

Possibilities of using artificial intelligence and natural language processing to analyse legal norms and interpret them

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Abstract. The study addressed the possibilities of using information technology and natural language in the study of legal norms. The study aimed to develop methods for using artificial intelligence and natural language processing to analyse jurisprudence. To achieve this goal, automatic strategies were created to recognise the main topics in legal texts, identify key legal concepts and analyse the structure of documents. The results of the study included an analysis of existing methods of using technology and natural language to analyse legal norms. The methods used included machine and deep learning, syntactic and semantic analysis, an automated classification system, relative analytics, and decision prediction. In addition, new methods of analysing legal texts based on artificial intelligence and natural language processing were introduced. These methods included the use of a thematic model that automatically identifies the main themes in legal texts, as well as automatic detection of legal concepts, which identifies key concepts. In addition, neural networks were used to analyse the structure of legal documents, which allows for more accurate recognition and analysis of various structural elements in documents. Automatic text generation based on legal information and ways to classify legal texts was also introduced. Thus, the main results were the automation of the process of analysing and understanding legal texts, an increase in the efficiency and accuracy of identifying thematic patterns and key legal concepts, and improved accessibility and speed of legal information processing. The results obtained indicate a great potential for the use of technological tools in jurisprudence, which can significantly improve the quality and accessibility of legal services, contributing to more efficient resolution of legal issues

Keywords: information technology; machine learning; analytical methods; legal standards; linguistic computing; interpretation of legal norms; legal technique

Introduction

The scientific community faces a problem in analysing legal norms due to the growing volume of legislation and the need for prompt access to it. The need to adapt traditional methods of analysis to the requirements and the lack of specialised techniques necessitate new approaches and technologies. There is an urgent need to create and evaluate methods for using artificial intelligence (AI) and natural language processing (NLP) for legal analysis to solve these problems and improve the quality of legal document analysis. AI has been making significant progress in recent years, finding wide application in various fields, including law (Striltsiv & Fedorenko, 2022). However, for AI to be used successfully in the legal sector, specialised methods and algorithms need to be developed that consider the specifics of legal texts and user requirements. NLP is a key technology that automates the comprehension and analysis of texts from various sources, facilitating the efficient processing of large amounts of textual

information. Thus, an understanding of the basic concepts of AI and NLP is important for further presentation of the research methods and results in the context of legal norms analysis.

For a better understanding of this topic, it is worth referring to the research already conducted in this area. For example, analysing the development of legal regulation of AI, O.V. Korvat (2023) identified the need for preventive measures to reduce the risks of its use in Ukraine. She emphasised the need for a dual purpose of development and risk protection policies, establishing liability for harm and improving procedures for proving harm. V. Bohomia and A. Hudz (2023) examined the current state and prospects of AI use, including its development, types, and applications in various industries. They emphasised that the use of AI raises ethical, legal and social issues that require attention.

T. Yarovoy (2023) studied the use of AI in public administration, identified the benefits of process automation and

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improved interaction with the public, and identified risks, including ethical issues and threats to security and privacy. K. Chałubińska-Jentkiewicz and M. Nowikowska (2022) analysed the legislation on personal data protection in the context of the development of the NLP and to identify legal barriers. The results highlighted a conflict of interest between data protection and the development of this technology, as well as shortcomings in the relevant legislation.

In addition, G. Alparslan (2024) assessed global legal norms in digitalisation and AI. The results showed the interconnection between digitalisation, globalisation and AI, but also revealed problems due to shortcomings in global legal norms. B.K. Mishra and R.K. Agrawal (2019) addressed NLP, AI and related areas, analysing theory and applications in computational information models. The research included a study of the latest technologies, challenges and achievements in these areas, which has become a useful resource for professionals.

In turn, S. Srivastava *et al.* (2024) addressed the possibilities of using machine learning and AI in the processing of advanced materials. They conclude that with the growth of data and the development of analytical methods, these technologies can be used to develop new materials and optimise production processes, but challenges such as data processing and the choice of algorithms arise. A. Iorliam and J. Ingio (2024) presented a live comparative analysis of certain AI tools, which showed that they have numerous advantages. The authors also explored the transformative impact of generative AI in the NLP, focusing on its integration with search engines, privacy issues, and ethical implications.

Moreover, P.M. Mah (2022) attempted to create a clustered AI and NLP system in which rich content is extracted using parts of speech and then classified into an understandable dataset. The author emphasised that the challenge is the lack of unique systems with standardised processes and procedures for AI and NLP in different systems to support the healthcare sector. Similar to the previous researcher, V. Božić (2023) analysed the role of AI and NLP in the medical field. He emphasised that one of the AI methods is NLP, which allows hospitals to better use the wealth of textual medical data that is often underutilised.

Therefore, this study focuses on the methods of applying AI and NLP to legal issues. This goal addresses the issue of effective use of AI and ML technologies in the field of law, aimed at improving the analysis and understanding of legal norms and processes. The tasks included analysing the existing ways of applying AI and NLP in the legal sector and assessing their effectiveness.

Materials and methods

The modelling method was used to create new ways of using natural language and technology in the legal field. The author has constructed diagrams illustrating various aspects of the analysis and processing of legal information and a table of practical applications of the developed methods. Thus, this method was used as a means of reflecting the process of text analysis using the thematic model method, where the main themes in legal texts were automatically identified. He demonstrated how the text of a legal document was run through machine learning algorithms that defined legal concepts.

The descriptive research method used in this study played a key role in providing an analytical and systematic description of the necessary information. It was designed

to provide a detailed description of the objective data that was important for the study. The analytical component of the study was to analyse various methods used in the application of AI and NLP. This identified potential areas for further research, enabling a deeper understanding of the approaches used and pointing to opportunities for improvement. Subsequently, the main aspects that should have been addressed in this study were identified to achieve more accurate and objective results.

In addition, a comparative analysis of the methods of using AI and NLP technologies to analyse legal texts was carried out. This method was used to identify both differences and similarities in approaches to text processing. The study also included a comparison of the results with previous research in this area. This assessed the uniqueness and importance of the work carried out in the context of the development of the scientific community and practical applications in the field of law. Thus, this aspect of the study has expanded the understanding of the possibilities and prospects of using technology in the field of law, opening new horizons for further research and development of legal science.

It also systematised the various technological and methodological approaches that have already been applied in this area. Methods such as deep learning and machine learning, semantic and syntactic analysis, decision prediction, relative analytics, and automated classification systems are considered. Each of these methods has been analysed in terms of its application in legal norms. To systematise the results, a table comparing the methods of applying AI and NLP in legislation was created, which reflects the advantages and disadvantages of each method.

Results

Assessment of modern methods of using technology and natural language in legislation. To develop methods for using AI and NLP in legislation, an analysis of existing methods should be conducted. One such method is machine learning, which is used to analyse large amounts of text and identify legislative patterns. This method can be used to automatically recognise keywords and phrases in the text of legislative documents and highlight their important aspects. Lex Machina (the United States of America) uses machine learning to analyse massive amounts of legal data, including court decisions and documents (AI in litigation..., 2023). It assists lawyers and legal professionals find key information faster and more efficiently. There is also a syntactic analysis that recognises the grammatical structure of sentences and their relationships. This method can be useful for establishing links between different legal provisions and their interaction. ROSS Intelligence (USA) uses parsing to automatically analyse the grammatical structure of legislative texts and establish links between different provisions of the law (A visual guide..., n.d.).

Semantic analysis determines the meaning of a text and determines its context. This method can be useful for identifying specific concepts used in legislation and their interaction with other concepts. International Business Machines (IBM) Watson Legal (USA) uses semantic analysis to understand the meaning of the text of legislative documents and determine their context (IBM Watson Natural..., n.d.). This helps lawyers find the information they need faster and analyse it more efficiently. Deep learning is used to solve complex legal text analysis tasks, such as classification or

segmentation, using deep neural networks (Sezonov & Sezonova, 2022). This method automatically detects and analyses complex relationships between words and concepts in large volumes of text, which processes legal information quickly and accurately. Pekat Vision (Singapore) uses deep learning to automatically recognise and analyse complex relationships between words and concepts in legal texts, helping lawyers make informed decisions based on reliable data (Stand-alone Software, n.d.). In turn, an automated classification system is used to classify legal documents into various categories, such as document type, subject matter, or scope. It can use machine learning techniques to train classification models based on a set of input data. Legal-Sifter (USA) uses this system to automatically classify legal documents into different categories, such as document type or topic, which helps organise and catalogue legal information (A first-of-its-kind factory, n.d.).

Relative analytics is used to analyse the relative relationships between legal provisions, their interpretations and

court decisions. It can use NLP algorithms to automatically detect links and patterns in the text of legal documents. Ravel Law (USA) uses relative analytics to analyse the relationship between court decisions and their interpretations (Lambert, 2016). It helps lawyers find precedents and predict the outcome of court cases. It is worth addressing the decision prediction method used to predict the outcome of legal processes, such as the resolution of court cases or responses to client requests. It can use machine learning models to analyse historical data and predict future events. Premonition (USA) uses decision prediction methods to analyse historical data and predict future events in the field of law (Premonition: Artificial Intelligence..., 2017). For instance, they analyse the outcomes of court cases to predict the outcome of future proceedings. These methods help automate and improve the analysis of legal norms using AI and NLP, which opens up new opportunities for legal practice and research. However, each of these methods has its advantages and disadvantages that require careful consideration (Table 1).

Table 1. Comparison of AI and NLP methods for analysing legal texts

Method	Advantages	Limitations
Machine learning	Automation of the analysis of large amounts of text. Identification of legislative models. Automatic recognition of keywords and phrases.	Requires a large amount of data to train the model. Requires complex computing resources. Possibility of misinterpreting the context and lack of understanding of the meaning of the text.
Syntactic analysis	Establishes links between different legal provisions and their interactions. Recognition of the grammatical structure of sentences and their relationships.	Possibility of interpreting incorrect syntactic relationships. Limited recognition of complex syntactic structures.
Semantic analysis	Identification of the meaning of a text and determining its context. Identification of specific concepts in legislation and their interaction with other concepts.	Requires large computing resources for accurate analysis. Possibility of inaccuracies in understanding the meaning of the text and determining the context.
Deep learning	Solving complex analysis problems. Automated recognition of legislative patterns.	Requires a large amount of data to train the model. Requires significant computing resources.
Automated classification system	Classification of legal documents into different categories. Process automation.	The need for accurate model training. Heterogeneity of classification with unequal documents.
Relative analytics	Identification of interrelationships between legal norms. Automatic analytics.	Difficulty in determining the relationship between legal documents. Requires a precise definition of concepts.
Predicting decisions	Prediction of the outcome of legal processes. Using historical data for forecasting.	Dependence of results on data accuracy and volume. The need to constantly update models.

Source: compiled by the author

A comparative analysis of modern methods of using technology and natural language in legislation allows provides more detail on their effectiveness and limitations. The first method, machine learning, can automatically recognise keywords and phrases and analyse large amounts of text to help identify legislative patterns. Although it provides effective keyword recognition, it requires a large amount of data to train, as well as complex computing resources. Parsing helps to establish links between legislative provisions, but can also interpret incorrect syntactic relationships and has limited ability to recognise complex syntactic structures. Semantic analysis can understand the meaning of a text and determine its context but requires large computing resources for accurate analysis. Thus, these methods help to establish the grammatical structure of the text and understand its meaning, but they may require significant computational resources. Deep learning can be employed to solve complex tasks of analysing legal texts and automatically detect and analyse complex relationships between words and concepts.

However, this method requires a large amount of data and computing resources. Moreover, the automated classification system simplifies the process of classifying documents. However, it is worth noting the heterogeneity of this system's classification when documents are not identical and the need for accurate model training (Palekha & Aliksienko, 2023).

Relative analytics can indicate the interaction between legal norms and automated analytics, but it is difficult to determine their context within legal documents. Decision prediction can predict the outcome of legal processes, but it requires constant model updates and depends on the accuracy and volume of data. In other words, these methods can be used to identify relationships and predict outcomes, but require precise definitions and extensive data for training. Thus, each of these methods has its advantages and disadvantages, which should be addressed when using them in legal practice and research.

Creating new methods for applying AI and NLP to analyse legal issues. As AI and NLP technologies improve,

new opportunities are emerging to improve the analysis and understanding of legal rules and texts. Modern ways of using these technologies allow for efficient and accurate analysis of legal information, opening up broad prospects for the development of new methods. However, new methods need to be developed to provide better analysis and better understanding of legal norms and texts using AI and

NLP. For example, the thematic model method can be suggested (Fig. 1). This method is based on the idea of topic modelling, which automatically identifies the main topics present in the text and the relevance of each document to these topics. For legal analysis, this method can help identify the main categories of legislative documents and their content.

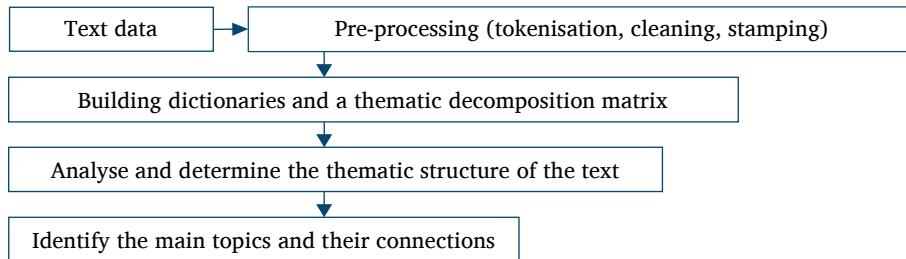


Figure 1. Thematic model method

Source: compiled by the author

This diagram shows the process of analysing a text using the thematic model method. Starting with the input text data, pre-processing such as tokenisation, redundant character removal and stemming is performed first. Then, a dictionary and a topic decomposition matrix are built using the Dirichlet Latent Placement algorithm. After that, the text is analysed, and the thematic structure is determined. The last step is to identify the main themes and their connections in the text.

The thematic model method can be used in the analysis of legal norms and texts to automatically identify the main themes present in legislative documents. It can be used to classify legislation into different categories, identify interrelationships between different norms, as well as identify various thematic aspects of a legal text that may be important for further analysis and interpretation. For example, when reviewing the Law of Ukraine No. 2297-VI

“On Personal Data Protection” (2010), the thematic model method can automatically identify the main topics, such as personal data processing, rights and obligations of data subjects, liability for violation of the law, and others. By predicting the analysis of this law with the help of AI, can expect faster and more objective identification of key aspects, which provide an explanation of the legal act and develop strategies to ensure its implementation.

Automatic legal concept detection is a method that uses machine learning algorithms to identify and classify legal terms and concepts in the text of legal documents (Fig. 2). It helps understand the key concepts and terms used in the legislation. The resulting diagram shows how the text of a legal document is passed through machine learning algorithms that detect and classify legal terms and concepts using NLP. The result of the analysis is a list of key concepts and terms used in the legislation.

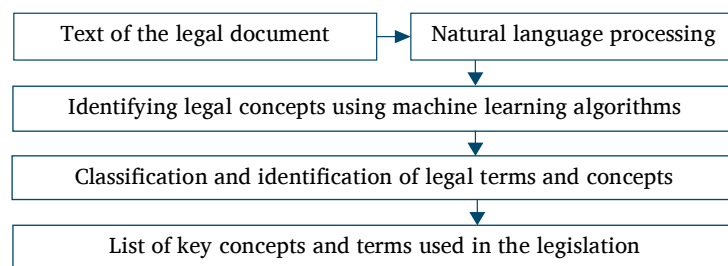


Figure 2. Method for automatic detection of legal concepts

Source: compiled by the author

The method of automatic detection of legal concepts can be successfully used in various areas of legal research and practice. In judicial practice, this method can be used to analyse the texts of court decisions in a particular area of law. AI analysis can automatically identify key terms and concepts contained in the text of the Constitution of Ukraine (1996). For instance, Article 3 of the Constitution of Ukraine states: “A person, his or her life and health, honour and dignity, inviolability and security are the highest social value. The precepts on the inviolability of human life, human rights and freedoms, and human dignity are

enshrined in this Constitution and recognised as binding on the entire territory of Ukraine”. By analysing this passage of text using AI methods, key concepts can be automatically identified and linked to the relevant articles and subparagraphs of the Constitution of Ukraine. Predicting AI analysis using this method, can expect to identify and systematise the identified key concepts in the context of the Constitution’s articles, which will facilitate the understanding and interpretation of legal reality.

Furthermore, the neural network method for document structure analysis uses deep neural networks to recognise

and analyse the structure of legal documents, including headings, sections, subheadings and other structural elements

(Fig. 3). This automates the process of understanding and analysing large amounts of text.

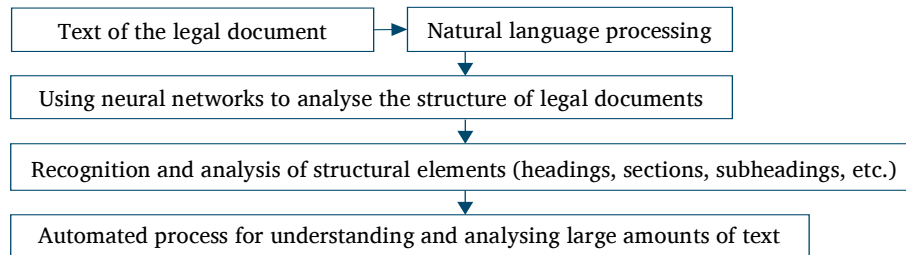


Figure 3. Neural network method

Source: compiled by the author

This diagram shows how the text of a legal document will be passed through the NLP to be analysed by a neural network method for structure analysis. Neural networks recognise structural elements, such as headings, sections, subheadings, and others, which automates the process of understanding and analysing large amounts of text.

The neural network method for analysing the structure of documents can be successfully used in the legal field for various purposes. In the field of legal research, this method can be used to automatically analyse the structure of laws. For example, by analysing the structure of the Criminal Code of Ukraine (2001) using neural networks, it is possible to automatically identify various structural elements of the text, such as sections, articles, paragraphs and subparagraphs. This will quickly find and recognise the necessary legal provisions, simplifying the processing of large volumes of legal information. This method can be expected to automatically determine the structure of the Criminal Code of Ukraine, which will find and analyse specific legal provisions faster when solving legal issues. Legal text generation is a method that uses text generation models based on legal data to automatically generate reports, documents, or analyses (Fig. 4). It can generate text that matches certain legal criteria or templates, which can significantly increase the productivity and speed of legal information processing.

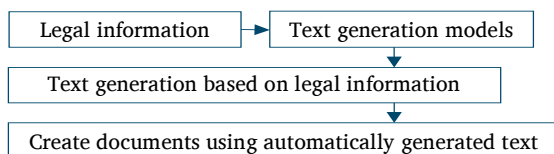


Figure 4. Text generation method

Source: compiled by the author

The diagram shows the process of generating text from legal information using text generation models. The first step is to present the legal information that is fed into the text generation models. Text generation models then convert this information into appropriate text that meets certain legal criteria or templates. Lastly, this automatically generated text can be used to create reports, documents or analyses.

The method of generating text based on legal information can be used in various areas of legal work. In law firms, this method can be used to automatically create various legal documents, such as contracts, statements or agreements, using appropriate legal templates. For example, in the case of the Civil Code of Ukraine (2003), using the text generation

method, it is possible to automatically generate various standard legal documents, such as purchase and sale, lease, hire agreements, etc. The system will address the relevant civil law provisions and use them in the appropriate context. Thus, should expect fast and automated creation of various legal documents following the relevant regulations, which will facilitate the work with legal documents and speed up the decision-making process based on legal information. In addition, the method of classifying legal texts uses classification algorithms to automatically categorise and sort legal texts by type, topic, or other parameters (Fig. 5). It organises large amounts of legal information and facilitates access to it for further analysis and use.

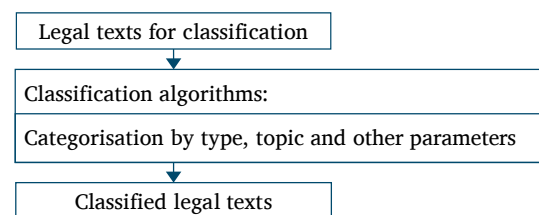


Figure 5. Method of classification of legal texts

Source: compiled by the author

The resulting scheme represents the process of classifying legal texts using classification algorithms. The input is legal texts that need to be classified. Classification algorithms automatically categorise these texts according to various parameters, such as document type, topic, or other characteristics. After processing, each text receives a specific tag or label indicating its classification. The method of classification of legal texts can be used in various aspects of legal activity. In law firms, this method can help organise large volumes of legal documentation by automatically categorising documents by type, topic or other parameters. It is worth mentioning the Law of Ukraine No. 2939-VI “On Access to Public Information” (2011). Using the method of classification of legal texts, it is possible to automatically categorise various aspects of this law, such as procedures for obtaining public information, obligations of public authorities to provide it, restrictions on access to information, etc. Using this method for AI analysis, it is possible to automatically classify various provisions of this law into different categories, which will facilitate the organisation and quick access to the necessary legal information for non-government organisations, journalists and citizens in general.

For a better understanding of these methods, examples of their practical application are listed in Table 2. The developed methods reflect new approaches to the analysis of jurisprudence that address certain limitations of existing methods. The topic model and automatic detection of legal concepts help to automate the process of identifying

topic patterns and legal concepts in texts, which would previously have required a lot of human involvement and time. Neural networks for document structure analysis provide more accurate recognition and analysis of the structure of legal documents compared to traditional methods of parsing.

Table 2. Practical applications of the developed methods

Method	Practical applications
Thematic model	Automated categorisation of legal documents by topic and subtopic. Identification of the main thematic areas in legal documentation for quick search and analysis. Creation of recommendation systems for lawyers and attorneys based on the identified topics.
Automatic detection of legal concepts	Automatic highlighting and definition of key terms and concepts in the text of legal documents. Analysing the structure and relationships between different concepts to support decision-making.
Neural networks for analysing document structure	Automatic highlighting and signing of structural elements in legal documents to facilitate their understanding and navigation. Development of systems for automatic analysis and recognition of structural elements for legal portals or databases.
Text generation based on legal information	Automatic generation of template documents such as applications, motions, or decisions based on legal data. Development of systems for automatic analysis of large amounts of text to highlight key information elements.
Methods of classification of legal texts	Creation of systems for automatic sorting and indexing of legal documents for easy access and search. Automatic categorisation of legal texts by their type, subject matter or other parameters for further analysis and use.

Source: compiled by the author

Text generation from legal information opens the possibility of automatically generating texts based on legal data, which helps to quickly create and analyse various legal documents. The classification of legal texts provides more accuracy in the classification of text data by their legal focus, which simplifies the search and analysis of the necessary legal information. These methods significantly improve the efficiency and accuracy of legal analysis compared to traditional methods, making them an important tool in legal research and practice.

Prospects for the introduction of technological tools and natural language in the legal sphere. The prospects for the introduction of technological tools and NLP in the legal field may prove to be decisive for the future of jurisprudence. New methods developed based on AI and NLP offer significant opportunities to improve the analysis and interpretation of legal provisions. The use of AI and ML technologies in the legal sector can significantly increase the efficiency of processing large volumes of documents and identifying key concepts, facilitating quick access to legal information and reducing the risk of errors in analysis.

One of the main prospects for the introduction of these technologies is to increase the efficiency and accuracy of legal text analysis. AI can help automate the process of analysing large volumes of documents and identifying key concepts and links between them. This can significantly increase the speed of processing legal information and reduce the likelihood of human error. At the same time, the use of AI in law can help automate the process of analysing various types of legal documents, including court decisions, legislative acts, and legal precedents (Cherniavskiy *et al.*, 2022). This will not only increase the speed of document processing but also improve the quality of analysis, as AI can identify and analyse various aspects of legal texts faster and more accurately. In addition, new methods can lead to a revolution in the search and analysis of legal information. The use of AI and NLP technologies can create

powerful tools for searching for precedents, analysing case law and predicting decisions based on historical data (Sanzharovskiy & Yurchyshyn, 2023). This perspective opens great opportunities for improving the processes of searching and analysing legal information, which can greatly facilitate the work of lawyers and researchers in identifying links between different legal documents and understanding their impact on court decisions and legal norms.

The developed methods can also become the basis for the development of innovative legal systems that will provide faster and more efficient access to legal information for citizens and professionals. They can help avoid unnecessary formalities and reduce the time required to resolve legal issues. This approach will increase the accessibility of legal services and the development of jurisprudence both nationally and internationally. However, along with the prospects associated with the introduction of new technologies in the legal sphere, there are also certain challenges and limitations. Some of them include challenges of adapting technologies to the specifics of legal texts, privacy and data protection issues, and the possibility of ethical issues arising from the automation of decision-making processes (Polishchuk, 2024). For the successful implementation of these technologies, it is necessary to address these challenges and develop effective strategies for interaction between humans and AI in the legal environment.

In general, the introduction of technological tools and NLP in the legal sector can significantly improve the quality and accessibility of legal services by providing faster and more efficient access to the necessary information for citizens and professionals. This will avoid unnecessary formalities and reduce the time required to resolve legal issues, which will open up new opportunities to improve public services and increase the level of trust in the legal system as a whole. At the same time, a more effective analysis of legal norms and processes caused by the use of modern technologies will contribute to the development of jurisprudence, helping to strengthen the rule of law in society.

Discussion

The results of this study open up new perspectives for the use of information technology and NLP in legal research. This work has a substantial role in the development of this field, as it expands the understanding of how technology can be used to analyse legal norms and texts. It identifies the potential benefits and challenges associated with the use of AI and NLP in legal practice. For a better understanding of this topic, it is worth considering other studies in this area, which will help to get a complete picture of the potential and possibilities of using AI and NLP technologies in the field of law.

This paper examines how AI and NLP technologies contribute to a better understanding and analysis of legal information and provides some results that demonstrate the effectiveness of these technologies in this area. Compared to the study of S. Mecaj (2022), where the author concluded that it is necessary to create an adequate legislative provision on AI following the growing use of this technology in various fields, this study has identified specific opportunities for using AI and NLP to analyse legal norms. On the other hand, R. Rohan Singh and P.V. Dhanush (2024) identified promising areas for the development of quadrupedal artificial intelligence assistants, in particular, to improve their emotional intelligence by combining NLP and image processing. In addition, this work can complement the study by Y. Ma (2023), which considered the ethical issues of using NLP. In comparison, both studies identified the importance of understanding and preventing ethical issues in this context. However, this study has provided specific opportunities to use AI and NLP for legal analysis, which is a specific contribution to this field. This study, similar to one of Y. Chen *et al.* (2024), which revealed the impact of AI on NLP, in particular in the context of legal analysis. However, the difference is that it focused on the specific application of AI and NLP in the field of law. In turn, the study has shown that the use of AI and NLP technologies can be used for effective analysis and understanding of the complexity of legal norms and texts, opening new opportunities for their application in the field of law. Compared to the study by S. Kumar *et al.* (2023), which examined smart city intelligent systems based on the Internet of Things (IoT), the present study found that the use of the IoT does not provide the same depth of analysis and understanding of legal information, making it less suitable for use in the legal field.

While the study by H.M. Mohamed (2024) identified the challenges and opportunities of using AI to achieve justice, this paper analyses the results of using information technology to analyse legal norms. In contrast to the study by D. Palasamudram *et al.* (2023), where the authors concluded that AI, in particular cognitive search, NLP and natural language generation, can be successfully used to create medical documents in the biomedical field, this study focused on the use of information technology and NLP in the legal field. Thus, the results of the study clarified the specifics and needs of jurisprudence, separating it from other fields, such as medicine. Moreover, the results of this study demonstrate that the use of AI and NLP in legislation contributes to the improvement of analysis and understanding of legal norms and texts. Compared to the study of E.S. Groenewald *et al.* (2024), which showed the role of AI in linguistics, this study focused on the use of these technologies in the context of law. On the other hand, in comparison with D.A. Arul Raj *et al.* (2024), who developed an

AI system for detecting offensive language on social media and showed the results of a new AI-based foreign language learning strategy, this study focused on the results in specific aspects of legal analysis.

The current study and the work of S. Wehnert (2023) focused on the use of modern technologies in the legal field. However, the distinctive feature of this study was its emphasis on the use of AI and NLP for analysing legal tasks, as opposed to using large language models to avoid flaws in the legal domain, as discussed in another paper. The findings of the study also highlighted the need to use technology in legislation and develop new methods of its application. This distinguishes them from the work of G. Mercan and Z. Varol Selçuk (2024), which showed the results of an analysis of the integration of AI into legal practice, the problems of algorithm transparency, bias in data sets, and liability. As in the present study, M.U. Nasir *et al.* (2021) found that NLP is a necessary component of AI. However, the difference is that the current study demonstrated results specific to the legal field, while the 2021 study presented findings related to linguistics, computer science and mathematics. Furthermore, in comparison with the statement of R. Girju (2023) on the importance of diverse approaches in science for social progress, this study highlighted the role of technology in improving understanding of legal issues and ensuring access to legal information.

The results of this study, which analysed the interpretation of legal norms using AI and NLP, are comparable with the findings of D. Singh *et al.* (2024), which investigated the use of chatbots in business, showed that the former study focused on the analysis of legal regulations using modern technologies. At the time, the second study was aimed at implementing intelligent systems to optimise business processes using the same technologies. In turn, while this study provided specific technological solutions for analysing legal norms, the authors of A.R. Vargas-Murillo *et al.* (2024) concluded that AI is increasingly influencing justice, exploring the prospects, obstacles and consequences of its implementation.

Compared to the study by Q. Yan (2023), which pointed to the potential of AI in criminal defence, this paper examined the use of technology in legal norms. Instead, in comparison with P.D. Callister (2020) and L. Robaldo *et al.* (2019), where the authors demonstrated the effectiveness of NLP in legal information retrieval systems, as well as the connection between language and semantic technologies and law, the study demonstrates a broad analysis of the use of AI and NLP in the context of legal norms analysis. Other studies, including V. Geetha *et al.* (2023), D. Vaz (2023) and D.M. Monte-Serrat and C. Cattani (2021), have shown general aspects of the development of NLP and AI processing, not limited to application areas. In turn, this study has resulted in a deeper understanding of the possibilities of applying AI and NLP in the field of legal analysis. Compared to other studies that have covered a broader range of applications of these technologies, this paper focuses on the specific challenges and opportunities that arise in the legal context.

Therefore, this study focused on the role and impact of AI and NLP in the legal field, in particular, their application to analyse legal tasks. As such, these technologies can facilitate the processes of working with legal information, increasing the efficiency and accuracy of decision-making. The discussion considered the technical challenges, ethical issues and risks associated with the use of AI in the legal sector.

Overall, this paper argues for the importance of addressing these issues and developing appropriate strategies to ensure the effective and fair use of technology in the legal context. The study also proved useful in formulating recommendations for the further development and implementation of AI and NLP in legal practice, contributing to the improvement of legal processes and ensuring fairness in law enforcement.

Conclusions

This study evaluates existing methods and proposes theoretical models for the future development of new methods of using AI and NLP for legal text analysis. The results of the study show that the application of the studied methods of using technology in the legal sphere has significant potential for analysing legal texts and identifying key legal concepts. In addition, a comparison with other works identified the strengths and weaknesses of different methodologies and identified opportunities for further development. In particular, the author identifies the need for further improvement of classification algorithms and methods of analysing the structure of legal documents.

The study emphasises the effectiveness of using deep learning and automatic text-processing methods in the field of jurisprudence. Neural networks have made it possible to effectively analyse the structure of legal documents and classify legal terms and concepts. Moreover, new methods have been developed that have helped to expand the possibilities

for analysing legal issues. Text-generation methods based on legal information allowed for the automatic creation of legal documents and analytical materials. Methods of classifying legal texts have also been developed, which simplifies the search and analysis of legal information.

The scientific and practical results of the work indicate the importance of further research in this area. The main areas for further research in this area include improving classification algorithms and methods for analysing the structure of legal documents, developing deep learning methods, exploring the possibilities of automating processes in the legal field and analysing the ethical and legal aspects of AI in the legal field. The recommendations are to further develop and improve AI and NLP methods to improve the analysis of jurisprudence. Additionally, it is important to consider the possibility of using these methods to automate legal processes and increase the efficiency of legal services.

The limitation of the study is the limited scope of the analysis, as well as the possibility of new technologies and methods that may affect the results. Nevertheless, the results obtained provide a basis for further research in this area.

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Conflict of interest

None.

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Можливості використання штучного інтелекту та обробки природної мови для аналізу норм права та їх тлумачення

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Анотація. Дане дослідження спрямоване на вивчення можливостей застосування інформаційних технологій та природної мови у вивченні норм права. Метою дослідження була розробка методів використання штучного інтелекту та обробки природної мови для аналізу правознавства. Для досягнення мети було створено автоматичні стратегії для розпізнавання основних тем в правових текстах, виявлення ключових правових концепцій та аналізу структури документів. Результати дослідження включають в себе аналіз існуючих методів використання технологій та природної мови для аналізу норм права. Було застосовано такі методи як машинне та глибинне навчання, синтаксичний та семантичний аналіз, автоматизована система класифікації, відносна аналітика та прогнозування рішень. Окрім цього, було впроваджено нові методи аналізу правових текстів, що базуються на використанні штучного інтелекту та обробки природної мови. Ці методи включають в себе використання тематичної моделі, яка дозволяє автоматично визначати основні теми в правових текстах, а також автоматичне виявлення правових концепцій, що допомагає в ідентифікації ключових понять. Крім того, використано нейронні мережі для аналізу структури правових документів, що дозволяє більш точно розпізнавати та аналізувати різні структурні елементи в документах. Також були впроваджені автоматична генерація тексту на основі юридичної інформації та способи класифікації правознавчих текстів за категоріями. Таким чином, основними результатами є автоматизація процесу аналізу та розуміння правових текстів, підвищення ефективності та точності виявлення тематичних зразків та ключових юридичних понять, а також поліпшення доступності та швидкості оброблення правової інформації. Отримані результати свідчать про великий потенціал використання технологічних засобів у правознавстві, що може значно покращити якість та доступність правових послуг, сприяючи ефективнішому вирішенню правових питань

Ключові слова: інформаційні технології; машинне навчання; аналітичні методи; юридичні стандарти; лінгвістичні обчислення; тлумачення норм права; юридична техніка