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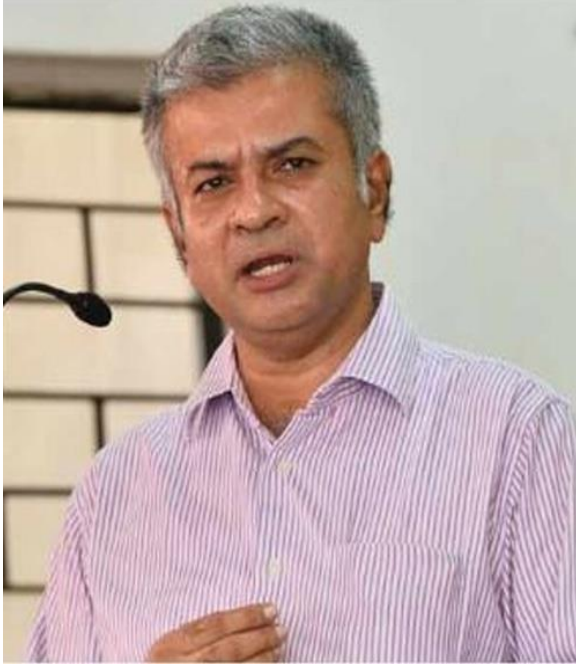
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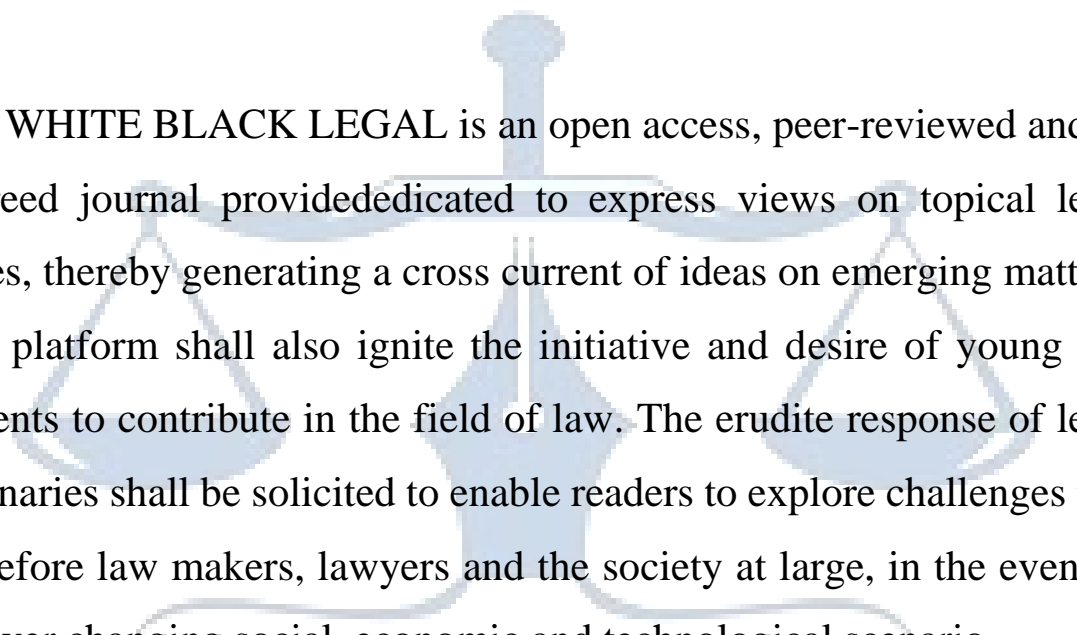
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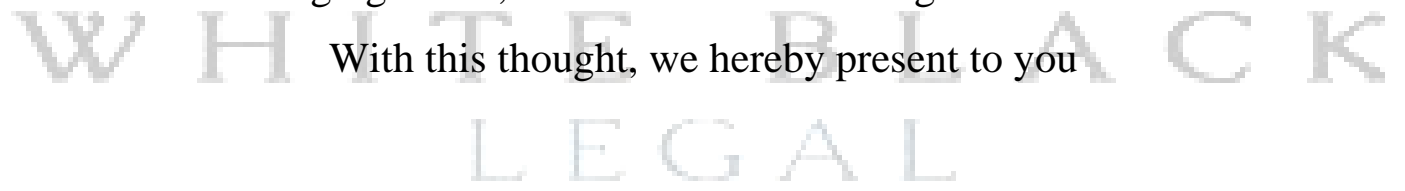
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With this thought, we hereby present to you



# **CHANGING DYNAMICS OF THE LEGAL FIELD BY** **THE INTEGRATION OF AI**

AUTHORED BY - HRIDAY KAPUR

## **CHAPTER I**

### **FUNDAMENTAL AND HISTORICAL ANALYSIS OF ARTIFICIAL INTELLIGENCE**

*“Generative AI has the potential to change the world in ways that we can’t even imagine. It has the power to create new ideas, products, and services that will make our lives easier, more productive, and more creative. It also has the potential to solve some of the world’s biggest problems, such as climate change, poverty, and disease.”*

*Bill Gates, Microsoft Co-Founder*

Artificial Intelligence (AI) is a transformative branch of computer science that focuses on creating machines capable of performing tasks that typically require human intelligence. These tasks range from understanding natural language and recognizing patterns to solving complex problems and making nuanced decisions. The overarching goal of AI is to not merely imitate human intelligence but to empower machines to assist or even enhance human capabilities across various domains. This includes simplifying daily activities such as recommending movies or music, to more intricate applications like diagnosing diseases or automating driving. Understanding how AI operates is essential. At the core of AI functionality is a process known as machine learning, which allows a machine to improve its performance of a task with increased experience. This concept can be likened to the way humans learn from experience. For instance, just as a child learns to identify animals by looking at numerous pictures and hearing their names, machine learning allows computers to recognize patterns and make predictions. This is achieved by feeding data into sophisticated algorithms, which are essentially sets of mathematical instructions that tell the computer how to solve problems based on the data it receives.

The data used in these algorithms is typically labeled to facilitate pattern recognition. For example, in developing an AI system to identify spam emails, the algorithm would be trained on a dataset

containing thousands of emails that have already been tagged as either "spam" or "not spam." Through processing this data, the algorithm identifies characteristics common to spam emails and uses these markers to filter incoming mail, learning and refining its criteria as it encounters new examples.

The scientific underpinnings of AI are deeply rooted in mathematics, statistics, computer science, psychology, and neuroscience. Mathematics and statistics provide the frameworks for modelling complex predictions and algorithms, while computer science offers the tools to build and program AI systems. Insights from psychology and neuroscience are particularly influential, as they guide the development of algorithms that attempt to replicate human cognitive processes.

Artificial Intelligence is typically segmented into three distinct categories: narrow AI, general AI, and super intelligent AI. Narrow AI, often referred to as weak AI, is designed to perform a specific task such as internet searches, facial recognition, or driving a car and is currently the most prevalent form of AI. General AI, also known as strong AI, represents a type of AI that could perform any intellectual task that a human can do. This form of AI remains largely theoretical but is the target of ongoing research and is considered the holy grail of AI aspirations. Super intelligent AI, which is still speculative and not yet in existence, would surpass the cognitive performance of humans in practically all areas, including creativity, general wisdom, and problemsolving.

AI's practical applications are vast and growing. In healthcare, AI systems analyze complex medical imaging to diagnose diseases more accurately than ever before, and in some cases, AI algorithms are used to personalize treatment plans to patients' genetic profiles. In the automotive industry, AI is the cornerstone of autonomous vehicle technology, enabling cars to navigate and respond to road conditions without human input. In the financial sector, AI detects fraudulent activities by recognizing irregular patterns in transaction data and is increasingly involved in automating trading decisions on stock exchanges.

As AI continues to evolve and become more integrated into everyday life, understanding its capabilities and limitations is crucial. This includes grappling with the ethical implications of AI, such as privacy concerns, biases in decision-making processes, and the potential for job displacement in various sectors. By fostering a deep understanding of AI, society can better prepare to utilize this technology effectively and ethically, ensuring that AI serves as a beneficial tool in enhancing human capabilities rather than a disruptive force.



Furthering the exploration into AI, it is important to discuss its integration across other sectors such as retail, security, and education, which showcase its versatility and potential for widespread impact.

In the retail sector, AI is revolutionizing the way businesses interact with customers and manage inventory. AI-powered recommendation systems not only enhance the shopping experience by suggesting products tailored to consumers' preferences and past purchasing behaviors but also optimize inventory management through predictive analytics that forecast purchasing trends and seasonal demand. Moreover, AI is transforming customer service through chatbots that handle inquiries and resolve issues around the clock, improving response times and customer satisfaction.

Security is another area where AI is making significant strides. Surveillance systems equipped with AI technology can now identify and track suspicious activities or individuals in real-time, vastly improving the capabilities of security monitoring in both public and private spaces. AI is also crucial in cybersecurity, where it helps detect and respond to threats more quickly and efficiently than ever before by analyzing data patterns to identify potential security breaches.

The education sector benefits greatly from AI as well. Adaptive learning technologies powered by AI customize the educational experience to meet the unique needs of each student. These systems assess a student's current knowledge base and learning pace, adjusting the curriculum accordingly to ensure optimal learning outcomes. Furthermore, AI can automate administrative tasks such as grading and scheduling, allowing educators to devote more time to teaching and less to clerical work.

However, the rapid advancement of AI also brings challenges, particularly in the realm of ethics and social justice. Issues such as surveillance overreach, data privacy violations, and algorithmic bias raise significant concerns. Algorithmic bias, in particular, can lead to unfair outcomes in areas such as loan approval, job recruitment, and law enforcement, perpetuating existing societal inequalities. Therefore, it is crucial to implement strict ethical guidelines and transparency measures in the development and deployment of AI systems to ensure they do not inadvertently harm individuals or communities.

Moreover, the potential for AI to displace jobs, particularly in sectors like manufacturing and customer service, poses economic challenges that societies must address. While AI can lead to the creation of new jobs and industries, the transition can be difficult for those whose skills are made

redundant by automation. Reskilling and upskilling initiatives, along with social safety nets, are essential to support workers through this transition, ensuring that the benefits of AI are distributed equitably across society.

## 2.1 HISTORICAL OVERVIEW OF ARTIFICIAL INTELLIGENCE

Although Artificial Intelligence (AI) is widely recognized as a modern technological innovation, its conceptual origins can be traced far back into ancient times. Ancient philosophers and thinkers, although they could not have possibly envisioned the contemporary incarnation of their ideas, laid the foundational thoughts that prefigured aspects of today's AI theories. The historical evolution of AI has been marked by a progressive incorporation of elements that simulate human cognition and abilities, making it a fascinating blend of ancient wisdom and modern technology.

Originally, AI applications were focused on formal and structured realms such as theorem proving—a discipline far removed from the dynamic and nuanced complexities of everyday human experience. These early endeavors were primarily theoretical, aiming to replicate the logical structure of human thought in a controlled environment. However, with the passage of time and technological advancements, the scope of AI expanded dramatically. The advent of expert systems, enhancements in natural language processing, and innovations in robotics have allowed AI to address a much wider variety of human experiences and behaviors, bridging the gap between rigid computational processes and the fluidity of human interactions. The development journey of AI has been steeped in controversy and characterized by diverse perspectives. Some proponents see AI as a bold attempt to replicate the entirety of human capabilities, while skeptics view humanlike activities generated by AI as mere simulations based on mechanistic processes. Thus, there is a rich tapestry of interpretations and theories surrounding what AI is and what it could become.

The researcher posits that a thoughtful examination of this intellectual voyage—from the musings of ancient thinkers to the sophisticated algorithms of today—will provide profound insights into the evolution of AI concepts. Such an exploration is not only about understanding where AI came from but also about envisioning where it might go.

To structure this exploration effectively, the study of AI's historical development is divided into two main phases. The first phase examines AI's lineage from its speculative origins in ancient philosophical debates through to 1956, a landmark year when John McCarthy officially introduced the term "Artificial Intelligence." The second phase focuses on the rapid development of AI from

McCarthy's seminal contribution to the present day, highlighting key technological breakthroughs and the expanding capabilities of AI systems.

This chronological study will clarify how AI has evolved over centuries and will help demystify the significant technological and theoretical advancements that have characterized its history. By doing so, it aims to provide a deeper understanding of AI's current capabilities and its potential future impact on society.

### **2.1.1 ANCIENT DEVELOPMENT OF ARTIFICIAL INTELLIGENCE**

In ancient times, the foundational concept of logical reasoning, which would later underpin the development of artificial intelligence (AI), was pioneered by Aristotle, a Greek philosopher active between 384 and 322 BC. Aristotle's exploration of logic not only influenced centuries of philosophical thought but also laid the groundwork for modern computational theories.

A significant advancement came in 1308 when Ramon Llull, a Catalan poet, articulated a system of reasoning through permutations in his seminal work "Ars Magna." This early exploration into algorithmic thought processes marked a crucial step towards structured scientific inquiry. Several centuries later, in

1666, the German mathematician and philosopher Gottfried Wilhelm Leibniz further developed these ideas. Leibniz constructed a mechanical device capable of manipulating symbols rather than numbers, a precursor to modern computing machines. In his publication "Dissertatio de arte combinatoria (On the Combinatorial Art)," Leibniz proposed that "ideas are nothing but combinations of simple concepts," a theory that paved the way for his development of calculus and propositional logics, integral to AI research today. While Leibniz's ambition to create a universal language of reasoning was not fully realized, his work significantly advanced the mathematical frameworks essential for later technological developments.

The evolution of logical reasoning continued with George Boole, an English mathematician, whose work in the mid-19th century led to the development of Boolean algebra. This system of logic became fundamental to the field of computer science, influencing the design of logical gates in silicon chips that perform operations based on predicates like "A is true" and "A is true but B is false."

Contemporaneously, Charles Babbage, often regarded as the "father of the computer," designed the Analytical Engine. Although Babbage never completed this mechanical computer, his innovative

design laid the conceptual foundation for future computing technologies. His ideas inspired the creation of the Atanasoff-Berry Computer (ABC) in the 1940s, a programmable digital computer that was a precursor to the electronic brains envisioned during that era. By the end of the 1950s, the shift from mechanical to electrical computing had been solidified with the development of vacuum tube computers, setting the stage for the digital revolution.

These developments culminated in the contemporary digital computer, which has become the cornerstone for modern artificial intelligence. This historical lineage from Aristotle's logical deductions to Babbage's mechanical calculations illustrates a continuum of intellectual pursuit that has directly contributed to the advent and progression of AI. Each of these thinkers and their inventions have played a pivotal role in shaping the trajectory of AI development, demonstrating the deep historical roots and complex evolution of what we now understand as artificial intelligence.

### **2.1.2 MODERN DEVELOPMENT OF ARTIFICIAL INTELLIGENCE**

The second phase of AI's development has been characterized by numerous fluctuations, including periods of significant decline in interest and investment, commonly referred to as "AI winters." Despite these challenges, researchers remained undeterred, continuing their work even when both corporate and governmental support waned. For the purposes of analysis, the development of AI during this phase can be segmented into several distinct stages:

1. **Incubation Stage (Mid 17th century to 1930):** This period marked the early exploration and theoretical foundations that set the stage for later developments in AI.
2. **The Birth of AI (1940 to 1950):** These years were pivotal as they saw the conceptualization and initial creation of machines that could simulate aspects of human intelligence, laying the groundwork for modern AI.
3. **Blossom Stage for AI (1950 to 1970):** During these two decades, AI technologies and theories rapidly advanced, driven by increased interest and substantial funding which led to significant innovations and applications.
4. **The AI Winter (1970s to 1980s):** This period saw a major slowdown in AI development and funding due to disillusionment with the pace of progress and the practical capabilities of existing AI technologies.
5. **The Revival of AI (1980 to 1987):** Interest and investment in AI resurged during these years, fuelled by new approaches and optimism about AI's potential applications.

6. Another AI Winter (1987 to 1993): AI faced another period of reduced funding and waning interest, as earlier optimism once again met with the harsh realities of technical and practical limitations.
7. Boom of AI (1993 to 2016): This era witnessed an explosion in AI development thanks to advancements in algorithms, computational power, and an influx of funding, redefining what was possible with AI.
8. Outbreak of AI (From 2016 onwards): The most recent stage in AI's history has seen unprecedented growth in its capabilities and applications, permeating every aspect of society and initiating a new era of innovation and transformation.

These stages reflect the cyclical nature of AI development, characterized by alternating periods of enthusiasm and scepticism, which have ultimately propelled the field to its current state of rapid advancement and integration into global technologies and industries.

#### ***2.1.2.1 THE INCUBATION OF AI (17TH CENTURY TO 1930)***

The period from the mid-seventeenth century to the 1930s can be regarded as the "incubation stage" of AI, during which the foundational ideas of modern computing began to take shape. This era saw significant intellectual contributions from figures like Charles Babbage, whose design of the Analytical Engine laid the groundwork for future computational machines. Ada Lovelace, who critiqued Babbage's work, insightfully observed that the Analytical Engine "has no pretensions whatever to originate anything. It can do whatever we know how to order it to perform. It can follow analysis, but it has no power of anticipating any analytical relations or truths." This critique later came to be seen as an early recognition of the limitations and possibilities of AI.

During this incubation period, several key developments occurred that would later be recognized as milestones in the journey toward AI. For instance, Jonathan Swift's "Gulliver's Travels," published in 1726, introduced the idea that a machine could enable even "the most ignorant person" to produce works in complex fields such as Philosophy, Law, Mathematics, Politics, and Theology with minimal effort or reliance on personal genius. This fictional concept reflected emerging thoughts about the mechanical automation of intellectual tasks.

Later, in 1898, Nikola Tesla demonstrated a radio-controlled boat—an invention that showcased the potential for machines to operate independently of direct human control, paving the way for modern robotics. The progression of robotic technology continued with notable instances such as the depiction of a robotic girl named Maria in the 1927 sci-fi film "Metropolis," directed by Fritz

Lang. This portrayal captured the public's imagination and foreshadowed the development of robotics.

Further advancements were made in 1921 when Karel Čapek introduced the world to the concept of robots in his play "Rossum's Universal Robots," emphasizing the potential for machines to mimic human actions and roles. Following up in 1925, the Houdina Radio Control Co. introduced a radio-controlled driverless car, leveraging radio technology to achieve remote control, a foundational technology in today's autonomous vehicles.

Additionally, in 1929, Japanese scientist Makoto Nishimura designed Gakutensoku, a robot capable of moving its head and hands, changing facial expressions, and adapting to interactions—features that hinted at early forms of what would later be understood as artificial intelligence.

Thus, while the term "AI" was not formally used during this period, the concepts and technologies developed during these years significantly contributed to the foundational understanding of AI and robotics, setting the stage for the formal emergence and evolution of the field in the decades that followed.

#### ***2.1.2.2 THE BIRTH OF AI (1940 TO 1950)***

The second stage, following the initial incubation and developmental phases, saw AI undergo sporadic yet significant advancements, characterized by cycles of progress, stagnation, and rejuvenation. This era is often referred to as the birth period of AI, largely because World War II acted as a catalyst for

unprecedented technological development, merging the functional capacities of machines with human-like capabilities. It was during this time that Alan Turing, often hailed as the father of AI, posed the seminal question, "Can a Machine Think?" in his ground-breaking paper "Computing Machinery and Intelligence." This inquiry captured the global attention and steered academic and scientific efforts towards the creation of intelligent machines.

Several key developments during this phase laid the groundwork for future innovations in AI:

- In 1939, John Vincent Atanasoff, along with his assistant Clifford Berry, developed the Atanasoff-Berry Computer (ABC), which was capable of solving 29 simultaneous linear equations. This was a significant leap forward in computational technology.

- By 1943, Warren S. McCulloch and Walter Pitts introduced a mathematical and computational model of a biological neuron in their paper "A Logical Calculus of the Ideas Immanent in Nervous Activity." This work later became foundational in the development of neural networks and subsequently deep learning, marking a critical point in understanding how machines could mimic human brain functions.

- In 1949, computer scientist Edmund Berkeley, in his book "Giant Brains: Or Machines That Think," discussed how machines had evolved to manage enormous volumes of data with both speed and precision. That same year, Donald Hebb's publication, "Organization of Behaviour: A Neuropsychological Theory," based on the assumption of neural networks, further contributed to the understanding of cognitive processes in AI.

- The year 1950 was notable for several advancements: Claude Shannon published the first computer program capable of playing chess, enhancing the interaction between human strategies and machine calculations. Simultaneously, Alan Turing introduced the concept of the Turing Test in "Computing Machinery and Intelligence," proposing that a machine's intelligence could be validated if it could converse indistinguishably from a human when questioned by a human interrogator. This concept laid the philosophical and practical foundations for what would later become known as the Turing Test, a standard for evaluating a machine's ability to exhibit intelligent behaviour equivalent to, or indistinguishable from, that of a human.

- Following closely in 1951, the first artificial neural network, SNARC (Stochastic Neural Analog Reinforcement Calculator), was developed, further advancing the practical applications of theoretical concepts introduced by earlier researchers.

These developments collectively marked a dynamic and formative period in AI's history, establishing essential frameworks and technologies that would shape the evolution of artificial intelligence in subsequent decades.

### **2.1.2.3 THE BLOSSOM PERIOD OF AI (1950S TO 1970S)**

During the 1950s through the 1970s, AI research saw significant advancements and a shift from mere theoretical concepts to practical applications. The original idealism of AI was tempered with a more realistic approach as computers began performing tasks beyond simple arithmetic

calculations. Prominent research labs such as those at MIT, Carnegie Mellon, Stanford, SRI, and Edinburgh expanded, with additional research groups emerging in other universities. The focus of this research was on applying algorithms and methods that mimicked human problem-solving techniques rather than creating robots with human-like intelligence.

This era was marked by several key developments that shaped our contemporary understanding of AI:

- In 1952, Arthur Samuel from IBM developed the first computer program capable of playing checkers and learning from its own experience.
- Herbert Simon and Allen Newell created the Logic Theorist in 1955, the first AI program, which successfully proved many initial theorems in mathematics.
- The term "Artificial Intelligence" was coined by John McCarthy in 1956 during a conference at Dartmouth College, setting a new direction for the field.
- McCarthy also introduced LISP in 1958 at the MIT AI Lab, which became the predominant AI programming language for three decades.
- In 1959, Arthur Lee Samuel coined the term "machine learning" and discussed its applications in an influential paper on the game of checkers.
- The same year, Nils Nilsson advanced the concept of logic-based knowledge representation, which is now fundamental in machine learning for applications such as image recognition.
- Joseph Weizenbaum created the first chatbot, ELIZA Psychotherapist, in 1964, simulating a conversation between a user and a psychiatrist through natural-language input.
- Also in 1964, Woody Bledsoe developed a face recognition system that could identify individuals from images or videos by analyzing facial features.
- Daniel Bobrow's "Student" program in 1964, presented in his PhD thesis, demonstrated natural language understanding for problem-solving systems.
- The DENDRAL project, developed in 1965 by Edward Feigenbaum and others at Stanford, became a famous expert system helping chemists identify organic molecules from mass spectra data.
- Alexey Ivakhnenko's early work in 1965 on supervised deep multilayer perceptrons laid the groundwork for what would later be known as deep learning, a type of machine learning where systems learn and adapt independently.
- The world's first mobile robot, "Shakey," developed by SRI International in 1969, demonstrated



autonomous navigation and problem-solving in real-world environments.

- These innovations not only propelled AI technology forward but also set the stage for the sophisticated AI systems we interact with today.

#### ***2.1.2.4 THE AI WINTER (FROM 1970S TO 1980S)***

During this phase, known as the "first AI Winter," AI research encountered significant obstacles due to reduced funding and limited government support, resulting in fewer developments than in previous decades. Despite these challenges, there were notable breakthroughs in robotics and automation that marked this period. In 1970, Waseda University in Japan introduced WABOT-1, the first humanoid robot equipped with a limb-control system and a vision system, capable of communication. Following that, in 1971, DARPA launched a five-year Speech Understanding Research (SUR) program, spearheaded by Roberts, which aimed to advance the development of speech recognition technologies. Stanford University contributed to the field by developing MYCIN in 1972, an early expert system designed to identify bacteria causing severe infections and to suggest appropriate antibiotics. However, the momentum of AI advancements was questioned in 1973 when Professor Sir James Lighthill famously critiqued the field by stating that AI had not fulfilled its promising potential, leading to a significant reduction in governmental support and intensifying the AI winter. During this challenging time, Raj Reddy, a prominent computer scientist, published a comprehensive review titled "Speech Recognition by Machine: A Review" in 1976, which surveyed the advancements and ongoing challenges in natural language processing. Despite the funding setbacks, 1979 saw the creation of the "Stanford cart," an early autonomous vehicle capable of navigating a room without colliding with obstacles. This invention underscored the continued potential and resilience of AI research even during periods of reduced support and skepticism.

#### ***2.1.2.5 THE REVIVAL OF AI (FROM 1980 TO 1987)***

The development of voice recognition systems in the previous decade reignited interest in AI, prompting researchers to explore new dimensions and revive research in the field. It's important to highlight some key advancements during this period that significantly contributed to AI progress. In 1981, the Japanese government launched "The Fifth Generation Computer Project," a large-scale initiative aimed at creating computers using massively parallel computing and logic programming to revolutionize technology. This project marked a significant national commitment to advancing

AI technology.

Additionally, in 1982, a notable advancement in neural networks emerged with the development of the 'Hopfield Net' by John Hopfield. This new form of neural network was capable of learning and processing information autonomously, without human intervention, representing a major step forward in machine learning.

By 1984, amidst these technological strides, notable figures such as Schank and Marvin Minsky issued a cautionary prediction about the future of AI. They suggested that AI development had reached a peak from which a downturn was likely; however, their forecasted AI winter did not materialize for another three years, allowing further advancements to take place.

One such advancement came in 1986, when Mercedes-Benz introduced the first "Driverless Car." Developed under the guidance of Ernst Dickmanns, this vehicle was equipped with cameras and sensors, enabling it to navigate empty streets at speeds up to 55 mph. This pioneering project demonstrated the practical application of AI technologies in automotive navigation and safety, setting a foundation for future developments in autonomous vehicles.

#### ***2.1.2.6 ANOTHER AI WINTER (FROM 1987 TO 1993)***

During this phase, it became apparent that the expert systems developed previously were limited to handling specific scenarios and soon might not meet the heightened expectations set by their promoters.

Globally, scepticism about AI's potential grew, leading many companies to withdraw their investments from AI research. Even the US Defence Advanced Research Projects Agency (DARPA) displayed a lack of confidence in AI's broader capabilities, choosing instead to fund projects with more clearly defined and achievable goals. Consequently, only a few significant developments emerged during this period, yet some of them were noteworthy.

In 1988, Rollo Carpenter introduced "Jabberwacky," an early AI chatbot designed to engage users in natural and entertaining conversations, mimicking human-like interactions. This innovation sought to make digital communication more engaging and less mechanical.

That same year, IBM pioneered "Candide," an autonomous translation system, which was one of

the first to use a statistical approach to language translation. The details of this ground-breaking system were elaborated in a research paper, marking a significant advancement in machine translation technology.

In 1990, Allen Newell proposed the development of 'unified theories of cognition.' His visionary concept aimed to create a comprehensive framework that would include language, learning, motivation, imagination, self-awareness, and encompass the entire spectrum of human intellect. Newell's advocacy highlighted a critical need for broader, more integrated approaches in AI research to truly mimic the complex nature of human thought and behaviour.

#### ***2.1.2.7 THE BOOM OF AI (FROM 1993 TO 2016)***

The period from 1993 to 2016 marked a significant resurgence in AI development, characterized by remarkable breakthroughs and rapid progress, making it aptly known as the boom period of AI. This era was distinguished by the accumulation of vast amounts of big data, which facilitated several groundbreaking achievements in the field. Here are some of the key developments that were particularly relevant to this research, presented in chronological order:

In 1994, the AI landscape was notably advanced by "Chinook," a checkers-playing AI program that became the first computer program to win a world checker championship title against a human. This marked a significant milestone in demonstrating AI's capabilities in strategic game-playing. Further elevating AI's profile in competitive gaming, 1997 witnessed a monumental achievement by IBM with the introduction of "Deep Blue," a chess-playing supercomputer. Deep Blue made history by defeating the world's reigning chess champion, Garry Kasparov, showcasing the sophisticated strategic thinking and processing power AI systems could achieve.

The year 1999 ushered in another transformative concept with the introduction of the "Internet of Things (IoT)" by Kevin Ashton. IoT refers to a network of interconnected, Internet-enabled devices that communicate and operate seamlessly through the web. These devices heavily rely on AI to function effectively, enhancing automation and efficiency in everyday objects, thus embedding AI more deeply into the fabric of daily life. This integration of AI with IoT represents a significant leap towards a more connected and intelligent global infrastructure.

## CHAPTER – II

### INTEGRATION OF ARTIFICIAL INTELLIGENCE IN THE LEGAL FIELD

*“I’m increasingly inclined to think that there should be some regulatory oversight, maybe at the national and international level, just to make sure that we don’t do something very foolish. I mean with artificial intelligence we’re summoning the demon.”*

*—Elon Musk warned at MIT’s AeroAstro Centennial Symposium*

Artificial intelligence (AI) has emerged as a valuable tool in law and legal studies. Within AI, there is a specific subfield dedicated to legal applications, known as "artificial intelligence and law." This subfield focuses on leveraging AI to address and potentially simplify legal challenges. Moreover, the tools and techniques developed for legal-specific problems often contribute to advancements in AI more broadly.

Legal scholars recognize the utility of AI particularly for legal reasoning, a broad concept that involves forming and justifying responses to complex legal questions. Such questions might concern the outcome of a trial or the specifics of tax obligations. AI enhances legal reasoning by enabling efficient searches through extensive databases of legal texts to pinpoint relevant cases for ongoing judicial proceedings. This capability greatly streamlines legal research by filtering out extraneous information. Additionally, some AI applications, known as expert or knowledge-based systems, can independently reason and offer specific solutions. According to Susskind, legal expert systems can be categorized into five types:

1. Diagnostic Systems: These provide specific solutions to problems.
2. Planning Systems: These offer strategies to achieve desired legal outcomes.
3. Procedural Guides: These assist users in navigating complex legal procedures.
4. Intelligent Checklists: These help ensure compliance with legal requirements.
5. Document Modeling Systems: Also known as document assembly systems, these generate legal documents from templates based on user instructions.

Document modeling systems come in two forms: procedural systems and expert systems. Procedural systems, which guide users through predefined steps to predetermined outcomes, do not qualify as AI because they do not involve autonomous decision-making. Expert systems, in

contrast, analyze rules from their knowledge bases to generate decision trees that address complex queries, including those posed in natural language.

The representation of legal knowledge and its evaluation is crucial yet challenging due to the open-ended and interpretative nature of law, which often involves balancing conflicting interests and values. Addressing ambiguities in natural language and representing legal concepts like causality, psychological states, and temporal effects are significant hurdles in legal AI.

Despite these challenges, AI's applications are increasingly utilized in various legal contexts. For instance, AI aids in the formalization of legislation to clarify ambiguities, supports the drafting of new laws, and models legal precedents. Legal professionals use AI tools for tasks such as identifying problematic clauses in contracts or devising strategies for intellectual property lawsuits. Additionally, AI is used in online dispute resolution platforms, such as those for e-commerce disagreements, and might one day automate certain judicial decisions, raising questions about transparency and oversight.

AI's potential extends into law enforcement, where it could support or even integrate into police work through autonomous robots. In digital forensics, AI's ability to sift through and analyze large volumes of data helps identify key pieces of evidence and predict crime scene opportunities for gathering forensic samples. As AI continues to evolve, its role in enhancing transparency, accountability, and efficiency in legal processes will only increase, albeit with a need for careful management of ethical considerations and public trust.

### 3.1 APPLICATIONS OF AI IN THE LEGAL FIELD

AI has firmly established its presence in the legal community, and its role is set to expand significantly, influencing a broad spectrum of legal tasks. From drafting contracts to reviewing documents and analyzing legal scenarios, AI's integration into legal practices is enhancing the efficiency and capacity of attorneys in client representation. By automating what were once time-intensive tasks, AI enables legal professionals to allocate more time to complex, high-level activities that require their expert attention.

AI operates through sophisticated software programmed to execute specific algorithms—coded instructions that allow it to process, analyze, and recognize patterns within vast datasets. This capability enables AI to draw conclusions, predict outcomes, and make well-informed decisions

based on the analyzed data. The core components of AI include machine processing, learning, perception, and control. Here, 'machine' refers to an AI system, which could be a piece of software or an interconnected network driving a more complex apparatus. AI involves training these systems to discern patterns in data, leading to actionable insights and decisions. The effectiveness of AI is directly proportional to the volume of data it processes; the larger the dataset, the more refined the AI's learning and output.

AI's capacity to generate actual work products and perform legal analyses is distinct from mere information retrieval systems like search engines, which require human intervention to translate search results into actionable insights. While AI's potential in the legal domain is vast, it also comes with inherent risks and must be adopted with careful consideration as the field continues to evolve.

### **Use of AI in the Legal Profession:**

The application of AI in law offers numerous benefits:

- **Contract Preparation and Review:** AI can automatically draft initial versions of legal documents such as contracts, briefs, and letters, suggesting optimal legal language. It can also scrutinize agreements to identify and rectify issues such as inconsistencies or erroneous terms.
- **Document Review and Organization in Litigation:** In complex litigation involving extensive document reviews, AI can swiftly locate relevant documents by searching for specific subjects, names, places, dates, or keywords, thus aiding lawyers in managing otherwise overwhelming reviews. This not only saves time but also reduces the costs and errors associated with manual document examination.
- **Due Diligence in M&A and Transactions:** Similar to its role in litigation, AI tools streamline the due diligence process in mergers, acquisitions, and other transactions by retrieving documents critical for thorough evaluations.
- **Legal Research:** AI enhances legal research by summarizing key elements of cases and judicial decisions and enabling rapid searches across expansive legal databases. This assists lawyers in gathering pertinent data, precedents, and legal statutes efficiently.

- **Predictive Case Analysis:** AI can evaluate the potential merits of a case and forecast outcomes, using predictive coding to analyze relevant data. This helps legal professionals make more informed decisions and better assess risks.
- **Document Organization and Management:** AI-driven document management systems allow lawyers to efficiently store, organize, and access critical legal files and communications, enhancing both productivity and data security.
- **Judicial Determinations:** In some jurisdictions, AI is being explored to aid judges in making informed sentencing and bail decisions.

As AI continues to integrate into the legal sector, it should be viewed as a supplementary tool that enhances, rather than replaces, the nuanced work and diligence of human attorneys. Legal professionals must maintain oversight and apply their judgment to ensure that AI-supported decisions are both accurate and justifiable.

As AI technology advances, it promises not only to revolutionize routine tasks but also to introduce new levels of sophistication to the practice of law, thereby reshaping the landscape of legal services.

### 3.2 THE FUTURE OF AI IN THE LEGAL FIELD

#### 1. Enhanced Legal Research and Analysis

Future advancements in AI will dramatically enhance the capabilities of legal research tools, enabling them to provide not only vast information retrieval but also deep contextual analysis, trend forecasting, and predictive insights. Utilizing sophisticated machine learning algorithms, these tools will parse through decades of case law, statutes, legal precedents, and ongoing litigation to identify patterns and predict outcomes. AI will be capable of suggesting the likelihood of a lawsuit's success based on factors like similar historical cases, past rulings by the presiding judge, and prevailing legal trends. This depth of predictive analysis will allow lawyers to strategize more effectively, manage client expectations, and tailor their legal approaches to suit specific judicial environments. Additionally, AI will enhance the granularity of legal research, pinpointing nuances and subtleties in case law that might be overlooked by human researchers, thus providing a richer, more comprehensive legal analysis.

#### 2. Automation of Routine Legal Tasks

As AI technology evolves, its potential to automate a wider array of routine and administrative tasks within legal practices will increase significantly. Future AI systems are expected to handle not only document sorting and billing but also complex scheduling, client communications, and preliminary legal drafting. This level of automation will increase operational efficiency, reduce the scope for human error, and free up legal professionals to focus on more substantive and strategic aspects of their work. Moreover, AI-driven automation will streamline the management of legal cases, from initial client intake to final billing, ensuring that every stage of the legal process is optimized for efficiency and accuracy.

### 3. Predictive Litigation and Legal Analytics

AI systems will become indispensable tools for predictive litigation, offering detailed assessments of the potential outcomes of legal cases before they reach trial. By analyzing data from similar precedents, AI tools can provide probabilistic assessments and statistical evaluations of case results, which can guide lawyers in deciding whether to settle or proceed to court. Legal analytics powered by AI will also help law firms identify profitable cases, understand trends in judicial decisions, and optimize legal strategies accordingly. These analytics can transform how law firms approach case selection, preparation, and management, ultimately leading to better outcomes and higher efficiency.

### 4. Personalized Legal Services

AI's capability to customize legal services to individual client needs will see significant advancements. Systems will analyze historical data on clients' previous legal issues, outcomes, and preferences to offer customized advice and strategies. This personalization will not only improve client satisfaction but also enhance the efficacy of legal interventions. Additionally, AI could facilitate the creation of dynamic legal profiles for clients, continuously updated with new data and interactions, which would enable even more precise customization of legal services over time.

### 5. Contract Management and Analysis

The future of contract management and analysis in AI involves far more sophisticated and interactive tools. AI will not only be used for drafting and reviewing contracts but will also negotiate them autonomously with counterparties' AI systems, using advanced natural language processing to understand and advocate for client interests. Post-signature, AI systems will monitor



compliance with contractual terms, alerting parties to potential breaches before they occur, and even automate certain dispute resolution processes without human intervention. This proactive approach to contract management will mitigate risks and enhance contractual compliance across business operations.

## 6. Compliance and Regulatory Analysis

AI's role in compliance and regulatory analysis is set to expand enormously. Future AI systems will not only monitor changes in legislation but will also predict regulatory trends and analyze the implications for business operations across multiple jurisdictions. These systems will become essential for multi-national corporations facing diverse and sometimes conflicting regulatory environments. AI will also be integral in training corporate compliance officers, providing simulations and interactive learning experiences that adapt to evolving regulatory landscapes.

## 7. Document Review and Organization

In the area of document review, AI will handle increasingly large datasets with unprecedented precision and speed. Future AI will employ advanced semantic understanding and machine learning algorithms to categorize documents by relevance, sentiment, and legal significance more effectively than ever. This will substantially reduce the time legal professionals spend on document review, allowing them to concentrate on strategic aspects of case management.

## 8. AI in Judicial Systems

The judiciary will benefit from AI through systems designed to assist in processing cases, analyzing legal arguments, and even drafting judicial opinions. AI could be used to support judges with legal document analysis, precedent retrieval, and summarization of lengthy legal arguments, although careful checks and balances will be needed to maintain fairness and transparency in judicial processes.

## 9. Legal Education and Training

AI will radically transform legal education and professional training, making it more interactive, personalized, and efficient. AI-driven simulations and virtual reality (VR) environments will offer law students and professionals realistic scenarios to practice and hone their skills without the risks associated with real-world practice. This will enable a more experiential and effective learning

environment, better preparing legal professionals for the complex realities of modern legal practice. These future applications of AI in the legal industry highlight the potential for transformative changes that could enhance efficiency, accuracy, and service quality. However, as these technologies advance, the legal profession must also address the ethical, practical, and regulatory challenges that accompany their adoption, ensuring that AI's integration into legal systems enhances both justice and professional integrity.

### 3.3 IMPACT ON EMPLOYMENT

#### 1. Pre-AI Employment Landscape in the Legal Profession

Before the integration of AI, the legal industry heavily depended on large numbers of junior lawyers and paralegals who were primarily tasked with time-consuming and repetitive tasks. These foundational tasks, such as document sorting, legal research, and initial case assessments, while not intellectually demanding, played a crucial role in the functioning of legal practices. They provided a learning ground for entry-level lawyers, crucial for their growth and understanding of the legal field. Law firms structured their workforce in tiers, with these junior employees forming the base, supporting more senior lawyers who would handle complex negotiations, strategic decision-making, and courtroom appearances. This traditional setup was not only a rite of passage for new lawyers but also a critical economic model for law firms, balancing cost with billable legal services.

#### 2. Impact of AI on Legal Employment;

##### - Displacement of Routine Jobs

The advent of AI has brought about significant changes in the task distribution within law firms. AI's ability to automate routine and high-volume tasks such as document review and due diligence has diminished the need for large numbers of junior staff who would traditionally handle these roles. For example, AI systems can review thousands of documents for relevant information far quicker and more accurately than human counterparts. This capability significantly cuts down the time and manpower required for due diligence processes, impacting employment for those whose jobs consisted mainly of these tasks.

Moreover, the efficiency of AI in these areas challenges the traditional billing model of many law firms, which often rely on billing hours spent on such tasks. This shift not only affects the structure

and economics of law firms but also impacts the professional development of junior lawyers, who may no longer receive the same hands-on training in basic legal processes.

- Creation of New Technological Roles

While routine jobs are being automated, AI's integration into the legal field has spurred the creation of specialized roles that blend legal expertise with technological skills. These include positions such as legal technology advisor, AI policy analyst, and legal data scientist. Individuals in these roles focus on implementing AI technologies within legal frameworks, ensuring that AI tools comply with existing laws and ethical standards, and leveraging AI to improve and innovate legal services offered by their firms.

These new roles require a sophisticated understanding of both the capabilities of AI and the intricacies of legal work. As such, they tend to be more complex and demand higher levels of education and training, often resulting in higher remuneration and career advancement opportunities compared to traditional legal roles. Law schools and continuing legal education providers are increasingly incorporating courses on legal technology and AI, reflecting this shift in required professional skills.

- Shift Towards High-Value Work

With AI assuming responsibility for routine tasks, lawyers are progressively moving towards work that requires higher cognitive skills and human empathy, such as complex litigation, intricate contract negotiations, and high-level client consulting. This transition is also enabling lawyers to focus more on strategic aspects of legal work, such as developing broader legal strategies, engaging more deeply in client relations, and pursuing new business opportunities.

AI's role in data analysis and pattern recognition further assists lawyers by providing them with insights and predictive analytics that inform their case strategies and potential outcomes. This allows lawyers to approach cases with a greater strategic depth, potentially leading to better outcomes for clients and more efficient legal processes.

Overall, as AI technologies continue to permeate the legal industry, they are reshaping the employment landscape by reducing demand for roles focused on routine tasks while simultaneously creating new opportunities for tech-savvy legal professionals and shifting the focus of traditional legal work towards more intellectually demanding and strategic activities.

### 3.4 INTEGRATION OF AI IN THE JUDICIAL SYSTEM

India's judiciary, plagued by backlog issues, has been progressively integrating AI to expedite the resolution of pending cases and enhance overall judicial efficiency. According to the National Judicial Data Grid, the adoption of AI and other technological solutions is increasingly seen as a critical element in reforming the judicial process.

#### 1. E-Courts Project

Launched in 2013, based on the "National Policy and Action Plan for Implementation of Information and Communication Technology (ICT) in the Indian Judiciary – 2005," the E-Courts Project was designed to leverage ICT for enhancing the efficiency of courts. The E-Courts portal provides a centralized platform where citizens can access case status, cause lists, orders, and judgments from any subordinate court in the country. This digital access reduces physical barriers and streamlines case handling, providing a significant boost in managing the caseload effectively.

#### 2. Supreme Court Vidhik Anuvaad Software (SUVAS)

In 2019, the Supreme Court of India introduced SUVAS, an AI-driven translation tool specifically designed for the judicial domain. This tool facilitates the translation of English judicial documents into nine vernacular languages and vice versa, utilizing natural language processing techniques. SUVAS enhances the accessibility of legal documents for a broader segment of the population, thus promoting greater inclusivity in legal processes.

#### 3. SCI-Interact

Developed in 2020, SCI-Interact is a software initiative by the Supreme Court to transition towards paperless operations across its 17 benches. This tool allows judges to access files, annexures, and notes digitally, streamlining the review process and significantly reducing the reliance on physical documents.

#### 4. Supreme Court Portal for Assistance in Court's Efficiency (SUPACE)

Launched in 2021, SUPACE is an AI-driven research portal aimed at simplifying legal research for judges. It uses machine learning to process vast amounts of data involved in case filings. This tool is designed to assist with legal research, data mining, and case progress projections, thereby reducing the judges' workload and improving courtroom efficiency.

## 5. Recent Developments and Applications of AI in Indian Courts

In March 2023, a notable instance occurred where the Punjab & Haryana High Court utilized the AI tool ChatGPT to decide a bail application. This marked a significant precedent, showing the potential of AI to contribute directly to legal reasoning and judicial decision-making. The use of ChatGPT to analyze global legal jurisprudence demonstrates the growing reliance on AI to provide informed, data-backed insights in complex legal matters.

### Global Usage of AI in Judicial Systems

#### 1. COMPAS in the U.S.

The Correctional Offender Management Profiling for Alternative Sanctions (COMPAS) is an AI tool used in U.S. courts to assess the risk of recidivism, thereby informing parole and sentencing decisions. This tool analyzes data from a comprehensive questionnaire and criminal profiles to assign risk scores to offenders, aiding in more informed judicial decisions.

#### 2. HART in the UK

The Harm Assessment Risk Tool (HART) is used in the UK to predict which criminals are most likely to reoffend. By analyzing historical data from custody suites, HART helps in determining the supervision level necessary for different offenders, thereby assisting in better management of criminal rehabilitation and community safety.

#### 3. VICTOR in Brazil

VICTOR is an AI tool employed by the Brazilian Supreme Court for preliminary case analysis, aiming to reduce the burden on the courts. It analyzes documents and assists in managing the case load by providing preliminary insights, showcasing how AI can aid in the efficient handling of high case volumes.

The integration of AI across global judicial systems showcases a significant shift towards technology-driven legal processes. Each of these examples illustrates how AI is being tailored to meet specific needs within the judiciary, from automating routine processes to assisting in complex legal analyses and decisionmaking. As these technologies continue to evolve, their potential to transform the legal landscape becomes increasingly apparent, promising more efficient, accessible,

and transparent judicial processes.



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