AI systems require massive datasets (text, images, audio, etc.) to learn. This data is collected, cleaned, and labeled to ensure quality and relevance.
- **Model Training:** The prepared data is fed into a chosen algorithm or model. The model iteratively adjusts its internal parameters to identify patterns and minimize errors in its predictions, much like trial and error.
- **Evaluation:** Once trained, the model is tested on a separate set of data it hasn't seen before to assess its accuracy and reliability.
- **Deployment:** The trained and validated model is put into a real-world environment where it can make predictions or assist in decision-making.

- **Feedback and Adjustment:** The system continuously receives feedback from its performance and user interactions, allowing it to adapt and improve its models over time.

➢ What are the core components of artificial intelligence?

AI is not a single technology but a broad field composed of several key disciplines:

- **Machine Learning (ML):** This is a core subset of AI that enables machines to learn from data and improve their performance over time without being explicitly programmed for every task.
- **Neural Networks:** These computational models are inspired by the interconnected neurons in the human brain. They use layers of nodes to process complex information and recognize intricate patterns, which is the basis for deep learning.
- **Deep Learning (DL):** A subset of machine learning that uses large neural networks with many hidden layers to process vast amounts of unstructured data (like images, sound, and text).
- **Natural Language Processing (NLP):** This allows computers to understand, interpret, and generate human language, enabling applications like virtual assistants (Siri, Alexa) and chatbots.
- **Computer Vision:** This field focuses on giving computers the ability to "see" and interpret visual information from images and videos, crucial for applications like self-driving cars and facial recognition.

➢ What are Artificial Neural Network or ANN?

Neural networks are AI models inspired by the human brain, using interconnected "neurons" in layers (input, hidden, output) to learn patterns from data, enabling complex tasks like image recognition, language translation, and predictions, by adjusting connection strengths (weights) through training. They process data through mathematical functions, adapting to new information without explicit programming, making them powerful for pattern recognition and decision-making in various applications.

➢ How do Artificial Neural Network Work?

Neural networks function by processing information through several layers:

- **Input Layer:** This layer receives the raw data, such as pixel values of an image or financial indicators.
- **Hidden Layers:** One or more intermediate layers perform most of the processing. Each neuron in a hidden layer receives inputs from the previous layer, applies a specific calculation (a weighted sum and an activation function) to them, and passes the result to the next layer. The "weights" of the connections determine the strength of a signal's influence, and the network learns by adjusting these weights during training.
- **Output Layer:** This final layer produces the network's ultimate result, such as a classification (e.g., "spam" or "not spam") or a forecasted numerical value.

The network learns through a process called training, where it is fed large datasets and uses a feedback loop (backpropagation) to adjust its weights to minimize errors between its predictions and the actual target values.

➢ What are the major types of Neural Networks?

Neural networks come in various architectures depending on the type of problem they are designed to solve:

- **Feedforward Neural Networks (FFNNs):** The simplest type, where data flows in only one direction, from input to output, without loops.
- **Convolutional Neural Networks (CNNs):** Designed specifically for processing grid-like data such as images, using specialized layers to automatically extract features like edges and shapes.
- **Recurrent Neural Networks (RNNs):** Networks with feedback loops that allow information to persist, giving them "memory" of previous inputs. They are well-suited for sequential data like time series or natural language processing (NLP).
- **Transformer Networks:** A modern architecture that uses "self-attention" mechanisms to understand the context of elements in a sequence, powering large language models like ChatGPT.

What is the flagship national program for AI in India and its key objectives?

The IndiaAI Mission, approved by the Union Cabinet in March 2024 with an outlay of ₹10,371.92 crore, is the comprehensive national-level initiative under the Ministry of Electronics and Information Technology (MeitY).

- **Vision:** "Making AI in India" (encouraging domestic development) and "Making AI Work for India" (ensuring AI benefits various sectors).
- **Objective:** To build a comprehensive AI ecosystem by democratizing computing access, enhancing data quality, developing indigenous capabilities, attracting talent, enabling industry collaboration, and promoting ethical AI use.

What are the seven core pillars of the IndiaAI Mission?

The Mission is built on the following seven pillars implemented by the IndiaAI Independent Business Division (IBD) under the Digital India Corporation (DIC):

- **IndiaAI Compute Capacity:** Establishing large-scale AI computing infrastructure with over 10,000 Graphics Processing Units (GPUs) through public-private partnerships.
- **IndiaAI Innovation Centre (IAIC):** Focusing on developing indigenous Large Multimodal Models (LMMs) and domain-specific foundational models for priority sectors.
- **IndiaAI Datasets Platform (AIKosh):** Creating a centralized national data repository of high-quality, non-personal datasets to facilitate AI innovation.
- **IndiaAI Application Development Initiative:** Developing AI applications to address India-specific challenges in sectors like healthcare, agriculture, and governance.
- **IndiaAI FutureSkills:** Building AI-ready human capital through fellowships (PhD, PG, UG) and setting up AI labs in Tier-2 and Tier-3 cities.
- **IndiaAI Startup Financing:** Providing targeted funding and mentorship to deep-tech AI startups to commercialize homegrown solutions.
- **Safe & Trusted AI:** Emphasizing a robust framework for ethical and responsible AI governance, including tools for bias mitigation, deepfake detection, and auditing.

Which government body is responsible for India's National Strategy for AI, and what are the identified focus areas?

NITI Aayog is the nodal agency that laid the foundation for India's AI governance through its discussion paper, the "National Strategy for Artificial Intelligence". It identified five key sectors for AI application to serve societal needs:

- Healthcare
- Agriculture
- Education
- Smart Cities and Infrastructure
- Smart Mobility and Transportation

Does India have a specific law or act for AI?

No, India does not have a single, dedicated law specifically for Artificial Intelligence (AI) yet, but it uses existing laws (like IT Act 2000 for deepfakes via IT Rules 2021) and non-binding guidelines/advisories (from NITI Aayog, MeitY) for governance, focusing on responsible AI, data privacy (DPDP Act), and ethical principles, with a national mission (IndiaAI) fostering innovation while developing future frameworks.

What are the current regulatory frameworks for AI in India?

India currently lacks a comprehensive, standalone law specifically for AI regulation. Instead, it employs a "light-touch" and "techno-legal" approach, leveraging existing statutes, government guidelines, and sector-specific regulations to manage AI-related risks while prioritizing innovation.

Key Regulatory Components

- **India AI Governance Guidelines (2025):** The Ministry of Electronics and Information Technology (MeitY) released these guidelines, which serve as the primary framework. They are based on seven guiding principles, or "sutras" (including people-centricity, accountability, and innovation over restraint), and recommend a risk-based, voluntary approach to compliance, with the possibility of making some measures mandatory in the future.

- **The Information Technology (IT) Act, 2000 & IT Rules, 2021:** This existing legislation forms the legal backbone for digital governance. It places due diligence obligations on intermediaries and platforms, which are being updated to cover AI-generated content (especially deepfakes) through amendments, requiring clear labeling and user declarations.
- **The Digital Personal Data Protection (DPDP) Act, 2023:** This Act governs the processing of personal data and is highly relevant to AI systems that use large datasets. AI developers must ensure compliance with data privacy principles such as consent, data minimization, and purpose limitation.
- **Sector-Specific Regulations:** Rather than a single AI regulator, India utilizes a sectoral approach. Regulatory bodies like the Reserve Bank of India (RBI) for financial services, the Securities and Exchange Board of India (SEBI) for trading, and the Indian Council of Medical Research (ICMR) for healthcare issue their own AI-specific guidelines to manage domain-specific risks.
- **Institutional Framework:** The government has established several bodies to coordinate its AI strategy:
    - **AI Governance Group (AIGG):** Coordinates national AI policy across different ministries and regulators.
    - **AI Safety Institute (AISI):** A virtual institute under the IndiaAI Mission responsible for developing safety standards, conducting risk research, and providing technical expertise.
    - **NITI Aayog:** A government think tank that provides strategic guidance and policy recommendations for AI development through foundational documents like the National Strategy for Artificial Intelligence (#AIForAll).

What is AI Governance Group (AIGG)?

The AI Governance Group (AIGG) is a proposed high-level inter-ministerial body in India responsible for coordinating national artificial intelligence (AI) policy and overseeing its governance. It is part of India's comprehensive AI governance framework, the "India AI Governance Guidelines," released by the Ministry of Electronics and Information Technology (MeitY) in November 2025.

Key Details

- **Role:** The AIGG will act as a high-level, effective decision-making body, providing strategic direction, reviewing existing mechanisms, addressing regulatory gaps, and guiding legislative or policy reforms related to AI.
- **Composition:** It will be chaired by the Government's Principal Scientific Adviser and include representatives from several key ministries and regulatory bodies, such as:
  - Ministry of Electronics & Information Technology (MeitY)
  - Ministry of Home Affairs
  - Ministry of External Affairs
  - Reserve Bank of India (RBI)
  - Securities and Exchange Board of India (SEBI)
  - NITI Aayog
  - Indian Council of Medical Research (ICMR)
- **Structure and Support:** The AIGG is designed to be a small, effective decision-making body and is chaired by the Principal Scientific Adviser to the Government of India. **It is supported by two other key institutions:**
  - **Technology & Policy Expert Committee (TPEC):** An advisory body of experts from diverse domains (e.g., technology R&D, law, public policy, cybersecurity) that provides specialized technical and policy inputs to the AIGG.
  - **AI Safety Institute (AISI):** The main body responsible for guiding the safe and trusted development of AI through research, risk assessment, safety testing, and developing technical standards.

What is AI Safety Institute (AISI)?

AI Safety Institute (AISI) is an initiative by the Government of India, operating under the IndiaAI Mission to ensure the safe, secure, and responsible development and deployment of artificial intelligence. It is not a single physical building but a virtual network of partner institutions across the country.

Key Details

- **Status:** The establishment of the AISI was announced in early 2025 and is in progress, led by the Ministry of Electronics and Information Technology (MeitY).
- **Structure:** It operates on a "hub-and-spoke" model, coordinating efforts among a network of academic institutions (such as various IITs), startups, industry partners, and government bodies. Each partner institution will have an "IndiaAI Safety Institute Cell" to work on specific projects.
- **Role:** The AISI functions as an advisory and capacity-building body, focusing on research, developing standards, guidelines, and frameworks for AI safety, rather than acting as a strict regulatory enforcement authority.

What major schemes and initiatives are part of India's vision to leverage AI?

India's vision to leverage Artificial Intelligence (AI) is primarily driven by the comprehensive IndiaAI Mission and the foundational "AI for All" strategy outlined by the NITI Aayog. These initiatives focus on building a robust indigenous AI ecosystem for inclusive growth and societal development across critical sectors like healthcare, agriculture, education, and governance. **Beyond the main mission, several other programs and initiatives leverage AI for specific outcomes:**

- **Centres of Excellence (CoEs) for AI:** The government has established multiple CoEs in key sectors such as Healthcare, Agriculture, Sustainable Cities, and Education to foster research-driven innovation and collaboration between academia, industry, and government.
- **Digital India BHASHINI:** An AI-led language translation platform that aims to break language barriers by enabling access to digital services and content in all 22 scheduled Indian languages, using voice-based interactions.
- **BharatGen AI:** The world's first government-funded multimodal LLM initiative, which aims to develop indigenous foundational AI models trained on diverse Indian data and languages to enhance public service delivery.
- **YUVA AI for ALL / Responsible AI for Youth:** A national program designed to promote AI awareness and provide foundational AI skills to school students and educators, particularly in government schools, to prepare a future-ready workforce.

- **National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS):** Promotes R&D and human resource development in emerging technologies, including AI and Machine Learning, through Technology Innovation Hubs across the country.

Which specific sectors are benefiting from AI in India?

- **Healthcare:** AI is improving patient outcomes by enabling faster and more accurate diagnoses through the analysis of medical images (X-rays, CT scans), which can detect conditions like cancer and diabetes at early stages. Telemedicine platforms powered by AI are helping bridge the urban-rural healthcare gap, providing remote access to specialist consultations and care.
- **Agriculture:** AI acts as a "digital companion" for farmers, providing real-time advice on weather predictions, pest management, and optimal irrigation and sowing times using satellite data and soil analysis. Government initiatives like the Kisan e-Mitra virtual assistant help farmers access government schemes, improving yields and income security.
- **Education and Skilling:** AI is personalizing the learning experience by tailoring content to individual student needs and progress. It automates administrative tasks for educators and provides language translation tools like the DIKSHA platform to make learning materials accessible in multiple Indian languages.
- **Governance and Public Services:** The government is using AI to make public services more efficient and transparent. Applications include the use of generative AI to make Aadhaar services smarter, AI-powered chatbots for citizen support (e.g., Aadhaar Mitra), and the translation of court judgments into vernacular languages under the e-Courts Project. AI also plays a role in smart city planning and disaster management through data analysis and predictive modeling.
- **Banking and Financial Services:** AI is revolutionizing the financial sector through robust fraud detection systems that analyze transaction patterns in real-time. AI-powered chatbots provide 24/7 customer support, while machine learning algorithms help in assessing creditworthiness for loan approvals, promoting financial inclusion for underserved populations.

- **Manufacturing and Logistics:** In manufacturing, AI is used for predictive maintenance to minimize downtime, quality control through computer vision, and optimizing supply chains and inventory management. AI algorithms optimize logistics routes for efficient and timely deliveries, while robotic systems manage sorting and packaging in fulfillment centers.

What is the Global Partnership on Artificial Intelligence (GPAI)?

The Global Partnership on Artificial Intelligence (GPAI) is a multinational, multi-stakeholder initiative that aims to guide the responsible development and application of AI, focusing on human rights, inclusion, diversity, innovation, and economic prosperity. It seeks to bridge the gap between AI theory and practice by supporting cutting-edge research and applied activities.

The initiative was launched in June 2020 by G7 members and other leading economies, and its Secretariat is hosted by the Organisation for Economic Co-operation and Development (OECD) in Paris.

What is India's role in the GPAI?

India plays a significant and leadership role in the GPAI:

- **Founding Member:** India is a founding member of the GPAI, having joined the initiative on June 15, 2020, alongside other leading economies like the USA, UK, Canada, and the EU. As a founding member, India has made substantial contributions to the goals and objectives of GPAI from the beginning.
- **Council Chair:** India was elected as the Council Chair in November 2022. It served as the Incoming Chair in 2023, the Lead Chair in 2024, and will be the Outgoing Chair in 2025.
- **Hosting Summits:** India hosted the annual GPAI Summit in New Delhi from December 12-14, 2023. During this summit, members adopted the 'New Delhi Declaration' to promote a global AI framework grounded in democratic values.
- **Promoting Inclusive AI:** India advocates for a human-centric approach to AI, leveraging its experience with digital technologies for inclusive growth (e.g., in healthcare, agriculture, and education) to address global challenges.

What specific contributions has India made to the GPAI's objectives?

India has actively engaged in several domestic projects aligned with responsible AI development and acceptance. Key contributions include:

- **National AI Strategy and Portal:** India has a national AI strategy and portal to harness AI for social and economic progress.
- **YUVAi Initiative:** In partnership with Intel India, India launched the 'YUVAi - Youth for Unnati and Vikas with AI' program to equip school students with AI skills for inclusive development.
- **Global Digital Public Infrastructure Repository (GDPIR):** India proposed the establishment and maintenance of a GDPIR to share digital public goods, which was endorsed in the New Delhi Declaration.
- **AI Gamechangers Award:** As part of the 2023 Summit, India organized the "AI Gamechangers Award" to recognize responsible AI solutions addressing global challenges like health and climate change.

What are the main focus areas of the GPAI that India contributes to?

GPAI brings together experts to work on priority themes through working groups:

- Responsible AI
- Data Governance
- Future of Work
- Commercialization of AI innovations

India's participation helps inform the global understanding of the opportunities and challenges surrounding AI from the perspective of a major economy in the Global South.

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Practice Questions

1. **Consider the following statements regarding the 'IndiaAI Mission', a flagship initiative of the Government of India:**

   I. The mission was launched with the vision of "Making AI in India and Making AI Work for India" under the Ministry of Science and Technology

   II. The 'IndiaAI Compute' pillar aims to provide high-end Graphics Processing Units (GPUs) at subsidized rates to researchers and startups

   III. 'AIKosh' is a platform developed under the mission to provide a unified hub for datasets, models, and a sandbox for AI innovation

   IV. The mission's regulatory approach is to enact a standalone, comprehensive AI law similar to the European Union's AI Act, to ensure strict compliance

   How many of the statements given above are correct?

   a) Only one

   b) Only two

   c) Only three

   d) All four

Answer: b

Explanation: Statement I is partially correct (Incorrect): The vision is indeed "Making AI in India and Making AI Work for India". However, the mission is implemented by the 'IndiaAI' Independent Business Division (IBD) under the Digital India Corporation (DIC) of **the Ministry of Electronics and Information Technology (MeitY), not the Ministry of Science and Technology. Statement II is correct:** The IndiaAI Compute pillar focuses on building a scalable AI computing ecosystem with high-end GPUs (like Nvidia H100) through public-private partnerships and offers these resources at subsidized or affordable rates to startups, researchers, and academia. **Statement III is correct:** AIKosh (or IndiaAI Datasets Platform) is the unified hub and national data repository that provides access to quality non-personal datasets, models, and a sandbox environment to enable AI innovation for developers, startups, and researchers. **Statement IV is Incorrect:** India's approach to AI governance and regulation is a "techno-legal" one, which emphasizes developing indigenous technical tools, guidelines, and governance

frameworks rather than a standalone, comprehensive AI law like the EU AI Act. The focus is on a balanced, India-specific approach to ensure responsible AI development.

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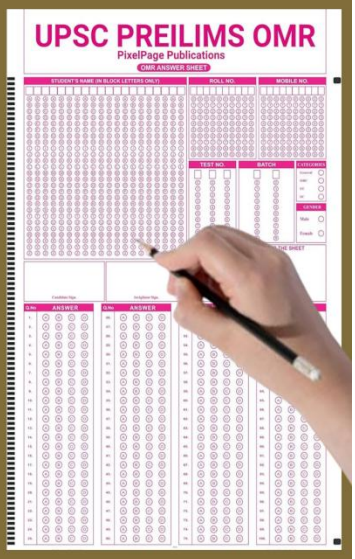

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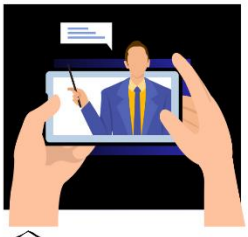

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