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THE EVOLUTION OF ARTIFICIAL INTELLIGENCE IN THE FIELD OF LAW

The article examines the historical development of using artificial intelligence in the legal field and suggests a periodization of this process into six key stages. Each of these stages is marked by unique achievements and contributions to the automation and optimization of various aspects of legal work.

Such a review of the historical context is intended to emphasize the importance of the role of artificial intelligence in contemporary legal practice and provide readers with a deeper understanding of how these technologies have evolved over time, impacting the work of lawyers and legal departments.

This article presents a comprehensive overview of the historical development of artificial intelligence (AI) in the legal field, categorized into six distinct stages. The initial stage, dating back to the 1960s and 1970s, saw the emergence of expert systems, which simulated decision-making processes of human experts in specific legal domains. The subsequent stage, in the 1980s and 1990s, focused on automating document-related tasks, making legal research more efficient.

The early 2000s marked the third stage, characterized by advancements in natural language processing and E-Discovery, significantly improving electronic data analysis in legal contexts. Moving to the 2010s, the fourth stage brought about the analysis and management of contracts with AI tools, streamlining the process and enhancing precision. From 2010 to 2020, the fifth stage introduced predictive analytics, revolutionizing economic and business forecasting with AI algorithms.

The current era, from 2020 onwards, represents the sixth stage, highlighting the automation of legal processes using AI. This automation enhances efficiency, reduces errors, and allows for rapid processing of large volumes of legal data. While AI augments various aspects of legal work, it doesn't replace the need for legal professionals, particularly in complex and strategic legal matters. Various AI tools and platforms like ROSS, Kira, Lex Machina, and Casetext are now widely utilized to optimize legal tasks and support informed decision-making in law firms and legal departments.

Key words: *artificial intelligence, legal field, historical development, automation, technology.*

Бессонов О. В. Еволюція штучного інтелекту у галузі права

У статті досліджено історичний розвиток використання штучного інтелекту в правовому полі та запропоновано періодизацію цього процесу на шість основних етапів. Кожен із цих етапів відзначається унікальними досягненнями та внеском в автоматизацію та оптимізацію різних аспектів юридичної роботи.

Такий огляд історичного контексту має на меті підкреслити важливість ролі штучного інтелекту в сучасній юридичній практиці та дати глибше розуміння того, як ці технології розвивалися з часом, впливаючи на роботу юристів і юридичних відділів.

У цій статті подано вичерпний огляд історичного розвитку штучного інтелекту (ШІ) у сфері права, розділений на шість окремих етапів. На початковому етапі, починаючи з 1960-х і 1970-х років, з'явилися експертні системи, які моделювали процеси прийняття рішень людьми-експертами в конкретних правових областях. Наступний етап, у 1980–1990-х роках, був зосереджений на автоматизації завдань, пов'язаних з документами, що зробило юридичні дослідження більш ефективними.

Початок 2000-х років ознаменував третій етап, який характеризується прогресом у обробці природної мови та E-Discovery, значно покращивши аналіз електронних даних у правовому контексті. Переходячи до 2010-х років, четвертий етап привів до аналізу та управління контрактами за допомогою інструментів штучного інтелекту, спрощення процесу та підвищення точності. З 2010 по 2020 роки на п'ятому етапі була представлена прогнозна аналітика, яка революціонізувала економічне та бізнес-прогнозування за допомогою алгоритмів штучного інтелекту.

Нинішня епоха, починаючи з 2020 року, представляє шостий етап, який підкреслює автоматизацію судових процесів за допомогою штучного інтелекту. Ця автоматизація підвищує ефективність, зменшує кількість помилок і дозволяє швидко обробляти великі обсяги юридичних даних. Хоча штучний інтелект розширює різні аспекти юридичної роботи, він не замінює потреби в професіоналах з права, особливо в складних і стратегічних юридичних питаннях. Різні інструменти та платформи штучного інтелекту, такі як ROSS, Kira, Lex Machina та Casetext, зараз широко використовуються для оптимізації юридичних завдань і підтримки прийняття обґрунтованих рішень в юридичних фірмах і юридичних відділах.

Ключові слова: *штучний інтелект, правова сфера, історичний розвиток, автоматизація, технології.*

Introduction. Studying the history of processes and phenomena is essential for several reasons. It helps us comprehend the evolution of these processes and phenomena over time. Without historical context, making informed decisions or drawing significant conclusions about the present becomes challenging. Furthermore, historical data allows us to identify patterns and trends in various phenomena. This can be especially important for forecasting, understanding cycles, and recognizing potential warning signs. Historical models and trends can inform our decision-making processes. History is replete with examples of innovation, progress, and human achievements. Therefore, delving into the history of processes and phenomena is vital for making informed decisions, aiding our understanding of the world around us, navigating complex issues, and planning.

Problem Statement. The purpose of this article is to investigate the evolution and development of artificial intelligence in the field of law. It aims to analyse the historical stages of AI usage in legal processes, from the early expert systems to contemporary applications in contract analysis, predictive analytics, and legal procedure automation. This article seeks to highlight the achievements, challenges, and prospects of using artificial intelligence in the legal domain, as well as defining its role in the modern legal environment.

Research Findings. It is worth concurring with E. Gold, who notes that humans have always shown an interest in developing machines with certain attributes of intelligence. An outstanding example can be found in the works of the ancient Greek engineer Hero of Alexandria. In the 1st century AD, Hero created numerous automatons, including a fully automated game lasting almost ten minutes, set in motion by a binary system of ropes, knots, and simple machines operating on a rotating cylindrical gear. An extraordinary illustration of early computational thinking and mechanical sophistication is the Antikythera mechanism. This ancient Greek device, created around

the end of the 2nd century BC, functioned as an analog computer for predicting astronomical positions and eclipses for calendar and astrological purposes [1].

Medieval legends abound with tales of objects imbued with motion and speech, resembling puppets. There are even stories of sages possessing homunculi – tiny artificial humans who, according to legend, had their own intelligence [2]. Ancient analogues of artificial intelligence include automata, self-operating machines designed to perform a pre-defined sequence of operations. Ancient civilizations often created automata to mimic human or animal actions, and these machines were typically used for entertainment, religious practices, or to showcase technological prowess [1].

In 1623, W. Schickard created a device called the "calculating clock," which allowed him to perform arithmetic operations entirely mechanically, automating functions previously done manually. He also invented several machines for various purposes, with his most notable contributions being the first mechanical calculator and a machine for studying Hebrew grammar [3].

In the 16th century, Swiss philosopher T. Paracelsus expressed the idea that "we will become gods" and "reproduce God's greatest miracle – the creation of man" [2].

In 1822, Charles Babbage could have developed and partially constructed a mechanical calculator capable of performing calculations in numerical function tables using the method of finite differences. He also designed an analytical engine for tabulation or computational programs, including his invention of the differential machine [3].

In 1830, Ada Lovelace created a device that could theoretically be programmed and reprogrammed to perform various tasks, not limited to mathematical calculations. This device could process symbols, words, and even music [3].

All these inventions essentially served as prototypes of artificial intelligence. The term "artificial intelligence" was officially introduced in 1956 after Marvin Minsky and John McCarthy conducted an approximately eight-week summer research project on artificial intelligence (DSRPAI) at Dartmouth College in New Hampshire. The goal of DSRPAI was to bring together researchers from various fields to create a new area of study aimed at developing machines capable of simulating human intelligence [4, p. 5]. It was during this time that John McCarthy defined artificial intelligence as the science of creating intelligent machines and computer programs [5, p. 13].

Indeed, the latest attempt to create synthetic intelligence is known as artificial intelligence. However, the mentioned historical events and phenomena characterize the peculiarities of the historical development of artificial intelligence. Instead, we set ourselves a narrower task: to study the retrospective development of artificial intelligence specifically in the legal field. A systematic analysis of scientific and analytical literature allowed us to identify several historical stages in the development of artificial intelligence in the legal field, each of which is characterized by significant achievements.

In our opinion, the historical stages of the development of artificial intelligence in the legal field include:

1) Emergence of expert systems (1960s–1970s).
2) Document automation (1980s–1990s).
3) Natural language processing and E-Discovery (2000s).
4) Contract analysis and management (2010s).
5) Predictive analytics (2010s–2020s).
6) Legal process automation (from 2020 to the present).

We propose to focus on each of these stages. The first stage marks the emergence of expert systems (1960s–1970s). During this stage, expert systems based on artificial intelligence rules programs came into existence. They could mimic the decision-making processes of human experts in specific legal domains.

Expert systems are computer programs that collect and store knowledge in specific areas, accumulated by expert professionals. They are designed to make informed decisions when processing information. Expert systems transform the expertise of professionals into a set of

heuristic rules and can provide consultations to less experienced experts [6]. The main advantage of expert systems is the storage and accessibility of accumulated knowledge over an extended period. They are also noted for their objectivity when working with information, which enhances the quality of expert assessments. In solving tasks that require processing large amounts of data, expert systems minimize the possibility of errors [6].

Expert systems are also actively used for the analysis of legal documents, contracts, and agreements to identify potential issues, inconsistencies, or clauses that may require attention. They can assist in proper review processes, contract management, and compliance checks.

The second stage in the historical development of artificial intelligence in the legal field is the automation of documents (1980s–1990s). During this period, artificial intelligence technologies were applied to automate the creation of legal documents and enhance legal research. Document assembly software helped create legal documents based on templates and made legal research more efficient.

In general, artificial intelligence-based document automation software is designed to automatically review, extract, organize, and store data from standard documents, such as invoices or tax documents. This process mainly involves transferring data stored in unstructured formats (such as PDF files and paper documents) into structured formats (such as an accounting system) where data can be easily and efficiently processed and stored for record-keeping purposes. Artificial intelligence document processing software can help organizations save time in handling business documents, such as invoices [7].

The third stage in the historical development of artificial intelligence in the legal field is natural language processing and E-Discovery (2000s). With the advancement of more sophisticated natural language processing (NLP) algorithms, artificial intelligence became capable of processing and understanding human language. This led to progress in electronic search tools used for analysing vast amounts of electronic data in search of relevant legal information, reducing the time and costs associated with legal proceedings.

E-Discovery encompasses more than traditional (narrowly defined) Information Retrieval (IR); basic search, review, and analytical tasks cannot be performed in isolation. To be effective, they depend largely on the stages of information identification, collection, transfer, and indexing that precede them [8, p. 323].

While the use of natural language processing and E-Discovery tools offers clear advantages in the legal field, it's important to acknowledge that these tools are not without challenges. Implementing these technologies requires initial investments and, in some cases, specialized training. Additionally, ensuring data security and confidentiality in the context of E-Discovery is crucial. Despite these challenges, the timesaving, cost-reducing, and document review accuracy-enhancing benefits make natural language processing and E-Discovery tools valuable assets for law firms and lawyers. These technologies help legal teams remain competitive, especially when dealing with increasing volumes of electronically stored information (ESI) in the digital age.

The fourth stage in the historical development of artificial intelligence in the legal field is contract analysis and management (2010s). It was in the early 2000s that artificial intelligence-based contract analysis and management tools gained popularity, offering the ability to review, extract, and manage the clauses and terms of contracts. These tools were particularly valuable for corporate legal departments, making contract management more efficient.

The most effective way to incorporate artificial intelligence into contract analysis is to assign it repetitive manual tasks that don't require the expertise of a highly skilled legal team. Through data analysis, artificial intelligence empowers the legal team to update contracts in real-time. Since all information in contracts is now searchable, organized, and visible to relevant parties in a user-friendly format, responsible parties can be held accountable for their actions [9].

The fifth stage in the historical development of artificial intelligence in the legal field is the emergence of predictive analytics (2010–2020s). Predictive analytics based on artificial intelligence systems began to be used for economic and business forecasting. It involved the use of statistical algorithms in combination with internal and external data to predict future trends,

enabling businesses to optimize inventory, reduce delivery times, increase sales, and ultimately cut operational costs. In combination with artificial intelligence, the information obtained from these advanced systems is the key to more accurate and timely forecasting in the future.

Artificial intelligence-driven tools provided insights into potential legal decisions and trends, assisting lawyers in their strategies. The latest advancements in machine learning allow for the use of unsupervised machine learning (UML) technology to predict events and analyse causal relationships. Unsupervised machine learning is a subfield of machine learning that uses algorithms to detect patterns and relationships in data without the need for data labels or annotations. This makes unsupervised machine learning a powerful tool for understanding complex systems and uncovering hidden connections [10].

All these and other ways of using unsupervised machine learning in the legal field can help lawyers and organizations improve the efficiency and accuracy of their work.

The sixth stage in the historical development of artificial intelligence in the legal field is the automation of legal processes (from 2020 to the present). The current stage is focused on automating various legal processes. While the previous stages involved the implementation of specific manifestations, methods, and technologies in various areas of legal activity, the automation of legal processes using artificial intelligence completes the digitalization of all aspects of professional legal activity.

The advantages of automating legal proceedings with the help of artificial intelligence include increased efficiency, reduced human errors, improved cost-effectiveness, and the ability to process large volumes of data and documents more quickly. However, it is important to note that while artificial intelligence can enhance various aspects of legal work, it does not replace the need for legal professionals, especially in complex, strategic, and nuanced legal matters. Some examples of artificial intelligence tools and platforms for legal automation include ROSS, Kira, Lex Machina, and Casetext, among others. These tools are used by law firms, legal departments, and organizations to optimize legal tasks and ensure more informed decision-making [10].

Conclusions. In summary, it is worth noting that because of analysing the historical development of artificial intelligence usage in the legal field, a periodization comprising six main stages has been proposed. The first stage covers the emergence of expert systems in the 1960s and 1970s, followed by the second stage, the automation of documents in the 1980s and 1990s. The third stage involves the development of natural language processing and E-Discovery, which occurred in the early 2000s. The fourth stage is the analysis of contracts and their management, identified in the 2010s. The fifth stage encompasses predictive analytics, considered during the period from 2010 to 2020. Finally, the sixth and latest stage is the automation of legal processes, which began in 2020 and continues to the present day.

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