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THE JOURNAL OF PARLIAMENTARY INFORMATION

Editor-in-Chief : Utpal Kumar Singh

The Journal of Parliamentary Information (JPI), a quarterly publication brought out by the Lok Sabha Secretariat since 1955, aims at the dissemination of authoritative information about the practices and procedures in Indian and foreign Legislatures. The Journal serves as an authentic recorder of important parliamentary events and activities. It provides a useful forum to members of Parliament and State Legislatures and other experts for the expression of their views and opinions, thereby contributing to the development and strengthening of parliamentary democracy in the country.

The Journal welcomes articles on constitutional, parliamentary and legal subjects for publication. The latest books on parliamentary and constitutional subjects are reviewed in the Journal by members of Parliament and scholars. Books intended for review should be sent to the Editor-in-Chief.

The views expressed in the signed articles, etc. published in the Journal are those of the authors and the Lok Sabha Secretariat does not accept any responsibility for them.

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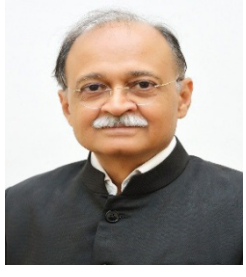
VOLUME LXXI NO. 3 SEPTEMBER 2025

CONTENTS

EDITORIAL NOTE



The Journal of Parliamentary Information (JPI) is a respected publication of the Parliament of India. Since 1955, this journal has served as a repository of institutional memory and vehicle for dissemination of information, primarily related to the legislative domain. JPI has been providing a platform to parliamentarians, legislators, scholars and parliamentary officials for sharing thoughts and ideas which have been honed on the anvil of their unique experiences gained from their close association with legislative bodies. Over the years, eminent parliamentarians from India and abroad have enhanced the prestige of the journal through their scholarly contributions. However, JPI received a setback during the pandemic years in 2020-21 when academic contributions to the publication dwindled and consequently, the offerings of the journal for its readers diminished considerably. It was the inspiration and encouragement from Hon'ble Speaker, Lok Sabha, Shri Om Birla that has goaded the editorial team to revive the journal.

The new issue of JPI in September 2025 carries an article from the Speaker, Lok Sabha on Artificial Intelligence (Al), a technology that is poised to revolutionise traditional methods of information and knowledge management in legislative bodies around the world. Further, the subject of Al and issues related to this transformative technology has been deconstructed for the benefit of uninitiated readers in a scholarly article "Artificial Intelligence: Contours and Contents" by Shri Sujeet Kumar, Member of Parliament, Rajya Sabha. The current issue also carries an article, "The Constitution and Indian Nationhood" by Dr. Shashi Tharoor, Member of Lok Sabha and Chairman of the Standing Committee on External Affairs, excerpted with his permission from his book *Our Living Constitution: A Concise Introduction & Commentary.* This issue has included an article on subordinate legislation which is an interesting, *albeit* a somewhat lesser understood subject. Shri N. K. Singh, author of a book on this subject and an ex-senior officer of the Rajya Sabha Secretariat has contributed an article titled 'Parliamentary Oversight of Subordinate Legislation: Balancing efficiency and Accountability' to explain the significance of delegated legislation in modern governance systems.

The September issue of JPI introduces a new section *'From the pages of Parliamentary Archives'.* The objective is to refresh readers with thought provoking addresses in our Parliament by eminent global leaders. The first address in this series "Confluence of the Two Seas" was delivered on 22nd August, 2007 by the late Prime Minister of Japan, Mr. Shinzo Abe in the Central Hall of *Samvidhan Sadan.* This issue will carry a selection of important speeches of Speaker, Lok Sabha delivered in national and

international fora to help understand the position and perspectives of the Parliament of India on domestic and global issues of common concern.

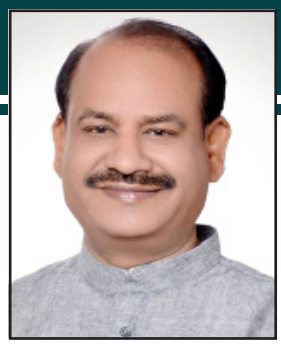
Readers will find in this issue a feature titled *"Remembering our Freedom Fighters"* to showcase the life and contributions of relatively little known freedom fighters from different parts of the country. This volume will carry a biographical sketch of late Kumar Kalika Prasad Singh, a freedom fighter and legislator by Dr. Ranbir Kumar, former Director, Lok Sabha Secretariat who is also an author of a biography of the freedom fighter.

This issue of JPI carries two book reviews. The first is a review article "Making of the Constitution" by Shri Bhartruhari Mahtab, an erudite and senior Member of Lok Sabha on a recent book "Our Constitution, Our Pride" authored by Shri Ram Madhav. The second is a review by Dr. Rupa Narayan Das of the iconic reference book - 'Practice and Procedure of Parliament', now in its 8th edition. The 'Practice and Procedure of Parliament' since its first publication in 1968, has served as authoritative compendium for consultation and reference by parliamentarians and secretariat officials on the parliamentary system in India. It has been our endeavour to introduce through the Book Review Section recent scholarship on parliamentary and legislative systems and related subjects.

In its seven decades long journey, JPI has been immensely enriched through the intellectual patronage extended by Members of Parliament, Presiding Officers of national parliaments and State legislatures, parliamentary and legislative secretariat officers, scholars and academicians in the form of articles, book reviews, memoirs, etc.

This volume of JPI is being produced in print and digital versions for convenience of a wide and varied readership. We hope and trust that the new issue of JPI will meet with the expectations of readers.

Utpal Kumar Singh
Editor-in-chief



Salience of Artificial Intelligence (AI)

-Shri Om Birla
Speaker, Lok Sabha

The world of technology is in a state of ferment. The creative disruption unleashed in the wake of the advent of Artificial Intelligence (AI) is ubiquitous. It fashions the way business is conducted, entertainment, knowledge and information are served to us – in short, the way we lead our lives in a universe powered by the force and versatility of AI technologies. The wide range of possibilities that AI offers in diverse domains when considered in conjunction with other emerging and cutting-edge innovations, present unique opportunities and challenges. Parliaments around the world could not have stayed aloof from the potential benefits that are likely to accrue from adoption of AI and digital technologies. AI has already made its appearance in various avatars in many parliaments, each being guided by the common objective of enhancing ease, efficiency, quality and effectiveness in the way business is conducted in the legislative chambers. Increasingly, AI tools are also deployed to protect parliaments and its members from cyber-security attacks.

Parliament of India has sought to embrace AI technologies in a variety of ways, such that parliamentary business – its practices, procedures and processes – is conducted effortlessly, and Members of Parliament find it easy to engage with the proceedings and debates in a meaningful manner. To take a telling example, parliamentary papers – agenda, questions, bulletins, papers laid on table and parliamentary debates etc. were hitherto provided only in Hindi and English languages. Now, AI powered machine translation based on Natural Language Processing (NLP) has enabled the Parliament of India to make a beginning by providing select parliamentary papers in several languages recognized by the Constitution of India. As the AI generated output gets further refined, the day is not far when all papers including parliamentary debates will become available to MPs and the general public in their preferred choice of language. One can only imagine the immense benefits that are likely to flow from this single innovative step in a multi-lingual Parliament like ours. By facilitating use of regional languages in our national Parliament, this initiative also helps to re-affirm the dignity in which our regional languages are held in the apex legislative body of the land.

A significant mission undertaken by Parliament of India, and where significant progress has already been made so far, is in facilitating AI-driven search on AI-based time tagged transcript duly indexed with the audio-video content of debates. The objective of this exercise is to provide user-friendly access and navigation facility through parliamentary audio-video resources. Audio video recordings of important debates on important pieces of legislation and speeches by our national leaders on the floor of the House on contemporary issues can be viewed on our computers or mobile screens effortlessly. Parliamentary debates and questions are also being digitized as part of a parallel initiative so that AI may enable metadata extraction of relevant portions of debates for the use of parliamentarians, citizens and researchers. AI can also serve as an incisive analytical tool to help dissect the voluminous parliamentary records and provide useful insights into a whole range of issues and subjects.

The AI-driven transcription tools hold great potential for real time and accurate record keeping. Parliament of India has started working on Proof of Concept for real time AI-based speech-to-text facility. This speech-to-text technology captures speech in real-time and converts it into the target language. The Parliament of India having realized the importance of this tool is already committed at developing it at a fast pace so the software can be rolled out once the quality of output crosses acceptable benchmarks.

The proposed Generative AI Knowledge Platform in the Parliament of India is set to revolutionize access to, and understanding of parliamentary rules, processes, and procedures. The AI tool will draw from a wide repository consisting of the Constitution of India, of parliamentary rules of procedure, directions of Presiding Officers, conventions and precedents and other official and credible sources etc. so that AI-driven search functionality on the knowledge platform is able to formulate well-considered, factually correct and relevant information.

A potential area where AI based technologies can prove useful is in providing simultaneous interpretation in multiple languages with a high degree of fidelity. In the Parliament of India, Members are free to speak in any of the 22 languages recognised in the VIII Schedule of the Constitution. At present, real time simultaneous interpretation is provided with the help of trained officials in the physical voice mode. However, with suitable refinements in the software, simultaneous interpretation facility has the potential to be deployed both inside the House Chambers and outside during national and international parliamentary conventions and meetings.

India's AI Mission is premised on the principle of "AI for All"! Prime Minister, Shri Narendra Modi has clearly enunciated that the objective of India's AI policy is to foster progress and well-being of all. India being a founding member of the Global Partnership on Artificial Intelligence has advocated responsible development and application of AI keeping human rights, inclusion, diversity, creativity, and economic prosperity in our sights. However, as global citizens, we need to be cognizant of risks posed by the application of AI technologies in domains stretching from ethics, data protection, global peace and security, *etc*. These risks can be mitigated with a comprehensive and united global response, involving both developing and developed nations. Parliaments can provide a lead in this direction by helping forge consensus on legal and regulatory frameworks that assure fairness, transparency and accountability.

In the 27th Standing Committee Meeting of the Conference of Speakers and Presiding Officers of Parliaments (CSPOC) held in Guernsey, Presiding Officers of participating Parliaments noted the steps being taken in the Parliament of India towards adoption of AI technologies. A decision was taken in the meeting to include as an agenda item, the theme of AI application in parliamentary functioning for plenary discussion at the 28th CSPOC meet in India next year.

The use of digital technology and AI has the potential for empowering our legislators in the discharge of their parliamentary responsibilities more effectively and efficiently. Equally, AI technology also offers constituents and citizens to understand better, the contributions and efforts of Parliamentarians in raising peoples' voices in the hallowed Chambers of the Parliament. The future holds great promise as the horizon of this technology is being continuously expanded to open up newer possibilities. The Parliament of India is fully committed to adoption of Responsible and ethical AI to serve the people of India with greater diligence and commitment.

Artificial Intelligence: Contours and Contents

-Sujeet Kumar
Member, Rajya Sabha

The core issue addressed in this article is the establishment of liability for Artificial Intelligence (AI) and the challenges associated with assigning legal responsibility and liability to such systems. Currently, the legal framework, specifically in India, lacks clear judicial precedents, legislative measures, or international covenants/conventions that address AI's role when in conflict with the law. Such absence of a clear legal structure may be a factor for complexity while determining cases where AI systems[1] are involved. An urgent question arises: whether there should be new laws regulating AI activities or if the existing legislation should be tweaked to be able to regulate this new form of technology. The 'Artificial Intelligence (GPAI) New Delhi Declaration', which was chaired by same need for a regulatory framework was acknowledged in the 2024 Global Partnership India that year[2].

AI systems are fundamentally different from humans in several key ways. They are not considered equivalent to people or entities with legal personhood due to various technological, philosophical and legal distinctions. Machines are essentially artefacts, products of human creativity and intellectual effort, rather than autonomous beings with intrinsic rights or responsibilities. There is no ontological basis for equating machines with humans, unless they exhibit a form of strong autonomy-meaning they would need to demonstrate self-determination, both in setting goals and in choosing how to achieve them. Currently, AI operates more as a metaphor for intelligence, reflecting similarities in rational processes between humans and machines, rather than possessing genuine, autonomous decision-making capabilities. The challenge lies in reconciling the capabilities of AI with legal concepts that are traditionally based on human behaviour and intent, underscoring the need for a nuanced legal approach to address these emerging issues.

Sometimes, the issue with present or existing laws is that some are either in conflict with other legislation or they are obsolete with the ongoing development of technology. The incorporation of vague language within the statute opens up the gateway for either the government to exercise unfettered discretion leading to the violation of the rights of the individual or the offender, using the loopholes of ambiguous laws. But, for actualising accountability, it is necessary for the relevant law or statute, formulated or pronounced by the competent authority, to be constructed in a manner so precise that an individual may foresee its liability and adjust his/ her conduct accordingly. A statute must be sufficiently precise to regulate the conduct of an individual and must not be open to broad interpretations and avoid vagueness that carries the risk of a slippery slope.

Advanced technology has always enhanced the human potential - from the invention of the wheel to the steam-powered engine to the advent of modern computers. This trend is illustrated by newly developed technologies, including self-driving automobiles and auto-generative artificial intelligence instruments. For instance, the self-driving car

market is projected to grow at a Compounded Annual Growth Rate (CAGR) of 33%, from 2024 to 2033[3]. Some foresee the potential growth to $469 billion from $238 billion, between 2020 and 2030[4]. Likewise, NASSCOM anticipates the Al market will grow to $17 billion by FY 2027 at a CAGR of between 25%-15% in India[5]. These projections depict the future of transformation across various sectors, including healthcare, finance, education, and law, et al.

Given this significant impact, it is necessary to define the accountabilities and liabilities associated with AI. Properly defining compliance responsibilities and sanctioning violations are crucial to ensuring meaningful compliance consequences; thereby encouraging adherence to legal and ethical standards. This is imperative, given that the level of automated decision-making in these systems varies and there is no standardised method for the creation or development of AI, or for the assessment of their intelligence. The complexity of AI, which involves data applications and technology, requires a detailed approach in terms of regulation and liability, so that the systems are not abused and to ensure that domestic legal frameworks can adapt to these evolving technologies.

What is AI?

The primary issue that must be unearthed at this stage is the need for a precise definition of 'Artificial Intelligence' or 'AI'. Currently, there is no universally accepted definition, which hinders progress in creating the legislation required to combat this activity. The refinement of the concept involves paving the way to a correct formulation of laws that properly address the right set of technologies under the definition and ambit of AI. Without such a common understanding, legal frameworks risk being either too broad, potentially stifling innovation, or too narrow, failing to address all relevant aspects of AI. Defining AI with precision helps legislators develop the laws essential for governing the technology, together with the capability to encourage more innovation while dealing with emerging challenges.

NITI Aayog, the Indian Government thinktank, in its 'National Strategy for Artificial Intelligence', attempted to define AI as: *"AI is a constellation of technologies that enable machines to act with higher levels of intelligence and emulate the human capabilities of sense, comprehend and act"*[6]. The issue with this definition is that it neither differentiates between hardware and software nor does it attempt to classify the 'AI' as weak or strong.

It may not be out of place; rather, it may be pertinent to highlight a few other definitions of AI. Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence, defines AI in Section 3(b)[7] of the order as:

"(b) The term 'artificial intelligence' or 'AI' has the meaning set forth in 15 U.S.C. 9401(3): a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments. Artificial intelligence systems use machine- and human-based inputs to perceive real and virtual environments; abstract such perceptions into models through analysis in an automated manner; and use model inference to formulate options for information or action."

Another important piece to be mentioned here is the definition proposed by the Safe and Secure Innovation for Frontier Artificial Intelligence Models Act[8] of California, which defines AI under Section 3(b) of the Act as:

"(b) Artificial intelligence' means an engineered or machine-based system that varies in its level of autonomy and that can, implicit objectives, infer from the input it for explicit receives how to generate outputs that can influence physical or virtual environments."

Along the US and California, OCED (The Organisation for Economic Co-operation and Development) in its 'Recommendation of the Council on Artificial Intelligence'[9] defines AI system as:

"AI system: An AI system is a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. Different AI systems vary in their levels of autonomy and adaptiveness after deployment."

When discussing AI, it is expedient to make a distinction with regards to the components as well as the functioning of such systems. AI software implemented on a small computer or over a computer network can be called 'AI algorithms' or 'software agents.' These algorithms are essentially designed with the purpose of doing work like data processing, pattern recognition, and decision making on the basis of data fed or received into the system.

In contrast, when AI system incorporates hardware components like sensors, cameras, and other devices, they are usually termed 'robot agents.' These systems integrate AI algorithms with physical hardware to perform more complex functions, such as autonomous navigation, object manipulation, or real-time environmental interaction. The combination of software and hardware enables robot agents to execute tasks that require both computational intelligence and physical interaction with the world.

With regards to the weak or strong AI classification, "Weak AI', or 'Narrow AI', refers to systems designed to perform specific tasks, like Natural Language Processing (NLP) or image recognition and 'Strong AI' or 'General AI', aims to achieve human-like intelligence across a wide range of activities, with the ability to learn and apply knowledge autonomously.

'Weak AI' refers to systems which are designed for a particular problem domain or to handle specific tasks or applications, such as NLP or image recognition. These systems are developed for specific tasks and do not possess general intelligence or the ability to learn beyond their designated tasks. They operate based on predefined algorithms and data, excelling in their specific areas but lacking broader cognitive abilities. 'Strong AI', on the other hand, aims to achieve a level of intelligence comparable to human cognition across a wide range of activities. This type of AI seeks to develop systems that can understand, learn, and apply knowledge autonomously in diverse contexts. Strong AI would be capable of general reasoning, problem-solving, and adapting to new situations with a level of flexibility akin to human intelligence, representing a more advanced and ambitious goal in the field of artificial intelligence.

In light of the above, we can define AI as, *"A system or interrelated technology based on an algorithm or computer programme integrated with hardware components built to perform tasks requiring human-like intelligence to make decisions or generate outputs without explicit human guidance."*

In all of the above cases, whether it is software agents, robot agents, Weak AI, or Strong AI, the most crucial element is 'data'. This data is imperative to build and train artificial intelligent systems. Especially for the latest AI generations, the quality and amount of data, strongly translate and influence and AI's learning capability and its performance. In the absence of data, AI systems would not be able to operate or make informed decisions. Consequently, data is seen to be

the building block on which all AI technologies are developed and improved.

Working of Artificial Intelligence

The evolution of technology is a boon as well as a bane for any nation and its legal system. A concrete scientific definition for artificial intelligence does not exist.[10] Still, in layman's language, it can be termed as a computer resource with the capacity to adapt or improve in response to inputs, in order to solve issues and address scenarios that extend beyond the specified set of inquiries and instructions that the computer was programmed with[11]. Artificial intelligence and autonomous robotic systems are gradually being implemented in many facets of our lives, and they interact with people on a regular basis[12]. Along with the various advantages that such innovations are predicted to provide, the chance that such systems would inflict physical, emotional, or economic pain or damage to individuals or property is also expected to rise[13]. It is imperative to note that AI doesn't need to have physical appearance or existence (e.g. robots), but it can also be a mere abstract existence (e.g. software programmes)[14].

The rapid advancement of AI is reshaping our world through various transformative dimensions, with 'Machine Learning (ML)' being a pivotal component. Machine learning enables algorithms and software to acquire new skills and improve their performance by analysing and learning from data. The US Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence defines ML as follows: "The term 'machine learning algorithms means a set of techniques that can be used to train AI to improve performance at a task based on data."[15]

Unlike traditional programming, where specific instructions are programmed while developing an AI system, ML algorithms are based on millions of iterations, refining their accuracy and efficiency as they process more data. This ability to learn and make predictions based on data allows for nuanced applications such as personalised recommendations, adaptive customer service, and automated diagnostics where the results of AI systems become increasingly accurate, efficient, and relevant to the users' needs as time passes.

Furthermore, ML has significantly enhanced human-computer collaboration, interaction, and group intelligence sharing and facilitates the processing of data collated from various geographical jurisdictions. ML systems support more informed decision-making and enable more effective interaction between humans and technology by processing diverse datasets and identifying patterns. For instance, the ML that is seen today has transformed the potential and capacity for autonomous operation, exemplified by self-driving cars and other intelligent systems. These systems use continuous learning to actively respond to new situations and navigate complex environments. This is achieved through the utilisation of continuous learning, which has fundamentally altered and revolutionised industries, driving innovation. Collectively, machine learning is poised with the potential to revolutionise the present in how humans interact with technology, offering unprecedented levels of automation, efficiency, and adaptability.[16]

'Deep Learning' (DL) is a narrow field of machine learning using neural networks, containing more than one layer, for analysis and comprehension of large arrays of data. Unlike traditional ML, where the process of identifying patterns often relies on feature extraction by humans, deep learning automates this process. It uses Artificial Neural Networks (ANNs) which mimic the structure of the human brain for learning the raw data, in contrast to the traditionally framed methods. Each and every layer of the network extracts different degrees of abstraction, from simple components in the first

layer to the complex patterns in the successive levels, to enable the system to handle very complex problems.

This is especially effective for solving the problems which are hard for traditional programming approaches because of the complexity and size. For example, in image recognition, it is possible to define tasks and find objects in comparison with millions of labelled images that the deep learning algorithms use. Likewise, in NLP, deep learning models can comprehend and produce human language after analysing big piles of texts. "Since deep learning models can learn from new data through evolving patterns, they are capable of powering technologies such as self-driving cars, healthcare diagnostics, and recommendation systems."

The key ability we often attribute to DL is the ability to work with unstructured data or tasks that depend on understanding and interpretation. The use of models which can learn with examples in order to make decisions is the most valuable asset in DL approaches and something which is hard to achieve with traditional programming models. This capability of transformation is already prompting dramatic change across nearly every field imaginable; from healthcare to finance and entertainment to everything else in-between, it is revolutionising automation, prediction, and personalisation. Instead, DL belongs to a category of ANNs, which are inspired by the structure and function of the human brain. These networks are made up of layers of interconnected nodes or neurons that make up the system and are designed to take in input data and pass the information to other layers that have been developed within the system. In a technique called training, the strength and the structure of the connections between the neurons in the network adapt by receiving data to be processed over time, allowing it to gain the capacity to analyse complex patterns and make correct assumptions. This training process can entail fairly massive datasets and substantial computation, but the end product that comes from it is object classifiers, NLP algorithms, and prediction engines of truly extraordinary capabilities.

When DL models are seamlessly integrated into Al systems, they enable these systems to efficiently process commands and generate desired results. For instance, self-driving cars use deep learning models to interpret real-time sensor input for object recognition, predict the behaviour of pedestrians and other automobiles, and make driving decisions. Likewise, in healthcare, deep learning techniques can integrate medical images and ascertain disease diagnosis at its preliminary stage with high accuracy. These two models' performances in learning from data and adapting to other conditions make it easier for the AI system to solve a lot of problems that need higher-order understanding and decision-making processes.

Deploying deep learning in an AI model/system means switching from traditional rule-based strategies to more free-form, data-based techniques. This shift enables solving problems that have high variability and uncertainty that cannot be solved using rule-based AI. DL makes use of neural nets, and is characterised by an ability to learn and to become more enhanced as samples of data pour in, hence making the systems more capable in their performance of accurate and reliable results. This capability places deep learning at the heart of current advances within artificial intelligence and its application across the many domains and sectors for the improvement of necessary problem-solving and decision-making processes.

Artificial Intelligence, machine learning, and deep

learning can be considered as having interconnected and overlapping of a given technology, but are not the same. Each term represents a different aspect of how computers can be programmed to mimic human intelligence, with varying degrees of complexity and capability. AI is the broadest concept, which means any form of technology capable of decision-making and solving problems on its own. ML is a subset of AI that allows systems to improve and adapt as they are exposed to the same data without being programmed for every job. There are two principal branches: supervised and unsupervised, with the latter divided even further into clustering and dimensionality reduction. DL takes Multilayer Learning a step contain neural networks for intricate pattern interpretation for tasks such as image and speech processing. These technologies are connected, as AI defines the structure of the whole system, ML shows how to learn from data, and DL describes advanced approaches to solve complicated data and problems.

It's important to note that AI encompasses a general idea of designing a machine or system capable of undertaking tasks best done by human intellect. Such tasks may include performing logical operations, decision-making, natural language processing, and visioning/interpretation of the stimuli. AI includes a broad list of approximations referring to the accumulation of methodologies, strategies, techniques, or algorithms designed to make machines intelligent, like human beings. Others state that the scope of artificial intelligence strengthens the vision of developing a type of intelligence higher than what human beings are capable of. This notion is explained by the theories of the 'singularity, according to which it is possible for the existence of an AI that will be non-interpretable by a human brain.[17]

ML is an imperative subset of AI, dealing with the building of a model that empowers the computer to modify its work based on data, without explicit programming. Unlike traditional AI systems that provide fixed instructions followed in decision-making, ML systems are able to train themselves from big data using pattern recognition techniques. This leaning process allows them to make predictions or decisions based on the data they have been exposed to. A key distinction from traditional programming is that ML models adapt and refine their behaviour through experience. There are various types of ML, such as 'supervised learning', where the model is trained on labelled data to map inputs to known outputs, and 'unsupervised learning', where the model detects patterns without predefined labels. 'Reinforcement learning' is another environment and receives feedback in the form of rewards or penalties. As ML models are exposed to more data, they become better at identifying relevant features and improving their predictions. The learning ability, as well as the ability to adapt and automate all forms of tasks, makes ML especially relevant in such areas of operation as image and voice recognition, NLP, self-driving cars, and recommendation systems. The applicability of ML also helps in its ability to work with vast amounts of data at once, which is vital in current industries.

DL can be described as a subset of ML that can teach ANNs with multiple layers, thus permitting their understanding of data using models that arrange the data hierarchically. These networks are the imitation of the human brain; they contain layers of neurons that successively analyse the input data with the capability of the model to learn features and patterns inherent at various abstraction levels. Due to this, DL is especially useful in applications that include image classification, NLP, and speech recognition, to mention but a few, as it surpasses regular ML approaches. Unlike other machine learning where features are designed in advance, DL models can do the feature

extraction on their own from raw, unformatted data, making them highly versatile for a wide range of applications.

There are networks in DL, such as Convolutional Neural Network (CNNs) and Recurrent Neural Network (RNNs), which are employed for specific sets of data categories like image data and sequence data. These models demand large datasets and lots of computational resources; however, their generality and effectiveness in these roles have made progress in areas such as sickness identification, and translation between languages. Even though DL is computationally expensive in many cases and, in some instances, it is difficult to decipher what has been learned, DL's capacity to learn from humongous amounts of data has placed the field at the core of modern-day AI technologies.

In summary, while AI is the broad concept of creating intelligent machines, ML is a subset of AI that focuses on learning from data, and DL is a further subset of ML that involves neural networks with multiple layers. DL represents a more advanced and specialised form of ML, capable of handling complex tasks and achieving state-of-the-art performance in various domains and driving innovation in technology and industry in specified areas. Each of these concepts plays a crucial role in advancing the capabilities of intelligent systems.

In a nutshell, the working of an Al system can be understood as a multifaceted process that involves several interconnected stages, each crucial for its functioning. It begins with data collection, which serves as the foundation, drawing from diverse sources such as sensors, databases, or the internet. This raw data then undergoes pre-processing, where it is cleaned, normalised, and transformed to make it suitable for analysis. After that, Al models are trained using pre-processed data by mapping different algorithms and techniques.

Model training is followed by evaluation, wherein the performance of the trained model is assessed using separate validation datasets to ensure its effectiveness and generalisability. Once validated, the trained model is deployed into the organisation's production environments where it is incorporated into current systems or in unique systems for making predictions or decisions. Post-deployment, further evaluation and updating of the model is essential to ensure its ongoing performance and accuracy. This involves tracking key metrics, detecting any drift or degradation in performance, and periodically retraining the model with new data to keep it relevant. This iterative process or feedback loop of data gathering, preparation, model development, testing, implementation, and updates constitute the foundation of the AI; at the same time, it provides the general framework for the formation of intelligent systems across many fields.

Levels of Automation

SAE International (2018)[18] identifies six levels of driving automation. Level 0 (No Automation) means the system can give warnings or briefly act but does not control the vehicle for long. Level 1(Hands-On) has both the driver and the system working together, like with Cruise Control or Parking Assistance, but the driver must be ready to take control. In Level 2 (Hands Off), the system handles acceleration, braking, and steering, but the driver Level 3 must keep an eye on the road and act quickly if necessary. (Eyes Off) allows the driver to focus on things other than driving, like texting or watching a movie, but they must still be ready to take over in a set timeframe. Level 4 (Minds Off) means the driver does not need to pay attention for safety, allowing them to sleep

or leave the seat. Finally, Level 5 (Steering Wheel Optional) signifies complete automation, where no human help is needed, as in fully autonomous[19] vehicles.

AI Ecosystem

AI systems do not operate in isolation; they work within a larger group of linked technologies, known as the "AI Ecosystem." This ecosystem includes AI's connections with other current technologies like the Internet of Things (IoT), blockchain, sensors, and data networks. These elements come together to allow AI systems to examine and process large volumes of data. The continuous creation, exchange, and analysis of data form the foundation of this ecosystem, allowing AI to function in increasingly dynamic and real-time environments. Data is collected from various sources-IoT devices, sensors, blockchain transactions and is pooled, reassessed, and shared, enabling AI systems to refine their operations. These interactions allow AI to function more effectively, but they also introduce significant liability risks.[20]

Each technology within the AI Ecosystem, whether it's IoT devices, blockchain systems, or data networks, brings its own set of liability issues. For example, if a sensor fails to accurately report data or if blockchain protocols are breached, it could lead to system malfunctions or misinformation, causing harm or financial loss. As these technologies are increasingly integrated and interdependent, the liability landscape becomes more complex, with risks overlapping and compounding across systems. When AI interacts with these technologies in real-world applications, such as autonomous vehicles, smart cities, or healthcare diagnostics, the potential for multi-layered liability emerges. It becomes difficult to determine and pinpoint fault when harm occurs- is it the AI's algorithm at fault, the sensor that fed it inaccurate data, or the blockchain that failed to verify the integrity of the data?

In this context, legal and regulatory frameworks struggle to keep pace with the rapidly

Level	Name	Description	Driver Role
Level 0	No Automation	Automated system issues warnings or momentary interventions, but no sustained control.	Driver has full control at all times.
Level 1	Hands-On	Shared control with systems like Cruise Control or Parking Assistance. Driver must always be ready to take over.	Driver must constantly supervise.
Level 2	Hands off	Automated system handles acceleration, braking, and steering. Driver must still monitor the system and be ready to intervene.	Driver supervises and intervenes if necessary.
Level 3	Eyes off	Driver can divert attention from driving tasks (e.g., texting, watching a film) but must intervene within a specified time if necessary.	Driver can focus on other tasks but must be ready to act.
Level 4	Minds Off	No driver attention required for safety. Driver can sleep or leave the driver's seat, but the system is limited to specific conditions (e.g., geographic areas).	No driver intervention needed during specific conditions.
Level 5	Steering Wheel Optional	Full automation with no human intervention required. Applicable in all environments and conditions, such as fully autonomous taxis.	No human intervention needed at all.

evolving AI Ecosystem, requiring new models of liability that address the interconnectivity of technologies and the role of human actors. The layered nature of the ecosystem means that when something goes wrong, fault could be spread across multiple parties-manufacturers, programmers, data providers, and users-each contributing to the final outcome in different ways. This raises questions about how to fairly allocate responsibility in an increasingly complex technological landscape.

Need for Liability

The advent of AI and autonomous systems introduces complex legal and ethical challenges, particularly concerning liability and accountability for wrongful acts committed by these systems.[21] Traditional legal frameworks, designed primarily to handle human actions, struggle to accommodate the unique characteristics of AI, necessitating a nuanced examination of responsibility and liability. As argued by many, AI is competent enough to inflict physical as well as non-physical damage to society at large in varied aspects.[22] For instance, physically, AI systems could cause damage through autonomous vehicles, weaponry, or other machinery that might malfunction or be misused. On the other hand, non-physically, AI could impact society through the manipulation of information, privacy violations, and the spread of misinformation, potentially undermining trust and social cohesion. The broad range of potential harms underscores the need for careful consideration and regulation of AI technologies.

One of the primary issues is the lack of established legal precedents specifically addressing the liability of AI and autonomous systems. Existing laws typically rely on concepts of human agency and intent, but AI systems operate based on algorithms and machine learning, which lack these human attributes. This fundamental difference complicates the process of attributing responsibility, as AI actions are the result of programmed responses and data inputs rather than deliberate human decisions. Moreover, the use of AI and autonomous systems often lead to a significant reduction in direct human oversight and control. These systems are designed to perform tasks independently, which inherently reduces the level of human responsibility in their operations. This creates a challenge in determining who should be held accountable when something goes wrong. The traditional concept of "command responsibility," where individuals are held liable for actions taken under their authority, becomes less clear when decisions and actions are executed by autonomous entities. Unlike traditional devices, which simply follow pre-set instructions and perform tasks mechanically, AIs possess the ability to make autonomous decisions. This autonomy in decision-making sets AI apart, as they can adapt and respond to new situations independently, whereas ordinary devices strictly adhere to the commands programmed by their human creators. This difference raises intriguing questions about the nature of intelligence and autonomy in artificial entities.

The type of liability applicable in cases involving AI can also vary. 'Product liability' might hold manufacturers and developers responsible if an AI system is deemed defective and causes harm. However, proving a defect in the complex and often opaque algorithms of AI can be challenging. Alternatively, negligence might apply if operators or users of AI systems fail to maintain or supervise the AI adequately, leading to harmful outcomes. Establishing a standard of care for the use and oversight of AI systems, however, is still an evolving area of law.

Overall, the integration of AI and autonomous systems into various sectors necessitates a rethinking of legal frameworks to address these emerging challenges. Ensuring accountability and protecting public safety will require legal innovation and possibly new regulatory approaches to effectively manage the unique risks posed by these advanced technologies.

Asimov's Three Laws of Robotics: *Ethical Foundations and their Impact on AI and Robotics*

Isaac Asimov's 'Three Laws of Robotics', highlighted in his fiction, are a set of ethical guidelines designed to govern the behaviour of robots and ensure their actions align with human safety and ethical standards. The rules were introduced in Isaac Asimov's 1942 short story, "Runaround," which is part of his 1950 collection I, *Robot*.[23] However, similar restrictions had been implied in Asimov's earlier stories. These laws have significantly influenced both science fiction and real-world discussions on robotics and artificial intelligence.

The First Law states that *a robot may not injure a human being or, through inaction, allow a human being to come to harm*. This law prioritises human safety above all else, ensuring that robots are fundamentally programmed to protect human life. It establishes a proactive duty of care, requiring robots to not only avoid causing harm directly, but also to take action to prevent harm if it is within their capability. This law forms the cornerstone of 'ethical robotics', emphasising that the primary purpose of robots is 'to serve and safeguard humans'.

The Second Law stipulates that *a robot must obey the orders given to it by human beings, except where such orders would conflict with the First Law*. This law ensures that robots remain subservient to human commands, reinforcing their role as tools and assistants to humans. However, it introduces a crucial caveat: robots must disobey any orders that would result in harm to humans. This creates a hierarchy of priorities, where human safety trumps obedience, thereby preventing malicious or harmful use of robots by humans.

The Third Law states that *a robot must protect its own existence as long as such protection does not conflict with the First or Second Law*. This law acknowledges the value of the robot's self-preservation but subordinates it to the higher priorities of human safety and obedience. By ensuring robots maintain their functionality and avoid unnecessary risks, this law supports the sustainability and reliability of robots in performing their duties. However, if a situation arises where protecting itself would result in harm to a human or disobeying a direct order, the robot must sacrifice its own safety.

Together, Asimov's 'Three Laws of Robotics' form the basis of a comprehensive ethical framework designed to guide the behaviour of robots and ensure their integration into human society in a safe and controlled manner. The First Law prioritises human safety above all, establishing a fundamental principle of non-harm. The Second Law reinforces the importance of human command while ensuring that such commands do not compromise safety. The Third Law balances the robot's self-preservation with its duties to humans and their directives. These laws not only serve as a narrative tool in science fiction but also provoke thoughtful discussions about the ethical design and use of autonomous systems. By addressing both the protection of humans and the operational integrity of robots, Asimov's laws provide a foundational perspective on creating responsible and effective robotic technology.

Conclusion

As we embark on our exploration of liability creation for Artificial Intelligence, it's evident that we stand at a critical juncture in the evolution and interface of technology and law. The issue of AI liability has shifted from science fiction

into a pressing real-world concern. Situations that once seemed confined to novels and films are now becoming part of our everyday lives, presenting complex ethical, legal, philosophical and societal challenges. The rapid advancement of AI technologies, from machine learning algorithms to autonomous vehicles, has outpaced our legal frameworks, presenting us with the formidable challenge of bridging this gap. The absence of a universally accepted definition of AI remains a primary hurdle, as precisely defining the subject matter is crucial for constructing effective laws and regulations. Moreover, the unique ability of AI systems, to make autonomous decisions, complicates traditional notions of liability, blurring the lines of responsibility in ways that conventional devices do not.

The lack of established judicial precedents specifically addressing AI liability leaves us in uncharted territory, with courts and legislators grappling to apply existing legal principles to these novel technologies. As we move forward, we must strike a delicate balance between fostering technological innovation and ensuring accountability, recognising that overly restrictive regulations could stifle progress, while insufficient oversight could lead to unintended consequences.

To address these challenges, we need to develop flexible legal frameworks that can evolve alongside AI technologies. This may involve creating new categories of legal personhood or liability specifically tailored to AI systems. Inter-disciplinary collaboration between legal experts, technologists, ethicists and policymakers will be crucial in creating comprehensive and effective solutions. Given the borderless nature of AI technologies, international cooperation in establishing standards and regulations will be essential to ensure consistency and prevent regulatory arbitrage.

As we develop liability frameworks for AI, it's crucial to address the ethical implications alongside legal considerations. Incorporating principles like transparency, fairness and accountability into our legal approaches will ensure that AI systems are used responsibly and that their impacts are properly managed.

Given the rapid evolution of AI technology, it is essential for our legal responses to be dynamic and adaptable. Regularly reviewing and updating liability laws will be necessary to effectively address emerging challenges and ensure that legal frameworks keep pace with technological advancements. While the creation of liability for AI presents significant challenges, it also offers an opportunity to reimagine our legal systems for the digital age. By addressing these challenges head-on, we can create a framework that not only protects individuals and society, but also fosters responsible innovation in AI technologies. The path forward may be complex, but it is one we must navigate to ensure that the potential of AI is realised within a framework of accountability and ethical responsibility. As we continue to grapple with these issues, our ability to adapt and innovate in our legal thinking will be as important as the technological innovations themselves.

Reference Notes

1. Refer, AI system in line with the Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence, US President Executive Order, October 30, 2023, Section 3(e) -the term "AI system" means any data system, software, hardware, application, tool, or utility that operates in whole or in part using AI.
2. The 2024 Global India AI Summit Report: Prepared by the Government of India, (July 2024) <https://gpai.ai/gpai-india-ai-summit-report-2024.pdf>- last accessed March 04, 2025.

3. Precedence Research, 'Autonomous Vehicle Market Size, Share, and Trends 2024 to 2034' (June2024)<https://www.precedenceresearch.com/autonomous-vehicle-market#:~:text=The%20global%20autonomous%20vehicle%20market,33%25%20 from%202024%20to%202033.>- last accessed March 04, 2025.
4. McKinsey & Company, The future of mobility is at our doorstep, Compendium 2019/2020, p. 80 https://www.mckinsey.com/-/media/McKinsey/Industries/Automotive%20 and%20Assembly/Our%20Insights/The%20 future%20of%20mobility%20is%20at%2 0our%20doorstep/The-future-of-mobility-is-at-our-doorstep.pdf last accessed March 04, 2025.
5. Reuters, 'India's AI market seen touching $17 bln by 2027, notes Nasscom-BCG report' (February 20, 2024) https://www.reuters.com/technology/indias-ai-market- seen-touching-17-bln-by-2027-notes-nasscom-bcg-report-2024-02-20/- last accessed March 04, 2025.
6. NITI Aayog India, National Strategy for Artificial Intelligence (2018) p. 12 https://www.niti.gov.in/sites/default/files/2023-03/National-Strategy-for-Artificial-Intelligence.pdf-last accessed March 04, 2025.
7. Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence, JOSEPH R. BIDEN JR., The White House (October 30, 2023) https://www.whitehouse.gov/briefing-room/presidential-actions/2023/10/30/executive-order-on-the-safe-secure-and-trustworthy-development-and-use-of-artificial-intelligence/ - last accessed December 11, 2024.
8. SB-1047, Safe and Secure Innovation for Frontier Artificial Intelligence Models Act (2023-2024), Act of California, February 07, 2024 https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240SB1047-last accessed March 04, 2025.
9. OCED, Recommendation of the Council on Artificial Intelligence, OECD/LEGAL/0449 Adopted on: 22/05/2019 https://legalinstruments.oecd.org/en/instruments/oecd-legal-0449 - last accessed March 04, 2025.
10. Peter Stone, Artificial Intelligence and Life in 2030' One Hundred Year Study on Artificial Intelligence Report of the 2015-2016 Study Panel, (Research Report, Stanford University 2016).
11. Matilda Claussen-Karlsson, Artificial Intelligence and the External Element of the Crime: An Analysis of the Liability Problem, (2017).
12. Ryan Calo, Robotics and the Lessons of Cyberlaw, (2015) 103 California L. Rev. 513, 532.
13. Yueh-Hsuan Weng, et al., Toward the Human-Robot Co-Existence Society: On Safety Intelligence for Next Generation Robots 1 INT. J. Soc. ROBOT 267, 273 (2009).
14. Gabriel Hallevy, The Criminal Liability of Artificial Intelligence Entities - from Science Fiction to Legal Social Control 4 AIPJ 171, 196 (2010).
15. US Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence, October 30, 2023-Section 3(t).
16. Thomson Reuters, Ready or Not: Artificial Intelligence and Corporate Legal Departments 4 (2017).
17. Kurzweil, The Singularity Is Near: When Humans Transcend Biology, 2005; V. Vernon, The Coming Technological Singularity: How to Survive in the Post-Human Era. Vision-21, Interdisciplinary Science and Engineering in the Era of Cyberspcae, Proceedings of a symposium co-sponsored by the NASA Lweis Research Center and the Ohio Aerospace Institute, 1993: 11-22.
18. SAE Levels of Driving Automation™ Refined for Clarity and International Audience, (SAE Blog, May 3, 2021) https://www.sae.org/blog/sae-j3016-update-last accessed March 04, 2025.
19. European Parliamentary Research Service, The ethics of artificial intelligence: Issues and initiatives, (European Union, 2020) https://www.europarl.europa.eu/RegData/etudes/STUD(2020)634452/EPRS_ STUD/2020/634452_EN.pdf - last accessed March 04, 2025.
20. Iria Giuffrida, Fred Lederer& Nicolas Vermeys, A Legal Perspective on the Trials and Tribulations of AI: How Artificial Intelligence, the Internet of Things, Smart Contracts, and Other Technologies Will Affect the Law, 68 CASE W. RES. L. REV. 747 (2018).
21. Andrew P Simester et al., Simester and Sullivan's Criminal Law (6th edn, Hart Publishing 2016) 72.
22. Jack M. Balkin, The Path of Robotics Law, 6 CALIF. L. REV. CIR. 45 (2015).
23. Isaac Asimov, I Robot, (Harper Voyager, 2013)