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The Regulatory Route for Reflexivity Theory-Based Artificial Intelligence-Assisted Judicial Decision-Making

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Abstract

The rapid development of artificial intelligence technology has revolutionized the judicial field, improving the efficiency of case handling, standardizing the adjudication process, and enhancing the review of evidence. However, the problems of uneven quality of judicial data, judicial injustice caused by algorithmic black boxes, erosion of judges' discretionary power, and rigidity of the trial process have seriously affected the public's trust in AI judicial assistance. The theory of inversion and the theory of self-creation have jointly constructed a comprehensive regulatory framework for the co-governance of law and technology to ensure that law and technology maintain independence and autonomy in the interaction process, to prevent technological abuses, to promote the in-depth integration of AI and the judicial system, and to safeguard judicial impartiality and systemic authority.

Full Text Article

Keywords: Inversion Theory, Autopoietic Theory, Artificial Intelligence, Judicial Decision Making

Introduction

The swift advancement of artificial intelligence technology has initiated a new phase of industrial transformation, prompting judicial systems at all levels to investigate methods for the systematic integration of artificial intelligence into legal applications. Whether it is from the feedback of the initial test or from the resources invested in the judicial institutions at all levels, generative artificial intelligence has been widely applied in the judicial field in China as the momentum of a torrential river rushing.

In 2017, the Supreme Court released a document delineating the parameters for the judicial application of artificial intelligence, confining the function of generative artificial intelligence

to merely "assisting in case management." However, due to the increasing volume of cases and performance assessments, the primary role of judges is progressively diminished. The judicial system is simultaneously embracing these technologies while facing pervasive challenges.The court system is actively integrating AI; nonetheless, its operational mechanisms and legality are under scrutiny. Substandard data and the "algorithmic black box" diminish public confidence in the artificial intelligence judicial assistance system, while a patterned adjudication framework undermines the litigation capabilities of the parties involved. Additionally, the absence of an evidence processing system exacerbates the challenges posed by "evidence specifications." These three significant deficiencies act as formidable obstacles to the advancement of artificial intelligence. The three faults resemble three mountains obstructing the advancement of the artificial intelligence judicial aid system. Consequently, addressing the "three major problems" within the "three dilemmas" has emerged as a critical concern for the successful implementation of the judicial aid system. Professor Gonta Tuebner's theory of reflective law and self-generated system theory offer a significant theoretical framework to address this difficulty. It has become into the "implement of the fool relocating the mountain." The integration of these two theories establishes a theoretical framework for the standardized implementation of artificial intelligence technology in the justice sector, while also synthesizing pertinent theories to propose regulatory recommendations for artificial intelligence, thereby enhancing its capacity to aid judicial decision-making.

Artificial Intelligence in Judicial Decision-Making

A. The problem of low-quality of judicial data

Data-driven artificial intelligence judicial decision-making is its foundation, and its application is predicated on high-quality judicial data. The quality of this data is directly correlated with the efficacy and reasonableness of artificial intelligence deep learning and decision-making modeling. The "three sexes" of judicial data are not only the foundation of the artificial intelligence-assisted judicial decision-making system to identify, analyze, and judge the laws of justice, but also to ensure that the system generated by the auxiliary decision-making is in accordance with formal justice and substantive justice. Therefore, the reliability of judicial data must be established by its authenticity, completeness, and standardization.

At present, the AI-assisted judicial decision-making system relies on the data provided by the partners and the court's internal network as its primary sources of information, with external network data serving as a supplement. Nevertheless, these judicial data are restricted by the frequency of updates, the source channels, and the discrepancies between identical cases.

Initially, the selective publicity of court decisions and the one-sided disclosure of information in various regions are indicative of the incompleteness of judicial data. Additionally, the lag in the updating of policies and regulations between different regions and judicial information barriers further impede the sharing and exchange of judicial data, making

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it challenging to obtain comprehensive case information. Secondly, the irregularity of judicial data is evident in the fact that judicial institutions at all levels in all regions are unable to uniformly reflect the diversity of cases that have emerged during the period of complex social transition. It is challenging to eliminate the situation of different judgments in the same case and different lawsuits in the same case. In the presence of atypical and uncommon cases, the model constructed on the basis of a small sample of data is susceptible to the influence of contingent factors due to the lack of historical data, insufficient samples, or differences in the qualities of judicial personnel. This results in bias in decision-making recommendations that may not be appropriate. bias, which leads to recommendations for decision-making that are not representative. Furthermore, the inauthenticity of judicial data is evident in the absence of case factors in the adjudication documents, including the economic status of the parties, the characteristics of the individual orientation of the judge, and the differential supply of judicial data in the legal documents. This will result in a system modeling process that deviates from the actual situation of the case due to the lack of information. The inauthenticity, incompleteness, and non-standardization of the judicial data directly threaten the decision-making reliability of the artificial intelligence judicial assistance system. Not only do these data quality issues result in the provision of inaccurate legal recommendations through decision-making assistance, but they also have the potential to influence the judge's independent judgment as a result of their dependence on the intelligent system's decision-support function, thereby materially misleading the hearing and ruling of the case.

B. Miscarriage of justice is the result of algorithmic black boxes.

The term algorithmic black box denotes the opacity of the internal mechanisms and decision-making processes of AI algorithms, rendering them unintelligible and inexplicable to users, particularly participants in legal proceedings. The algorithmic black box effect of AI in the judicial decision-making assistance program results in participants struggling to comprehend the rationale and foundation of AI-generated adjudication recommendations, thereby hindering their ability to assess the accuracy and fairness of these decisions.

The implementation of AI in the judiciary has enhanced case processing efficiency and decision-making suggestions; nonetheless, the influence of the algorithmic black-box issue on judicial equity must not be overlooked. This circumstance may not only result in biased adjudication outcomes in specific cases but also consistently diminish public faith and support for judicial justice.

The intrinsic tension between the algorithmic black box issue and the idea of judicial transparency is evident. From a technological perspective, AI techniques are often implemented using intricate computer programs that execute deep learning models to analyze case data. The construction of these algorithmic models entails trade secrets, technical patents, and other confidential factors. As the volume of training data increases and the algorithm undergoes iterative optimization, the operation of artificial intelligence becomes increasingly complex. Consequently, participants in the judicial process find it challenging, if not impossible, to comprehend the decision-making pathways, leading to a lack of trust in the

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recommendations generated by the program. The opacity and procedural intricacy are fundamental factors for algorithmic black boxes. Furthermore, the non-interpretability of AI arises from its dependence on vast quantities of high-dimensional data and neural network architectures for non-linear reasoning, rendering each phase of the AI-assisted decision-making process challenging for participants in the judicial system to comprehend and interpret. For the judge, even if the AI offers a sentence or refereeing suggestion, the judge cannot ascertain the methodology behind the system's conclusion, which subsequently influences the composition and interpretation of the reasoning section in trial and refereeing papers. This tendency contradicts the "reasoning" underscored in the judicial process in China, thereby hindering judges' ability to rationally justify the legality of judgment recommendations, so impacting the openness and transparency of the case. The cognitive obstacles created by the opaque nature of algorithms render judges and judicial officials inactive in their utilization of intelligent technologies. Prof. Cass Sunstein's study (2018) indicates that the algorithmic black box effect not only results in miscarriages of justice in specific instances but also instigates systemic mistakes within the judicial process, thereby causing extensive detrimental effects on the judicial system. In this situation, although the decision-making outcomes of some algorithms may appear rational, the underlying decision-making processes may reveal biases in data selection, biases in model design, and issues in certain circumstances. Algorithmic prejudice resulting in erroneous sentence recommendations, compounded by the algorithmic black-box problem, creates an inscrutable and unclear predicament for judges, so eroding the authority and credibility of the legal system.

C. Inflexibility of sentencing procedures compromising an individual's right to appeal

The purported rigidity of sentencing guidelines denotes the high consistency of AI-generated adjudication views utilized by judicial bodies at all levels, resulting in the formalization of trial oversight. In first-instance courts, AI-assisted adjudication typically utilizes algorithmic models and historical case data to analyze case facts and legal applications, thereby offering decision-making support, including sentencing recommendations and adjudicative determinations. If the parties are dissatisfied with the first-instance ruling, they often seek re-evaluation by a superior court via the appeals procedure to correct potential judicial mistakes. Nevertheless, if the superior court similarly depends on the identical AI-assisted decision-making process and fails to conduct a substantive review of the adjudication recommendation relative to the original adjudication outcome, it is highly probable that the adjudication result in the second trial will mirror that of the first trial. This scenario seems to conclude the trial process; nonetheless, it effectively denies the parties their substantive right to appeal, so formalizing the trial system's error-correcting function and eventually resulting in a lack of impartiality in the judicial judgment.

In the case of Wisconsin v. Loomis, neither the trial court, the appellate court, nor the Supreme Court expressly challenged the validity of the COMPAS system's output or the precision of the algorithm.

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During the trial, the court employed the COMPAS algorithm to evaluate Loomis's recidivism risk as a consideration in the sentencing process. The trial court deemed the COMPAS report beneficial for sentence, however did not challenge the scientific validity or correctness of the algorithm. The court exhibited a greater propensity to rely on the system's risk assessment outcomes, whereas the appellate court refrained from scrutinizing the technical aspects of the COMPAS algorithm or its predictive efficacy. The court concentrated on whether the implementation of the method infringed against Loomis's due process rights, rather than assessing the algorithm's inherent flaws. The Court of Appeals eventually upheld the trial judgment, determining that while COMPAS is a black-box model, its outcomes might serve as a reference and did not solely inform the sentence decision. The Wisconsin Supreme Court, in its conclusive ruling, did not challenge the scientific validity or rationality of the COMPAS system's output and algorithms. The Court indicated that the outcomes of COMPAS's risk assessment may serve as a sentencing reference; nevertheless, judges must exercise caution and not depend exclusively on the system's output for sentencing decisions. The Supreme Court refrained from addressing the particulars of the algorithm's functionality or the precision of its results, instead emphasizing the necessity for judges to acknowledge the constraints of such instruments and to prevent the undue influence of COMPAS on sentence decisions.

Wisconsin v. Loomis illustrates that when intelligent systems are inflexibly and excessively utilized by various trial courts, the judicial system fails to adequately fulfil its essential roles of error review and correction, potentially resulting in unjust outcomes due to insufficient substantive scrutiny.

D. Inflexibility of sentencing procedures compromising an individual's right to appeal

The foundation of every fair judgement in a court case is the evidence presented, and a full chain of evidence is necessary to accomplish this. Although judicial personnel must address the value of the evidence, whether it meets the standard of truth and sufficiency, and whether it complies with the evidence of the "three sexes" and other concerns, the most important need for judicial activities is to resolve the problem. While AI has helped the judicial process locate and improve the chain of evidence to some degree, it is still unable to produce a fixed model for accurate evidence screening in any given case, making it impossible to process all crucial evidence without human intervention.

The underlying structure of the training model restricts its flexibility to complicated and unique scenarios; artificial intelligence systems frequently depend on fixed algorithmic models that are based on the collection of judicial data. When stuck between the bias of statutory evidentializm and the automatic calibration problem of a single norm for access to evidence, this can cause important evidence to be overlooked, redundant evidence to be misjudged, or evidence to be judged in the wrong context. To ensure that the standard is adequate, it is not enough to simply look at the quantity of evidence; it is necessary to take into account the significance and relevance of the evidence as a whole. When it comes to AI, the problem is that it often uses a single evidence access standard to analyze evidence, which

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ignores the fact that evidence has multiple dimensions and, as a result, fails to take decisive evidence into account. Due to AI's limited understanding of evidence relevance, judges may come to unduly rely on AI's judicial advice when handling cases. Additionally, according to the "anchoring effect" in decision-making science, judges may unknowingly be influenced by AI's judicial decision-making advice, which could introduce bias into arbitration.

Reflexive Law Theory and Autopoiesis Theory

A. Reflexive Law Theory (RLT):

1)Concept Gunther Teubner's Reflexive Law Theory is a legal regulatory framework centered on the holistic system, which prioritizes the normative structuring of legal processes to foster self-regulation, self-reflection, and self-correction within social systems, rather than governing social conduct by direct legal mandates.

The theory of reflexive law posits that the law should serve as a catalyst for social systems to adapt, reflect, and modify their behavior, rather than functioning just as a coercive instrument.

2) Theoretical Advancement

The theoretical foundation of antinomian law is primarily shaped by the contributions of Luhmann and Habermas. Niklas Luhmann's systems theory posits that society comprises various functional systems (e.g., legal, economic, political, educational) that function autonomously through autopoiesis, each possessing distinct communication codes and operational logics. Every system possesses an own communication protocol and operational logic. The legal system operates on a binary communication code of "legal/illegal," analogous to "1/0," which evaluates social behavior to preserve social order and system stability. In the 1980s, Tuebner, drawing on Luhmann's system theory, proposed that the law should be implemented through established processes. In the 1990s, Tuebner advanced the theory of antinomian law, advocating for the elimination of the conventional command-and-control model in favor of fostering self-regulation within diverse societal subsystems, including the economy, science and technology, and the environment. He proposed the significant notions of "polycentric governance" and "self-regulation." The legal system functions not merely as a regulator of external conduct, nor is it suitable to render simplistic binary judgments. Rather, through the normative structuring of the legal process, it should encourage self-adjustment, self-reflection, and self-correction within other social systems, thereby achieving dynamic equilibrium and internal coherence within the overarching social system.

Jürgen Habermas' theory of communicative action underscores the attainment of social consensus via communication and negotiation. Habermas posited that the legal system serves not just as an instrument of authority, but also as a mechanism to foster public discourse and collaborative negotiation aimed at attaining social justice. Tuebner assimilated Habermas's concepts and posited that the legal system ought to facilitate discussion and interaction across diverse social systems via proceduralization, thus enabling the entire social system to attain coordinated flow and standardized functioning on a more extensive scale. At the onset of the

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21st century, the transitive law theory has been extensively applied in global governance, corporate governance, and related domains. Tuebner's transitive theory offers a theoretical foundation for multilevel governance and international collaboration, particularly within the legislative framework of the European Union. He also employs the notion of antinomy in emerging social domains such as information technology and cyber security.

3)Key Points

The notion of reflexive law emphasizes the interplay between the legal system and other social systems. Antithetical law differs from traditional command-and-control legislation in that it does not explicitly dictate behavior assessment; instead, it directs the functioning of social institutions by establishing norms or procedures that facilitate self-regulation. The law ought to function as a facilitator of societal self-regulation rather than as an authoritative force, promoting interaction and collaboration among various entities in governance. This multi-latitude governing paradigm aligns more closely with the complexities of contemporary life.

4) Pioneering Utilisation in the Era of Artificial Intelligence

In light of the swiftly advancing AI technology, legal frameworks should direct the technology towards self-regulation via established norms and principles, thereby achieving the co-regulation of law and technology. This can be accomplished through the development of AI ethical guidelines, industry standards, regulatory mechanisms, and other modalities, ensuring that technology developers and users operate AI programs within the confines of the legal framework. AI programs autonomously regulate their behavior while continuously operating, fostering self-learning and reflective mechanisms for AI systems. Additionally, developers must perform regular technical reviews and risk assessments to promptly identify and rectify potential issues, thereby addressing new situations, risks, and challenges in technology applications. The advancement of AI technology complicates the ability of traditional laws, which exhibit lagging tendencies, to address the myriad new challenges it presents. The inverse law theory can facilitate the establishment of a dynamic legal framework via multi-party collaboration mechanisms, such as expert committees, during the application of artificial intelligence technology. This process involves the continuous adjustment of technical application standards, initially achieving the customization of these standards, followed by feedback to legal norms, thereby completing the re-adjustment of legal standards and achieving a dynamic equilibrium between law and technology. In the contemporary digital age of AI advancement, legislation must be restructured to accommodate the self-governance requirements of decentralized networks and varied entities. The legal system must improve its "multi-directional and transparent" communication framework to successfully address the difficulties of diversity and uncertainty posed by information technology. The advancement of artificial intelligence and digital technology has enabled the emergence of "sub-divisions" within the legal framework that include not only national legislation but also the interplay of legal systems of non-state entities and transnational networks.

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B. Autopoiesis Theory

1)Concept

First proposed by biologists Humberto Maturana and Francisco Varela, the theory of autopoiesis describes the process by which biological systems maintain self-independence and continuity through their own organization and functioning. Tuebner draws on this theory and applies it to the analysis of social and legal systems. It is argued that legal systems can be analogized to biological systems maintaining their independence and stability through self-generation and self-regulation.

2)Theoretical Development

The theoretical basis of Tuebner's theory of autopoiesis is mainly derived from the biological theory of autopoiesis of Maturana and Varela. The term Autopoiesis was proposed by Chilean biologists Humberto Maturana and Francisco Varela in the 1970s to describe how biological systems maintain their structure and independence through their own organization and function. The theory of autopoiesis suggests that systems generate and maintain their own functioning through their own feedback mechanisms and rules of operation, such as the way cells maintain their life activities through self-replication and self-regulation. In the 1980s, Tuebner introduced the concept of autopoiesis to Luhmann's theory of systems and began to explore how the legal system maintains its independence through self-generation and self-regulation. Tuebner borrowed this biological concept and applied it to the analysis of social and legal systems. In the 1990s, Tuebner further deepened the theory of autopoiesis and applied it to the fields of multinational corporate governance, environmental law, labor law, and other fields to study the self-generation, self-regulation, and self-innovation of the legal system in complex societies. At the beginning of the 21st century, the theory of autopoiesis was further expanded to the field of global law and governance. to the field of global law and governance. Tuebner examines the interdisciplinary application of the legal system to meet the challenges posed by globalization and to maintain its independence and function in the process of globalization.

As a self-created system, the legal system is able to maintain its independence and stability through internal norms and operational rules and to respond to changes in the external social environment through self-regulatory mechanisms.

3) Main Points of View

The theory of a self-created system focuses on the operation mechanism and independence of the legal system itself. The legal system is dynamically adaptive and can maintain its structure and function through its own rules and norms. It is able to respond to changes in the external environment through internal feedback mechanisms (e.g., case law development, legal interpretation) while maintaining the consistency and stability of its internal logic. The legal system is open in its access to information, receiving and reacting to information from other systems in society. However, it is closed in the operation process, that is, it only operates through its own legal logic and norms, and the closedness of the operation ensures the

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autonomy and independence of the legal system. Therefore, the channel for the legal system to achieve optimization makes it possible to adjust and optimize its own norms and operation mode through internal review, feedback, and adjustment mechanisms (such as judicial interpretation and law revision), so as to respond to the changes and challenges of the external environment.

4) Pioneering Utilisation in the Era of Artificial Intelligence

In the era of artificial intelligence, the theory of self-creation provides an important theoretical framework for how the legal system responds to technological change:

The mechanism of the artificial intelligence system is designed as a self-created system (open access to information, closed program operation), and the artificial intelligence system is designed to have an internal feedback and learning mechanism to automatically adjust and optimize its own function. Therefore, the law can respond to new issues such as data privacy and algorithmic discrimination brought about by AI technology through self-adjustment means (e.g., legal interpretations, judicial precedents, etc.), and when there is a conflict or interaction between the legal system and the AI system. Self-adjustment guidelines can be formulated to guide AI systems and their developers to self-regulation and self-correction, thus realizing the benign interaction between law and technology. Interpretability & Transparency:

Interpretability & Transparency refer to the fact that the rationale for making mediation decisions or material text outputs cannot be understood due to the lack of a standardized explanatory framework for AI dealing with large amounts of high-dimensional data processing. Low interpretability means that when the AI provides a mediation program, negotiation proposal, or processing text, the user (e.g., attorney, party, or mediator) is unable to understand why the AI made the decision it did, and thus is unable to create psychological certainty about the fairness and credibility of the decision-making in the outcome of the dispute case, greatly reducing the efficiency of mediation.

C. The distinct benefits of reflexive and autopoietic theories in addressing AI judicial aid.

1)The Practical Quandary of Critical Jurisprudence

Critical jurisprudence prioritizes the interplay between law and social transformation, concentrating on social fairness and disparities in power. Nonetheless, the oversight of technical bias may occur in AI-assisted judicial decision-making, where data selection and algorithm design might instigate algorithmic discrimination and value prejudice. Critical jurisprudence fails to effectively identify and rectify biases, as its theoretical framework is overly abstract, devoid of practical guidelines for AI-assisted decision-making and struggles to establish specific legal frameworks or standards, resulting in a disjunction between theory and practice.

2) Deficiencies of Economic Law

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Economic law primarily addresses the interplay between legal frameworks and economic efficiency, highlighting that economic conditions influence legal structures and that legal regulations ought to facilitate the optimal allocation of resources. In AI-assisted judicial decision-making, there is an excessive emphasis on economic factors, neglecting non-economic considerations, and prioritizing efficiency and cost-effectiveness, whereas in judicial decision-making, non-economic factors such as emotion, public order, and social justice hold equal significance. The judicial decision-making assistance offered by artificial intelligence may overlook case complexity and forfeit humane consideration if predicated only on economic efficiency, resulting in biased outcomes. Secondly, economic law frequently depends on quantitative data analysis; nevertheless, in legal situations, a significant portion of the evidence and information is challenging to quantify. This significant dependence on data may result in erroneous case assessments.

3)The challenge of implementing comprehensive jurisprudence

Holistic jurisprudence underscores the thorough examination of legal, ethical, and social dimensions, promoting a methodical and integrative perspective on legal matters. In artificial intelligence-assisted judicial decision-making, while holistic jurisprudence seeks to integrate multiple factors, the practical implementation, particularly the utilization of artificial intelligence, may result in theoretical intricacies and operational challenges in specific instances. Secondly, although the systematic and comprehensive nature of holistic jurisprudence facilitates the consideration of multiple factors, its complexity in a rapidly evolving technological landscape may hinder prompt responses to emerging situations, thereby diminishing the significance of targeted information.

Problem-solving paths and regulatory direction

A. Strategies for addressing the issue of substandard judicial data

The integration of reflexive theory with self-creation theory offers a thorough and efficient approach to addressing the issue of substandard judicial data quality. The precise solutions are as follows: Initially, the application of reflexive theory underscores the law's capacity for dynamic adjustment. The legal system must consistently evaluate and revise its data collection and application methodologies, establishing a data quality assessment mechanism, or data "sifting," to mitigate the GIGO phenomenon ("garbage in, garbage out"). This approach aims to enhance the authenticity and completeness of data. Concurrently, it advocates for the development of a data collection mechanism that interacts dynamically with society, promptly addressing emerging societal needs to ensure the law's adaptability, thereby improving the timeliness and relevance of the data. Significance. Secondly, integrating the theory of self-created systems, emphasis is placed on the self-organizing capacity of the legal system, enabling it to self-adjust in response to complex and low-quality data, while dynamically optimizing data collection and analysis strategies by evaluating the outcomes of data utilization in real time through a feedback mechanism. The creation of a legal information network facilitates data sharing across legal entities and enhances the diversity and openness

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of information. Integrating these two theories creates a dynamic adaptation mechanism that allows the legal system to adjust flexibly to variations in data quality and to leverage collective intelligence and machine learning technologies to improve decision support efficiency. Ultimately, public and stakeholder engagement is implemented to gain insights into the underlying causes of data quality issues via social co-governance, hence facilitating the development of more effective data governance solutions. This holistic strategy enhances the quality of court data and guarantees the legal system's fairness and efficacy in a dynamic social context.

Establishing data-driven evaluation indicators enables the identification of low-quality data impacts in reality, promotes data governance and standardization, and thus enhances data quality. Implementing public engagement and third-party review procedures inside the legal system can guarantee the authenticity and integrity of data while minimizing the production of low-quality data.

Establishing a legal information network facilitates the sharing and interoperability of data across diverse legal entities. This interconnected framework enhances data quality while fostering variety and openness of information, hence augmenting the legal system's capacity to address data quality concerns. Involving the public and stakeholders enables the legal system to comprehend the underlying causes of data quality issues, hence facilitating the formulation of more effective data governance plans.

B. A Regulatory Framework for Addressing Judicial Injustice Caused by Algorithmic Black Box Issues

The integration of reflective and self-creation theories offers a definitive resolution to the issue of miscarriages of justice resulting from algorithmic black boxes. While the two theories do not address the algorithmic black box problem at a technical level, technologies like Explainable AI are regarded as promising avenues for resolving this issue by elucidating the algorithm's decision-making process in a visual and comprehensible manner, thereby enabling users from non-technical backgrounds to grasp the algorithm's behavior clearly. Initially, the transparency of algorithms can be enhanced via dynamic feedback and review mechanisms, while independent external auditing and interpretability frameworks can be instituted to guarantee that the procedures employed in the judicial system are subject to regular scrutiny, ensuring that each phase of the AI output is accompanied by a clear explanatory rationale. Simultaneously, create internal and external feedback loops utilizing machine learning to accurately identify and evaluate algorithm performance, encompassing both quantitative analyses of algorithmic outcomes and systematic examination of the algorithm's decision-making logic, while also regulating the legal information network to facilitate the integration of judicial data. It facilitates cross-domain data sharing and cross-validation from multiple sources, integrates data from various jurisdictions and cultural contexts, and trains diverse models to enhance the applicability of AI-assisted decisions and mitigate misjudgments caused by data bias. The inversion theory ensures algorithm transparency via external oversight, while the self-creation theory enhances algorithm fairness through internal

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optimization. The integration of these two theories establishes a dynamic adaptation mechanism to effectively address the issue of judicial injustice stemming from the algorithm's black box nature.

C.Framework for Regulating the Rigid Judgement Process Undermining the Party's Right to Appeal

The inverse theory highlights the legal system's capacity for dynamic adjustment, advocating for the creation of a feedback mechanism. In light of the reform addressing the complexities and simplicities of case processing, the court's utilization of AI assistance should be tailored to the intricacies of each case. Facilitate prompt feedback from the parties about the decision-making process, and refine and enhance the adjudication procedure. In the implementation of artificial intelligence for supplementary judicial decision-making prior to the establishment of a specialized appeal and protest review mechanism, it is essential to prevent the second instance court from utilizing the same artificial intelligence system as a referee or directly adopting the judicial decision-making recommendations proposed by the artificial intelligence system, thereby formalizing them into the second instance procedure without substantive review, in order to avoid excessive encroachment into the domain of adjudication by artificial intelligence. Artificial intelligence, as indicated by feedback in the appeal process for self-reflection and correction, proposes judicial decision-making recommendations in more complex cases. It is essential to consider social cognition, case experience, and public sentiment to achieve outcomes that align with societal evaluation standards, thereby minimizing unnecessary procedural obstacles. In cases involving novel legal relationships, factual determinations, and evidence identification necessitate proactive judicial intervention in value assessment. Assessment. Ensure the effective exercise of the party's right to appeal, subsequently receiving the appeal request for automated optimization and simplification, to guarantee that the adjudication process can adaptively address the party's appeal requirements, thereby mitigating the limitations of the right to appeal caused by procedural rigidity. An artificial intelligence-driven judgment process management platform is developed to analyze judgment and appeal data in real-time, deliver dynamic feedback, optimize processes intelligently, and guarantee that the processing path of each case remains sufficiently flexible and adaptable.

C. Challenges in regulating the processing trajectory of pertinent evidence using "proportionality criteria."

The artificial intelligence system utilizes a judicial database to create a mechanism for evidence classification and prioritization assessment, informed by the latest advancements in legal standards and evidence grading practices. This ensures the AI can accurately identify and manage pertinent evidence. Furthermore, a deep learning-based evidence assessment platform is developed to enhance the system's ability to discern complex correlations among evidence, thereby improving the evaluation of evidence appropriateness. This may be accomplished by enabling the platform to dynamically modify the evidence analysis model

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based on input to enhance processing accuracy. Establish a multi-tiered segmented keyword guidance framework, and based on the current keyword advice, further refine and diversify the categories and levels of keywords. For instance, regarding "juvenile delinquency," it is essential to consider not just "sentence," "age," and "trial level," but also to incorporate these elements comprehensively. In the context of "juvenile delinquency," our analysis encompasses not only "sentence," "age," and "trial level," but also incorporates keywords such as "type of crime" and "age." Furthermore, we can refine our focus to specific factors, including "family background" and "psychological state," to attain a more comprehensive understanding of the case. It may utilize keywords such as “type of crime” and “age,” and can be further refined to particular aspects such as “family background” and “psychological state,” therefore thoroughly analyzing many components pertinent to the case. It can assist judges in more precisely identifying the legal norms and adjudicative factors pertinent to the case, so preventing the mechanical application of legal laws by AI. The AI can enhance and modify the search logic by incorporating the usage data of judges across various domains, alongside the criteria for evidence, thereby establishing a differentiation standard between "basic evidence" and "decisive evidence," ultimately offering precise references for judges in novel cases. It will systematically establish the standards for differentiating between "basic evidence" and "decisive evidence," so furnishing judges with explicit references for future cases.It is crucial to restrict the relevant contexts and capabilities of AI in aiding judicial decision-making.

The use of AI in judicial aid should be determined by the case's type and complexity. In straightforward, repetitive cases, artificial intelligence can comprehensively aid the judge in process optimization and evidence evaluation; however, in intricate cases, its function should be confined to providing informational support and legal analysis. This should be determined by the case's complexity and the application of legal statutes, utilizing intelligent review criteria to alert the judge to potential trial risks in advance. In instances of conflicting legal requirements or ambiguous application standards, judges should be promptly informed of the legal uncertainties in the case to prevent excessive dependence on the judge and to uphold the judge's primary responsibilities.

Conclusion

As nations globally advocate for the establishment of intelligent justice, the amalgamation of artificial intelligence and the judicial system has emerged as a prevailing trend, particularly in judicial adjudication, where AI-assisted decision-making in the judiciary has become increasingly evident. China's artificial intelligence-assisted judicial decision-making system is integrated into the national information technology development strategy, encompassing various facets of judicial adjudication and the broader judicial process. Its objectives include enhancing adjudication efficiency, standardizing the adjudication process, reinforcing evidence review, and offering intelligent support for sentencing and related aspects. It must be emphasized that AI serves solely as an auxiliary instrument for judicial advice throughout the judicial process and cannot supplant or undermine the judge's authority and decision-making. Additionally, there exists a discrepancy between the actual efficacy and the anticipated

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functions of AI in practice, complicating the establishment of appropriate standards for fact determination, procedural application, and the enhancement of the qualifications of personnel overseeing the case, among other issues. Nonetheless, it possesses the capacity to manage repetitive and mechanized tasks inside the process, so alleviating the pressure on judges.

The advent of robust artificial intelligence will not entirely undermine the current legal framework; rather, it facilitates the advancement of the legal system with the help of digital technology. This process necessitates careful consideration of the social risks and legal challenges posed by technological application, optimizing its supportive value under the regulation of the theory of inversion and the theory of self-creation, augmenting its role in fact determination, ensuring equitable empowerment of technology, strengthening accountability mechanisms, and preserving the impartiality of justice. In conclusion, the integration of artificial intelligence into judicial adjudication should not be anticipated to supplant judges or assume judicial roles in the near future. This amalgamation of artificial intelligence and judicial processes reflects the evolution of contemporary society, and its future trajectory within the realm of justice is far from linear. The deployment of generative artificial intelligence raises social and jurisprudential risks, necessitating a critical examination of foundational theories to ascertain the optimal synergy between generative artificial intelligence and criminal trials, thereby facilitating the ongoing transformation and enhancement of modern jurisprudence.

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Conflict of Interest

The authors declare no conflict of interest.

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