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Serhiy Dashkevych*

PhD, Associate Professor

West Ukrainian National University

46009, 11 Lvivska Str., Ternopil, Ukraine

<https://orcid.org/0009-0002-4088-7729>

Implementation of artificial intelligence in modern judiciary

Abstract. The purpose of the article was to explore the issue of implementing AI in the judiciary, the challenges involved, and existing solutions. The study employed methods of comparative analysis of international experience, an examination of Ukraine's legal framework, as well as an analysis of the ethical and socio-legal aspects of AI application. It was established that algorithms trained on historical data may inadvertently reinforce or exacerbate existing biases. This creates a risk of unfair outcomes, undermining the principle of justice—the cornerstone of the judicial system. It was noted that the complexity of legal systems poses challenges for AI implementation. Laws vary across jurisdictions, and the nuances of legal reasoning are difficult to codify into algorithms. AI applications must be adapted to specific legal frameworks, requiring significant investments in customisation and continuous updates to keep pace with legal reforms. The article highlighted international examples of successful AI integration into judicial systems. It was found that AI integration could support ongoing judicial reform efforts in Ukraine by promoting transparency and reducing opportunities for corruption. AI tools can monitor case processing and flag violations, increasing accountability within the system. However, these advancements must be accompanied by robust training programs for legal professionals to ensure they understand AI applications and trust them. A balanced regulatory approach is needed to mitigate risks and maximise benefits. By addressing ethical concerns, ensuring data security, and adapting solutions to local needs, AI can become a powerful tool for advancing justice. AI tools can facilitate judicial reform by reducing corruption and enhancing accountability. However, effective AI utilisation requires appropriate training for legal professionals to ensure proper understanding of the technology and its correct interpretation

Keywords: legal technologies; automation; international experience; justice; machine learning

INTRODUCTION

The modern world, driven by innovative technologies, is undergoing radical changes in all spheres of life, including the judiciary, which is built on centuries-old traditions and established procedures. The implementation of AI has the potential to accelerate the pace and efficiency of judicial processes, reduce the workload on judges, and eliminate subjective human factors. At the same time, serious issues arise regarding the ethical acceptability, transparency of AI algorithms, and accountability for decisions made by artificial intelligence. The importance of this issue is further emphasised by the

lack of regulatory frameworks in Ukraine that would establish a legal basis for the use of AI in judicial practice.

There are numerous scientific reports on the implementation of AI in the field of justice. The study by N. Aletras *et al.* (2016) demonstrated that machine learning is used to predict court decisions based on the analysis of case law and statistical data. The authors found that AI algorithms can predict case outcomes with high accuracy, opening up opportunities for the automation of judicial analytics and the improvement of law enforcement. J.C. Allen (2020) examined the role of artificial

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*Corresponding author



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intelligence in the legal system, particularly its ability to simplify legal procedures and enhance the efficiency of judicial research. He emphasised potential benefits such as the rapid processing of large volumes of legal information but also highlighted challenges, including possible algorithmic bias and ethical concerns regarding AI use in the judiciary. Ukrainian researchers have also contributed to the discussion of this topic.

Researchers D.M. Byelov & M.V. Byelova (2023) analysed the potential and risks of using artificial intelligence in judicial processes. They emphasised the need to develop transparent algorithms that ensure fairness in court decisions, as well as the importance of creating legal mechanisms of checks and balances to prevent abuses. K.D. Holosiy (2023) examined the challenges faced by the Ukrainian judiciary in implementing artificial intelligence. He highlighted the lack of necessary digital infrastructure and stressed the need for legal reform to ensure the effective integration of technology into the judicial system. Additionally, he pointed out the necessity of training qualified professionals capable of working with new technologies in the legal field. D.O. Savytskyi (2024) also described the use of artificial intelligence in judicial decision-making, emphasising the balance between technological progress and fundamental legal principles. The specifics of AI implementation in the judicial system depend on several factors, including technical readiness, human resources, and the existence of a regulatory framework. Other international studies focus on legal and ethical considerations.

M.N. Greenstein (2020) emphasised the ethical duty of judges to incorporate artificial intelligence into the decision-making process, focusing on the need to establish clear guidelines for AI accountability. M.L. Shope (2021) examined documentation requirements for AI datasets and machine learning models, advocating for greater transparency in AI-based judicial processes. By bridging the gaps between legal values and technological advancements, this work contributes to discussions on the role of artificial intelligence in ensuring justice and the proper functioning of the judiciary.

Research on the application of artificial intelligence in judicial proceedings and decision-making is actively conducted in fields such as law, computer science, statistics, and machine learning. It is essential to weigh all the disadvantages and advantages of artificial intelligence and gradually and skillfully integrate it into modern jurisprudence, simplifying and automating the process. This study aimed to assess the feasibility of

implementing artificial intelligence in the judicial system of Ukraine, taking into account its advantages, risks, and regulatory issues. It is focused on addressing ethical concerns, evaluating existing regulatory frameworks, and providing recommendations for the use of AI in lawful judicial proceedings.

MATERIALS AND METHODS

The methodology of this study was based on a comprehensive approach using theoretical methods to analyse the potential of AI in judicial systems. The research process began with an extensive review of relevant literature to understand global trends in the implementation of AI in legal systems. The selected materials included peer-reviewed articles, policy documents, and official reports related to the ethical, legal, and technical aspects of AI. Key sources included J.C. Allen (2020), D.M. Byelov & M.V. Byelova (2023), N.R. Lashchuk & I.R. Serkevych (2024), which provided foundational understanding of the role of artificial intelligence in judicial decision-making. These materials created the theoretical foundation for comparing international practices and assessing their relevance to Ukraine.

The comparative analysis method was used to study the implementation of AI in various countries (USA, UK, Norway). Specific examples, such as the “robot judge” in Norway (Sobol & Habelko, 2023) for small claims, were considered to evaluate their effectiveness and ethical consequences. A crucial aspect of this research was the analysis of legislation. The study assessed the legislative framework of Ukraine, particularly the Decree of the Cabinet of Ministers of Ukraine No. 1556-r¹, to determine the country’s readiness for AI integration. This analysis identified regulatory gaps and areas in need of reform to facilitate the use of AI in the judicial system.

Ethical considerations were an integral part of the study. The research critically examined risks such as algorithmic bias and the consequences of decisions based on AI. Sources such as M.N. Greenstein (2020), M.L. Shope (2021), and the National Center for State Courts (2024) were used to explore transparency and accountability in AI systems, ensuring public trust in judicial outcomes facilitated by AI.

The study also acknowledged several limitations, including the lack of empirical data on the implementation of artificial intelligence in Ukraine and the difficulty of translating legal reasoning into algorithms. To overcome these challenges, the research relied on international practices and theoretical models (Cherevko, 2024;

¹ Decree of the Cabinet of Ministers of Ukraine No. 1556-r. “On the Approval of the Concept of the Development of Artificial Intelligence in Ukraine”. (2020, December). Retrieved from <https://zakon.rada.gov.ua/laws/show/1556-2020-%D1%80#Text>.

Clio, 2024; The Artificial Intelligence Act, n.d.) to propose solutions tailored to the judicial needs of Ukraine. A systems approach provided a clear foundation for studying the integration of artificial intelligence into judicial systems, while simultaneously addressing ethical, legal, and technical issues.

RESULTS AND DISCUSSION

Artificial intelligence (AI) is one of the most dynamic and promising fields of modern science, combining computer science, mathematics, linguistics, philosophy, and other disciplines. Its goal is to create intelligent systems capable of imitating human behavior and solving tasks that typically require human intelligence. This includes aspects such as learning, decision-making, speech recognition, natural language processing, self-learning based on data analysis, and much more. AI is characterised not only by the ability to perform programmed actions but also by the ability to adapt behavior based on new data and experience, making it an important tool in various fields, including law (Byelov & Byelova, 2023).

To understand the essence of the problem of implementing AI in the judicial system, it is necessary to consider the existing definitions of artificial intelligence itself. For example, on December 2, 2020, the Cabinet of Ministers of Ukraine approved Decree No. 1556-r, which became the first act in Ukraine dedicated to AI issues. The Concept provided the following definition of AI: "An organised set of information technologies, the application of which makes it possible to perform complex, multifaceted tasks through the use of a system of scientific research methods and information processing algorithms, obtained or independently created during work, as well as to create and use its own knowledge bases, decision-making models, information processing algorithms, and determine methods to achieve the set objectives."¹

One of the main characteristics of AI is the automation of routine processes. This means that AI can perform tasks without direct human intervention, allowing processes to be accelerated and their efficiency increased. The use of artificial intelligence (AI) for automating judicial processes is a relevant trend in the development of jurisprudence. AI systems can use specialised machine learning algorithms to analyse texts and identify certain patterns in judicial decisions, providing quick access to information and facilitating the analysis of case law for well-grounded decisions (UNESCO, 2024).

First, it is essential to examine the experience of other countries in this area. One of the first users of artificial

intelligence in justice, particularly in civil and criminal cases, was the United States. The U.S. judicial system has a public access program to electronic court records (PACER), which allows access to district and appellate court records for a fee. This is done to uphold the principle of transparency regarding case proceedings; however, court case protocols are not public. In the state of Iowa, it was found that citizens can now submit applications and procedural documents 24/7, view the status of court proceedings, and grant access to representatives in a fully virtual mode. This is an undeniable reflection of the high development of both the information and judicial systems, which have been synchronised to enhance the efficiency of the judicial process (Sobol & Habelko, 2023). It is important to note that a decision influenced by AI must be understandable, and if necessary, the parties must be provided with explanations of any uncertainties. Specifically, paragraph one of Article 380 of the Criminal Procedure Code of Ukraine No. 4651-VI states²: "If the court decision is unclear, the court that issued it, upon the request of a participant in the judicial process or the enforcement authority, or a private executor, shall clarify its decision without changing its content".

Proponents of replacing judges with artificial intelligence argue that AI does not require rest or a salary, while offering an unbiased, corruption-resistant judge capable of quickly and efficiently handling cases. In such a model, the judge's role is reduced to analyzing the data provided by the parties. This ensures the "perfect decision," based on precise algorithms. However, such a simplified model of the judicial system undermines its essence. A judge, when applying the law in practice, aims to restore justice and harmony in the disrupted order by making decisions that take into account the specific circumstances (Tokar, 2020). A study was even conducted that found artificial intelligence was able to predict the decisions of judges at the European Court of Human Rights with 79% accuracy (Aletras *et al.*, 2016). However, it is important to remember that for justice to be administered, a judge must possess the right will and a deep understanding of the essence of the law. Artificial intelligence does not have either will or genuine understanding, but it can simulate these qualities, creating an illusion of fairness.

One of the most important issues related to the implementation of artificial intelligence is the legal risks and challenges associated with responsibility and the protection of personal data (Greenstein, 2020). The use of algorithms involves processing significant amounts

¹ Decree of the Cabinet of Ministers of Ukraine No. 1556-r "On the Approval of the Concept of the Development of Artificial Intelligence in Ukraine". (2020, December). Retrieved from <https://zakon.rada.gov.ua/laws/show/1556-2020-%D1%80#Text>.

² Criminal Procedure Code of Ukraine No. 4651-VI. (2012, April). Retrieved from <https://zakon.rada.gov.ua/laws/show/4651-17#Text>.

of personal information, which may be vulnerable to abuse. This raises questions about responsibility in cases of improper use or loss of data, especially when it comes to confidential information related to legal cases. For example, when using AI to analyse past judicial decisions or generate predictions, the potential leakage of personal data jeopardises an individual's right to privacy. It is also important to consider that responsibility for potential errors or omissions made by AI is a new legal area that requires clear legislative regulation (OECD AI Policy Observatory, n.d.).

Along with legal challenges, ethical issues and the risk of algorithmic bias also arise. The data used to train algorithms may contain elements of discrimination or bias related to race, gender, social status, and so on. In cases where AI makes recommendations regarding judicial decisions, there is a risk of automatically reproducing these biases. A striking example is the COMPAS system used in the United States to assess the risk of recidivism, which was accused of racial bias because it significantly more often predicted a higher risk for individuals from certain ethnic groups (Cherevko, 2024). This highlights the need for special attention to the training of algorithms and the implementation of control mechanisms to prevent unfair outcomes. Moreover, involving AI in decision-making in cases with significant emotional or moral components raises doubts about the effectiveness and ethicality of such an approach.

An analysis of the current state of artificial intelligence development in the Ukrainian judiciary shows that the Ukrainian legal system is only beginning to move toward digital transformation. Some initiatives are aimed at integrating basic technologies, such as electronic document management systems and databases for judges, lawyers, and citizens. One of the most promising steps has been the implementation of the "Electronic Court" system, which allows for online document submission and optimises administrative processes. However, the implementation of true artificial intelligence for analysis and decision-making in judicial matters is still in its early stages (Sobol & Habelko, 2023). The main obstacles include the lack of sufficiently trained personnel to work with AI, a shortage of funding, and the absence of legislative regulation that clearly recognises the use of AI in judicial processes.

Artificial intelligence can indeed be highly effective in the analytical activities of law enforcement agencies, as well as in detecting and processing various types of information that could be considered electronic evidence. This can include data on online purchases, financial transactions, emails, chats, social media posts, as well as subscriber and traffic information. In this context, AI can focus on identifying electronic traces of past

criminal activity that might be imperceptible to humans or would require considerable time to detect (Zabzaliuk *et al.*, 2024). It is worth noting that Ukraine already has experience in implementing such technologies. The Kharkiv National University of Radio Electronics, in collaboration with the Main Department of the National Police in the Kharkiv region, developed the RICAS system. This system is used to analyse the criminal status of specific investigations, group criminal activity, as well as to conduct comparative analysis aimed at improving the effectiveness of operational-search activities and preventing criminal offenses (Zavorina & Nechayeva, 2020).

In terms of innovative solutions and the prospects for further implementation, various artificial intelligence tools are already successfully used globally, offering new solutions for jurisprudence that could be adapted for the needs of the Ukrainian judicial system. For example, in the United States, the ROSS Intelligence system operates based on artificial intelligence and helps lawyers quickly find necessary legal precedents and regulations (Cherevko, 2024). This digital assistant uses natural language processing to analyse thousands of pages of legal information, allowing lawyers and judges to spend less time searching for documents and more time analyzing and making decisions. A similar tool could significantly ease the workload of Ukrainian courts, especially considering the need to optimise access to vast amounts of legislative information.

In the United Kingdom, automated platforms are widely used for analyzing large volumes of data and predicting outcomes in legal cases. These systems use machine learning algorithms that, based on statistical data, predict likely decisions and risks, which can be useful for lawyers in determining defense or prosecution strategies. For example, in criminal cases, such platforms can assess the likelihood of reoffending and assist the court in making decisions regarding parole or early release (Clio, 2024). If Ukraine implements similar technologies, it will lead to significant time and resource savings, as many administrative cases could be resolved with minimal involvement from judges, leaving them more time for more complex and large-scale cases.

One of the most interesting examples is the "robot-judge" project in Norway, which is currently in the testing phase and is intended to resolve disputes related to contract violations. While the creation of the robot-judge is still in progress, the use of artificial intelligence has already found its place in leading countries worldwide (Sobol & Habelko, 2023). M.L. Shope (2021) argues that for Ukraine, such an approach could be valuable in resolving uncomplicated administrative and civil cases, where an algorithm could make preliminary decisions, for example, in cases of traffic violations or

minor disputes between citizens. This would allow for a reduction in the time spent on handling small cases and ease the burden on the judicial system, enabling judges to focus on more significant matters.

Most contemporary research focuses on the potential of AI to enhance the efficiency of judicial processes. In particular, D.M. Byelov & M.V. Byelova (2023) noted that the automation of judicial processes helps speed up case resolutions, eliminate unnecessary bureaucracy, and minimise human errors. Their study also explored the possibility of using AI to predict court decisions based on the analysis of a large number of precedents and case law. These findings align with the results of this research, which also emphasises the potential of AI to optimise judicial procedures and reduce the burden on judges. Researchers Y.V. Bilousov *et al.* (2020) examined the process of digitalising civil proceedings in Ukraine, which is an important step in the modernisation of the judicial system. The authors analysed key aspects of implementing digital technologies, including the automation of judicial processes, electronic document circulation, and the use of modern information systems. They also outlined challenges related to the implementation of cutting-edge technologies, particularly cybersecurity and the need to improve the legislative framework, which are critical aspects of integrating AI into the judicial system.

Yu. Kryvytskyi (2021) also explored the possibilities of using artificial intelligence technologies to improve the legal system and emphasised the importance of integrating AI into the legal sphere to enhance the efficiency of judicial processes, automate routine tasks, and improve access to justice. Kryvytskyi analysed current trends in the development of AI in law, highlighting the potential of using algorithms for predicting court decisions and supporting legal enforcement. However, the author also pointed out that the implementation of such technologies requires careful legal regulation and consideration of ethical aspects to avoid potential misuse.

The study by N. Aletras *et al.* (2016) confirmed that machine learning algorithms can accurately predict court decisions, opening up vast opportunities for using technologies in the legal field. Specifically, it was found that by analyzing textual data from court rulings, algorithms can predict the likely outcome of a case with a high degree of accuracy. A similar conclusion was drawn by J.C. Allen (2020), who noted that AI can assist judges by automating routine legal procedures, thereby increasing the speed of case processing.

In addition to the positive aspects, many researchers also highlight the risks associated with the use of AI. This study also notes that algorithms may reproduce existing biases or even exacerbate them, which poses a threat to the principle of fairness in the judiciary.

Similarly, O.Ya. Kovalchuk (2024) emphasised the need for the development of transparent algorithms that would minimise the potential distortions in justice caused by incorrect input data or methodological limitations of machine learning.

Despite the general agreement on the importance of integrating AI into the judicial system, there are different approaches to assessing its implementation. This research primarily focuses on adapting AI to Ukraine's legal framework and the need for balanced regulation. Some researchers approach the integration of AI into the judicial system through the lens of specific branches of law. S. Cherniavskiy *et al.* (2022) and O.Yu. Kostiuchenko (2023) analysed the possibilities of using AI in criminal justice, noting that the lack of a single definition of AI and its legal status is one of the key problems in legal regulation. The researchers emphasised that the use of algorithms in criminal proceedings must be approached with caution, as decisions made with the assistance of AI can significantly impact human rights and freedoms. U. Shadska (2024), in her study, examined the impact of artificial intelligence on human rights compliance, focusing on key challenges and the need for legal regulation in this area. The author analysed current trends in technology development, potential risks to privacy, freedom of speech, and non-discrimination, and proposed ways to improve legislation to protect fundamental rights in the digital age.

In the study by V. Shepitko *et al.* (2024), the role of artificial intelligence in combating crime is examined, from legal regulation to the practical implementation of technologies. The authors analysed contemporary approaches to using AI in law enforcement, including algorithmic crime forecasting, big data analysis for identifying potential threats, and the application of AI in investigative actions. V. Shepitko *et al.* (2024) emphasised that the effective implementation of AI in the fight against crime requires clear legislative frameworks that ensure a balance between technological capabilities and the protection of human rights.

A comparison of the results of this study with the work of other authors shows that there is a general consensus on the potential of AI to enhance the efficiency of judicial processes and the need for a cautious approach to its implementation. Researchers agree that machine learning algorithms can speed up case processing, reduce the burden on judges, and even contribute to the fight against corruption. However, the issues of algorithm transparency, legal regulation, and potential biases in court decisions made with the help of AI remain critical.

Different authors emphasise various aspects of this issue: some focus on the necessity of training judges, others highlight the need for the development of

legal mechanisms to regulate AI in the judiciary, while some researchers examine AI through the lens of its application in specific areas of law. Therefore, the integration of AI into the judicial system is a complex process that requires a comprehensive approach, including legal regulation, training for legal professionals, and the development of transparent algorithms.

CONCLUSIONS

The use of artificial intelligence in the judicial system must strike a balance between automation and human judgment. While AI can enhance the decision-making process by optimising procedures and eliminating bias, final decisions should remain with qualified judges who consider all aspects of the case. The human factor—professional judgment and moral values—must remain the anchor of justice. AI should be used as a tool to assist judges in their work, not as a replacement for them. AI lacks the innate human sense of social dynamics, ethics, and sensitivity to human relationships. Excessive reliance on AI in legal proceedings would lead to the devaluation of the role of the judiciary.

To ensure the ethical and effective use of AI in courts, a regulatory framework must be established. This involves the development of legal instruments that define the principles, limitations, and responsibilities for using AI in the judiciary. Legislation must take into account ethical, social, and legal aspects while ensuring transparency, accountability, and protection of citizens' rights. An optimal approach for Ukraine is the gradual implementation of AI as an auxiliary tool in analyzing judicial

practices, preparing decisions, and forecasting court outcomes. Key conditions for successful integration include the creation of appropriate legal regulations, the development of ethical standards for AI usage, and the protection of personal data. The use of advanced technologies in the judicial process should be based on the principles of fairness, transparency, and accountability, and AI should complement the work of judges, not fully replace them.

Nevertheless, there is a need for further research on the actual application of artificial intelligence in Ukrainian courts, such as empirical testing of AI-driven decision support systems. Additional research should focus on the development of AI algorithms to minimise biases, improving judges' training on AI technologies, and developing oversight mechanisms to ensure that AI systems comply with legal principles and human rights protection. Moreover, responsible implementation of AI in the justice system requires interdisciplinary collaboration among lawyers, technologists, policymakers, and others. To enhance transparency and trust, continued scientific development, such as understandable AI models, is necessary. Ethical and effective deployment of artificial intelligence will require ongoing evaluation and adaptation to uphold core values of justice while leveraging technological innovations to improve judicial processes.

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CONFLICT OF INTEREST

None.

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Сергій Дашкевич

Доктор філософії, старший викладач
Західноукраїнський національний університет
46009, вул. Львівська 11, м. Тернопіль, Україна
<https://orcid.org/0009-0002-4088-7729>

Впровадження роботи штучного інтелекту в сучасному судочинстві

Анотація. Метою статті було дослідження проблеми впровадження ШІ в судочинство, викликів та існуючих рішень. У дослідженні використано методи компаративного аналізу міжнародного досвіду, аналіз правової бази України, а також дослідження етичних та соціально-правових аспектів застосування ШІ. Встановлено, що алгоритми, навчені на історичних даних, можуть ненавмисно закріпити існуючі упередження або посилити їх. Це створює ризик несправедливих результатів, підриваючи принцип справедливості – наріжний камінь судової системи. Зазначено, що складність правових систем створює проблеми для впровадження ШІ. Закони відрізняються в різних юрисдикціях, і нюанси юридичної аргументації важко кодифікувати в алгоритми. Додаток штучного інтелекту має бути адаптований до певної правової бази, що вимагає значних інвестицій у налаштування та постійне оновлення, щоб йти в ногу з правовими реформами. У статті висвітлено міжнародні приклади успішної інтеграції ШІ в судові системи. Досліджено, що інтеграція штучного інтелекту могла б підтримати поточні зусилля щодо судової реформи в Україні, сприяючи прозорості та зменшуючи можливості для корупції. Інструменти штучного інтелекту можуть контролювати обробку справ і позначати порушення, підвищуючи підзвітність у системі. Однак ці досягнення мають супроводжуватися надійними навчальними програмами для юридичних професіоналів, щоб переконатися, що вони розуміють програми ШІ та довіряють їм. Для зменшення ризиків і максимізації вигоди необхідний збалансований регуляторний підхід. Вирішуючи етичні проблеми, забезпечуючи безпеку даних і адаптуючи рішення до місцевих потреб, штучний інтелект може стати потужним інструментом для просування правосуддя. Інструменти ШІ можуть сприяти судовій реформі, зменшуючи рівень корупції та підвищуючи підзвітність. Однак для ефективного використання ШІ необхідне відповідне навчання юридичних кадрів, щоб забезпечити розуміння технологій та їхню правильну інтерпретацію.

Ключові слова: правові технології; автоматизація; міжнародний досвід; справедливість; машинне навчання