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Risks and Mitigation Strategies of Artificial Intelligence in Judicial Adjudication: A Human-AI Collaborative Framework for Judicial Reasoning

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Abstract: Artificial Intelligence (hereinafter referred to as AI) is being rapidly integrated into judicial adjudication, with big data-driven technologies playing a pivotal role. The transformation underpinning intelligent adjudication-a shift from text-based to code-driven judicial logic-has not only catalyzed the emergence of AI jurisprudence but also reshaped the concept of justice centered on the consistent adjudication of similar cases. However, the coexistence of complexity and opacity in AI-powered judicial systems may undermine their purported advantages. Beyond the black-box effects arising from the irreducibility of AI-driven judicial processes, issues persist in data and algorithms, two critical components of the AI judicial ecosystem. Consequently, judges' interpretive responsibilities now encompass new dimensions: verifying and integrating the foundational conditions of AI-assisted adjudication. To align AI technologies with the objectives of human judicial decision-making, judges should focus on four hermeneutic checkpoints through human-machine collaboration: (1) Is the case dataset sufficiently comprehensive? (2) Is the adjudicative outcome normatively justified? (3) Is the causal relationship appropriately established? (4) Is the symmetry between affirmative and negative computational reasoning maintained.

1. Introduction

The rapid advancement of AI, exemplified by ChatGPT, has garnered significant societal attention in recent years. Notably, OpenAI's recent releases of the Sora model and ChatGPT-4o signify that large-scale AI models have ascended to new heights of sophistication. Within the judicial domain, AI has already achieved broad application, demonstrating unique advantages in handling voluminous, low-technical tasks such as legal research and document drafting. Nevertheless, the deployment of AI in judicial contexts raises systemic concerns, including difficulties in ethical value judgments and algorithmic opacity, which may engender unjust adjudicative outcomes. While AI-generated adjudicative outcomes are ostensibly transparent, the judicial process now incorporates a machine-language layer distinct from natural linguistic structures, necessitating judges' interpretative engagement with both computational logic and algorithmically generated texts. To borrow Gadamer's insight: "We must reconnect the solidified scientific propositions embedded in non-linguistic symbols

with the fundamental order of our existence-an order that is neither arbitrary nor subject to our manipulation, but demands our respect."[0] Simultaneously, as Holmes reminds us, The life of the law has not been logic; it has been experience. The realization of legal justice depends not solely on outcomes or logical deductions but on arguments and demonstrations aligned with the lifeworld, thereby securing public compliance and trust. Consequently, it is imperative to develop legally sound interpretations of AI-derived judicial results, ensuring the organic integration of computational processes with jurisprudential reasoning-a challenge demanding urgent resolution.

2. The Practice of Introducing Artificial Intelligence into Judicial Adjudication

The Concept of AI was formally proposed at the 1956 Dartmouth Conference. To expedite mastery of cutting-edge AI technologies, the Chinese government has invested substantial human and material resources in advancing AI research and development for judicial adjudication. Based on its developmental trajectory, AI in judicial adjudication can be categorized into two phases: preliminary and advanced. Preliminary judicial AI serves merely as an auxiliary tool in adjudicative processes. As AI becomes increasingly embedded in daily life, the construction of Smart Courts and the realization of Intelligent Justice have emerged as pivotal societal priorities. China's judicial practice is progressively advancing toward an advanced phase of AI adjudication, where systems may independently render judicial decisions. Empirically, AI has already achieved extensive application in judicial adjudication across various nations.

2.1 Judicial Practice in the United States

In 2016, IBM developed ROSS, the world's first artificial intelligence attorney. [0] Operating on IBM's Watson cognitive computing system, ROSS is currently employed at a New York-based law firm, specializing in corporate bankruptcy cases. ROSS can engage in direct dialogue with humans, analyze critical elements of legal cases, and retrieve answers from case law. In January 2023, a U.S. Columbia Court became the first to utilize ChatGPT as an adjudicative aid. After formulating a preliminary judicial opinion, the presiding judge discussed the case with ChatGPT, ultimately incorporating the AI's analysis into the final judgment. Notably, the judge explicitly cited the human-AI dialogue within the court's official written opinion, sparking widespread societal debate.

2.2 Judicial Practice in China

At the 2016 Hangzhou Yunqi Conference, the legal tech platform Wusong unveiled "FaXiaoTao", marking China's inaugural AI-powered legal assistant. Leveraging judicial big data, FaXiaoTao analyzes causes of action by extracting keywords from client inquiries, matches clients with suitable attorneys based on jurisdictional preferences, and provides granular details such as law firm profiles and historical case volumes in specified courts. Beyond basic information retrieval, it employs data modeling to identify adjudicative patterns and enforcement trends under evolving legal landscapes, thereby enhancing judicial decision-making through predictive analytics and emergency response frameworks, offering data-driven support for judicial operations. In China's judicial domain, the most notable AI application is Shanghai's "Project 206"-the Intelligent Case-Assistance System for Criminal Proceedings. This system integrates expert knowledge, algorithmic models, and massive datasets to embed standardized evidentiary criteria into digitized workflows. Following its success in criminal justice, Project 206 has expanded to civil, commercial, maritime, financial, intellectual property, and administrative cases. It addresses high-volume disputes as well as jurisdictionally distinctive matters like financial leasing contract disputes and online copyright infringement cases, reflecting Shanghai's economic complexity.

3. Advantages and Risks of Introducing Artificial Intelligence into the Judicial Domain

The integration of AI into judicial systems has sparked significant debate, particularly regarding its capacity to enhance adjudicative accuracy. Nonetheless, the advantages of AI in judicial contexts are evident across multiple dimensions: First, AI-driven adjudication, grounded in algorithmic and data-driven decision-making, exhibits greater objectivity and fairness compared to human judges' subjective interpretations, thereby fostering broader societal acceptance. Second, AI systems enable rapid processing of voluminous legal cases and documents, improving information consolidation and screening efficiency. Third, AI applications minimize human interference, reducing risks of judicial errors and unjust outcomes. In societies with heightened trust in automation and compatible cultural contexts, AI adjudication is often perceived as more precise and impartial. As an indispensable tool in modern judicature, AI leverages massive datasets and predictive analytics to establish correlations between individual cases and their analogous counterparts, generating adjudicative outcomes aligned with the principle of consistent treatment of similar cases. This approach not only operationalizes case-law consistency but also substantially shortens trial durations and enhances adjudicative efficiency. By providing judges with data-supported references, AI further strengthens the determinacy and accuracy of judicial decisions. While AI demonstrates tangible utility in judicial auxiliary mechanisms, its deployment concurrently entails significant systemic risks that demand rigorous jurisprudential scrutiny.

3.1 Judicial Data Risk

First, judicial databases may face compliance and security risks in data sourcing. "AI systems train on massive datasets, which often include materials from internet sources with potential copyright infringements or third-party repositories containing information that violates personal privacy, corporate trade secrets, commercial interests, or even national security".[0] Despite the evident illegality of such data sources, verifying their authenticity and regulatory compliance remains operationally challenging. Second, the authenticity of data content cannot be reliably guaranteed. AI systems require high-quality, well-curated databases to ensure output accuracy. However, existing judicial AI databases predominantly rely on unverified internet data, compromising factual reliability. For example, ChatGPT-3.5 has demonstrated tendencies to fabricate legal provisions, misrepresent precedents, and generate counterfeit citations-a phenomenon colloquially described as "authoritative-sounding fabrication" Third, judicial data varies significantly across regions, historical periods, and procedural stages, hindering the establishment of unified data standards. As legal norms and societal values evolve dynamically, the judicial philosophies and socialist core values underpinning adjudicative outcomes also shift. This inconsistency risks generating divergent rulings for factually similar cases, thereby undermining judicial fairness.

3.2 Value and Ethical Risk

Judicial discretion, rooted in value-laden judgments, constitutes the foundation of judicial decision-making. Although AI adjudication employs deep learning technologies, its computational processes inherently struggle to assimilate societal value judgments. Each case involves multifactorial complexities, with no two cases being entirely identical. Legal application inherently reflects societal realities, requiring integration of prevailing social values-a nuanced process beyond machine comprehension. First, while AI trained on massive datasets can approximate human judges' decisions, generative AI fundamentally fails to grasp core legal concepts such as substantive justice and societal welfare, nor does it comprehend the ontological nature of judicial adjudication. Its data-driven deductions merely systematize past precedents. Confronted with novel cases, AI cannot replicate

human logical reasoning or contextual adaptability. In contrast, judges rely on human creativity to address emerging societal disputes-a capability absent in AI. For instance, in the Yu Huan case (a high-profile Chinese case involving self-defense claims), AI would mechanically classify the act as intentional homicide, unable to navigate the ethical dimensions of self-defense within China's jurisprudential context. AI's analysis, constrained by fixed reasoning models, lacks the humanistic empathy essential for achieving the justice law seeks to uphold. Second, while AI integration enhances court efficiency and facilitates smart court initiatives, it risks constraining judges' discretionary authority. Overreliance on AI may foster judicial inertia, trapping judges in data-driven conformity rather than exercising independent value judgments. This dynamic complicates defining AI's proper role and epistemic boundaries in adjudication. Third, the pluralistic social values shaped by regional and ethnic diversity demand continuous judicial adaptation through dialectical engagement. AI systems face insurmountable challenges in discerning the evolving standards of societal-value-infused justice across these heterogeneous contexts.

3.3 Liability Ambiguity Risk

AI lacks the status of a natural person or legal entity under jurisprudential definitions and possesses no independent assets, thereby precluding its capacity to bear liability. Responsibility for erroneous judicial outcomes may be attributed to two categories of actors: (1) AI algorithm designers and (2) judges utilizing AI to render case adjudications. If wrongful judgments arise due to operational errors, flawed evidentiary review, or other judicial missteps by judges, the judicial liability shall presumptively rest with the presiding judge. Regarding AI algorithm designers, intentional or negligent incorporation of erroneous value judgments during algorithm development, or systemic deficiencies in AI training datasets that materially distort judicial outcomes, presents complex questions of liability typology. Current legal frameworks struggle to delineate whether such scenarios warrant judicial liability, administrative sanctions, or civil remedies. Quantification of liability remains problematic under existing doctrinal paradigms. Judges retain an affirmative duty to scrutinize AI-generated adjudicative outputs. The principle of "judges who adjudicate shall render decisions, and decision-makers shall bear responsibility" necessitates judicial accountability. However, proportionate allocation of liability between human judges and algorithmic systems resists precise calibration. A thorough examination of liability issues involves numerous stakeholders and entails substantial systemic costs. Furthermore, certain erroneous judgments may stem from inherent technological limitations transcending contemporary technical foresight. In such cases, it remains challenging to determine whether judges should bear liability for outcomes attributable to epochal technological constraints.

3.4 Algorithmic Security Risk

We are increasingly cognizant of the algorithmic black box problem inherent in AI-assisted adjudication. With the exception of specific non-public trials, judicial transparency remains a foundational principle of China's judicial system. Consequently, resolving the algorithmic opacity is imperative to ensure the fairness of AI-generated adjudicative outcomes. The deep learning models underpinning AI operate through self-iterative mechanisms, raising critical questions: Why do big data training processes yield specific model architectures over alternatives? How are risk metrics computationally derived? What weightings are assigned to predictive factors? This implicates a broader epistemological issue in machine learning-the prioritization of correlation over causation-which may contravene the presumption of innocence in criminal proceedings. Predictive analytics, even when statistically robust, generate probabilistic inferences rather than factual determinations. For instance, facial recognition during investigative phases and AI-driven assessments of recidivism

risks for parole eligibility both exemplify this tension. Under big data paradigms, the inner logic of deep learning algorithms remains opaque: their outputs reflect technical optimization rather than human interpretability. First, algorithmic systems exhibit inherent non-disclosure and non-interpretability. When developers obscure algorithmic architectures, both the public and judicial decision-makers confront systemic opacity, precluding scrutiny of computational reasoning. The technical complexity of algorithms renders them unintelligible to laypersons, undermining the judicial system's obligation to provide transparent, reviewable rationales for decisions-a cornerstone of procedural justice. Second, embedded data biases compound these risks. Algorithmic designers may unconsciously encode value judgments during model development. For example, historical datasets reflecting higher arrest rates among African American populations in the U.S. (as documented in ProPublica's analysis of COMPAS recidivism algorithms) risk perpetuating discriminatory outcomes absent rigorous bias-mitigation protocols. Third, the abstract nature of "fairness" itself complicates algorithmic governance. Defining equitable outcomes between litigants has always been a jurisprudential challenge, and computational systems struggle to operationalize context-sensitive notions of justice. Finally, algorithmic failures resulting in security breaches would catastrophically erode judicial credibility, infringe civil rights, and incur irrecoverable sunk costs to institutional legitimacy.

3.5 Regulatory Liability Risk

The rapid development of AI will inevitably bring unpredictable transformations to judicial adjudication. Therefore, determining an appropriate regulatory model to effectively address the significant challenges posed by technological breakthroughs has become a critical factor in promoting the responsible advancement of AI. The European Parliament has proposed the Artificial Intelligence Act and the Digital Services Act to establish effective AI oversight. The Artificial Intelligence Act achieves risk regulation through full-process supervision, advocating the principle of "the provider bears responsibility," which focuses on strengthening risk governance for AI developers while imposing lighter obligations on end-users. The Digital Services Act stipulates that AI developers are responsible for monitoring algorithmic risks, making technology providers the primary regulatory subjects. However, this approach may significantly increase compliance costs and lead to resource inefficiencies. Currently, there is no institutional framework to reasonably define regulatory responsibilities among stakeholders, resulting in a partially absent liability regime for AI governance.

3.6 The Acceptability of Judicial Decisions Risk

Taking the case-model expert system of Shanghai's "Project 206" as an example, this system is built on machine rationality and procedural justice through historical big data, typically applicable only to routine cases and incapable of resolving complex, difficult, or novel disputes. When legal expert systems fail to match analogous cases or provide case referrals, AI adjudication faces operational limitations, compelling judges to retain jurisdiction-consistent with Arthur Kaufmann's observation that "deductive reasoning cannot generate new knowledge." From a cost-benefit perspective, complex and difficult cases constitute a minimal fraction of total caseloads. Assigning these rare cases to judges aligns with principles of judicial economy: streamlined processing of simple cases through standardized protocols, while reserving ordinary procedures for exceptional complexities. The critical issue lies not in this bifurcated approach but in judges' inability to intervene in algorithmic models or adjust parameters, leaving them bound to accept outcomes predetermined by technical operators. A common critique of algorithmic modeling asserts: "Recognizing the cat is what matters, not how it is recognized." This logic disregards human agency, prioritizing outcomes over procedural rigor-particularly the normative value of procedural justice-thereby eroding the

independent significance of due process. The opaque and unexplainable nature of AI adjudication (the "algorithmic black box") risks fundamentally undermining litigants' perception of legitimacy derived from procedural fairness, thereby threatening the acceptability of judicial decisions.

4. Exploring Judicial Interpretation in Human-AI Collaboration

First, data bias necessitates correction through judicial interpretation. The application of AI technology in human adjudication inherently presupposes trust in data. However, the big data era demands a reconfiguration of such trust. As articulated, "We must determine when and how to trust findings from data science, and where or to what extent to distrust them. Trust in reconstructed inferential knowledge requires empirical verification and foundational analytical contestability." While judicial big data-comprising legally validated judgments as AI training inputs-retains overall credibility despite potential errors in individual cases, its granular reliability must be quantified and refined across specific case volumes. Data inherently involves integration at varying scales. In small-data contexts, human rationality compensates for sampling errors, but in big-data regimes, systemic biases within larger sample populations demand rigorous scrutiny. Random, contingent, fluctuating, and chaotic variables all critically influence AI systems. Judges' legal interpretations, as embodiments of judicial logic, must assume custodial responsibility for verifying whether the deep neural networks and machine learning models rely on sufficiently representative legal corpora.

Second, case data referencing requires judges to balance competing priorities through interpretive techniques. As noted, judicial big data encompasses case datasets of divergent scales, containing heterogeneous behavioral patterns, legal consequences, and contextual correlations. Precedents can thus be categorized into three types: big-data precedents (reflecting general public judicial philosophy), medium-data precedents (representing negotiated judicial philosophy), and small-data precedents (embodying evolving judicial philosophy). To preserve legal order stability and safeguard citizens' legitimate expectations, judges should exhibit heightened deference to large-scale datasets-regardless of behavioral pattern uniformity-while reducing reliance on smaller datasets. This hierarchy aligns with the principle of equality and the psychological imperative for continuity and consistency in legal cognition. However, adhering to this judicial logic risks two latent dangers: AI adjudication may erode judicial creativity in large-scale precedent applications while negating the factual value of case guidance in small-data precedents. Conversely, the inverse scenario remains plausible. Consequently, it becomes imperative to identify and introduce justifications for novel cases beyond existing datasets-specifically through judges' interpretive selection and argumentation-to balance legal logic's consistency with transformative potential.

Third, code execution requires judges to embed public rationality through interpretation. Even assuming flawless data and algorithms, and granting AI's capacity to assimilate socio-cultural knowledge via digital learning, legal policy-as an integral component of public policy-must dynamically integrate shifting societal priorities and litigants' contextual realities into AI adjudication. Programmers' algorithmic codification of law cannot substitute judges' jurisprudential comprehension. Judges must therefore articulate public policy through legal interpretation to rectify AI's latent value biases, moral inclinations, and ethical risks. Operationalizing public policy in AI adjudication demands judicial mastery of weighting normative elements-particularly the interplay between doctrinal meanings and adjudicative outcomes-and explicating these relationships to litigants through reasoned discourse.

Fourth, algorithm validation must correlate with case-specific judicial reasoning. Within AI ecosystems, algorithms occupy foundational roles. To mitigate legal risks, ideal algorithmic innovation necessitates convergence of judicial and engineering expertise-a synergy precluded by professional specialization trends. Reliance on programmers' self-certification for algorithmic

validity proves untenable; only judges' interpretive arguments in concrete cases can expose algorithmic vulnerabilities and align code with legal logic. Judicial reasoning thereby generates refined training data and enables algorithmic optimization-even novel algorithm creation.

In summary, AI-driven judicial big data processing represents machine language transcending human linguistic ambiguities to classify, categorize, and match pending cases against precedent corpora, thereby resolving judicial uncertainties. This constitutes legal science's positivistic transformation via AI. As Kaufmann observed, "legal hermeneutics without analytics risks blindness, while analytics without hermeneutics remains hollow." Yet AI adjudication, despite its analytical prowess, confronts legal interpretation with unprecedented challenges through machine language's incursion into legal dogmatics. In concrete judicial adjudication, the pressing challenge of human-AI collaboration lies in effectively integrating AI's impact on judicial rationality through legal interpretation to align outcomes with societal expectations of justice. In essence, AI functions both as a judicial instrument and as part of the adjudicative environment. This dynamic implicates not only the self-justification of judicial authority and rationality but also the ontological and axiological relationship between human and machine intelligence. Judicial decision-making, however, remains an intimidatingly complex domain. Beyond analyzing voluminous facts, rules, precedents, or their combinations to formulate legally sound resolutions, its true gravity resides in cases involving profound interests and emotions-decisions that shape legal actors' expectations and reconfigure their understanding of the legal order. Methodologically and epistemologically, human-AI collaboration necessitates judicial reasoning calibrated to AI's operational characteristics, regulating adjudicative processes and outcomes to synergize AI's analytical prowess with human jurisprudential wisdom. AI adjudication's interpretative challenges cannot be resolved by algorithmically encoding social morality, public sentiment, or legal fairness. While AI enhances human adjudication as a cognitive extension, it cannot replace judicial control over legal interpretation-a safeguard against judicial alienation, even with superintelligent AI. Proposed technical audits (e.g., diversifying inputs or reverse-engineering computational weights) acknowledge the opacity of mapping AI's logic to human concepts, especially with undefined variables. This article argues that while technology may improve transparency, systemic judicial logic must adaptively compensate for AI's limitations through legal interpretation, balancing its strengths and weaknesses within human oversight.

As noted, AI adjudication excels at extracting latent knowledge, behavioral patterns, and outcome models from judicial big data-high-dimensional insights irreducible to human-comprehensible dimensions. Under black-box mechanisms, judges must test behavioral subsets and legal consequence correlations by adjusting legal parameters to trace causal spectra and marginal effects. Herein, human legal language assumes meta-linguistic value over AI's machine language: legal interpretation becomes the natural-language mediation of technical rationality into the lifeworld, preventing algorithmic extremism from subverting societal commonsense. In other words, AI adjudication not only reconfigures justice paradigms but also necessitates transformative adaptations in traditional interpretive methodologies. Prudently calibrating case-specific interpretations in AI contexts requires attention to the following dimensions:

4.1 Is the case dataset sufficiently comprehensive?

Current AI models rely on deep neural networks that learn by extracting patterns from data, making big data foundational to AI training. While human judges retain ultimate judicial authority, AI's precedent-driven logic fosters confidence when backed by robust datasets. However, limited data necessitates greater emphasis on human judicial subjectivity, as data scale directly shapes whether courts adopt standardized or context-specific interpretive methods. Three principles govern the data-interpretation nexus: First, ample data enables AI to align cases with high-dimensional schemas,

yielding sociohistorically coherent outcomes. Second, scarce data confines AI to binary frameworks, amplifying errors due to statistical gaps-flaws unmitigated by AI's lack of dialectical reasoning. Third, data scales are fluid: fragmented small/medium datasets evolve into big data over time, demanding dialectical analysis of their judicial roles. Consequently, trust in machines and reliance on human judgment must proportionally adjust. Courts should defer to big-data judgments for generality, categorize behavioral patterns in medium-data contexts, and prioritize judicial wisdom in small-data scenarios while cultivating richer datasets. AI adjudication thus requires dynamic integration of interpretive techniques (textual, purposive, sociological, systemic) tailored to data scale and contextual demands. This approach balances technical precision with human oversight, ensuring algorithmic reliability without compromising judicial adaptability. By calibrating machine deference and human intervention to data granularity, the system mitigates risks of over-automation while fostering incremental improvements in both data quality and interpretive sophistication-a dual optimization critical for maintaining judicial legitimacy amid AI integration.

4.2 Is the adjudicative outcome normatively justified?

"The reasonableness of adjudicative outcomes and the extent thereof depend on whether and to what degree the normative purpose of legal provisions is realized." [0] Although such purposes are conferred by the legislature, their interpretation requires balancing objective substantive rationality while respecting formal legality. Consequently, even if AI-derived judgments based on big data demonstrate precision and determinacy, normative scrutiny remains imperative. Essentially, judges-as the adjudicative subjects in AI-assisted justice-must recognize the objectivity and factual nature of judicial data to ensure continuity and universality of outcomes in general fairness. Simultaneously, they must critically examine case-specific results through the lens of legislative intent and legal policy. U.S. Supreme Court Justice Breyer once noted: "Historical lessons demonstrate that when judicial rulings contradict mainstream public sentiment or face resistance from the executive and legislative branches, courts lose their capacity to safeguard human rights and constrain public power." While this conclusion addresses human adjudication, it equally applies to AI-derived judicial outcomes.

While AI justice surpasses human adjudication in processing precedent data with superior abstraction and correlation capabilities, judicial cases remain rooted in historical-cultural contexts shaped by sociolegal evolution. This heritage forms the "human DNA" of adjudication, essential for societal acceptance of rulings. In an era of rapid technological change, prioritizing judicial stability and civic legitimacy requires balancing AI's technical strengths with rigorous legal scrutiny. AI-derived judgments deserve deference but must be scrutinized for contextual appropriateness, avoiding overreliance on algorithmic outputs that neglect shifting policy landscapes. As a public service, AI justice cannot evade review: judges must anchor interpretations in legal norms, align outcomes with sociopolitical values embedded in policies, and actively calibrate rulings through methodological frameworks. Ultimately, legitimizing AI adjudication in civil society hinges on continuous evaluation of its reasonableness via interpretative accountability mechanisms.

4.3 Is the adjudicative outcome normatively justified?

It is widely acknowledged that correlation constitutes a defining feature of big data analysis, whereas causation-regardless of doctrinal approach-differs fundamentally due to its high normativity. Specifically, the intellectualization of judicial big data enables AI to establish complex high-latitude connections among multifarious legal elements, thereby examining, extracting, and matching input judicial data. "Through processing and interacting with big data within reasonable timeframes, big data analysis can facilitate the emergence of previously hidden insights, reveal unknown trends and evolutionary patterns, support effective predictions, eliminate sampling and opinion polling, promote

novel investigative and deterministic analytical methods, and achieve more reliable and precise results." By capturing correlations across heterogeneous datasets-a prerequisite for advanced analysis-big data exhibits predictability despite inherent randomness. While correlations may refine cognitive biases, approximate causation, or even generate statistically significant causation with legal implications, jurisprudence must ascertain causation based on its own objectives without violating scientific principles. From this premise, adjudicators must normatively evaluate legal elements in AI-derived judgments by synthesizing contemporary scientific knowledge and societal common sense. Consequently, factual knowledge must not be conflated with normative knowledge to misidentify correlations as causation. Simultaneously, latent and uncertain knowledge derived from AI's data mining and machine learning cannot be disregarded, as such insights may catalyze novel causal constructions under legal normative purposes.

4.4 Is the symmetry between affirmative and negative computational reasoning maintained?

AI adjudication extends litigants' strategic trial interactions by converting factual elements (e.g., mitigating/aggravating factors) into gradient data parameters, enabling dialectical cross-examination for equitable outcomes. Symmetrical-asymmetrical computation-mandated by judicial principles-serves dual roles: preventing algorithmic bias through procedural safeguards and countering programmer self-certification flaws via robust oversight protocols. While algorithms underpin AI justice, their infrastructure must embed dialectical checks to reconstruct judicial fairness and authority. Judges must assess evidence reliability and error risks (e.g., wrongful convictions), balancing two benefits: (1) big-data patterns from analogous cases enhance consistency and public trust; (2) adversarial data permutations model outcomes addressing litigants' concerns while aligning with legal expectations. This framework transforms adversarial dynamics into calibrated data-driven adjudication, ensuring algorithmic accountability without compromising procedural rigor-a critical equilibrium for legitimizing AI's role in justice systems.

Symmetrical-asymmetrical computation is critical for data quality and deep learning evolution. While the U.S. Data Quality Act (2001) requires federal decisions to use verifiable data with public oversight, big data's exponential growth hampers error correction, reducing public accountability to symbolism. Judges must proactively address data risks and algorithmic biases through legal interpretation-both a judicial duty and a safeguard against AI-related risks. When precedents feed machine learning, unchecked biases threaten judicial fairness and human agency. AI-driven judicial simplification thus demands counterbalancing via symmetrical-asymmetrical computation and gradient scrutiny, embedding litigation's adversarial nature into data governance. This ensures procedural rigor as AI adjudication applies historical data and generates new outputs, requiring integrated legal analysis and dynamic monitoring. By harmonizing litigation structures with data balancing, judges enhance algorithmic accuracy, mitigate AI risks, and preserve judicial sovereignty. Data becomes self-correcting, fortifying technical and ethical foundations of AI justice.

5. Conclusion

The emergence of AI adjudication not only resolves challenges in legal knowledge extraction during the transition from judicial small data to judicial big data but also redefines the fairness principle of "like cases treated alike." Given AI's inherent limitations and complexity, judges must recalibrate interpretive strategies to align with AI judicial processes. Judges must treat critical nodes within AI's legal symbolic system-such as the adequacy of case data, reasonableness of adjudicative outcomes, proportionality of causal relationships, and symmetry of symmetrical-asymmetrical computation-as hermeneutic anchors to validate AI-derived judgments. Furthermore, from the perspective of data growth and AI evolution, constructing and enhancing human-machine trust,

collaboration, and learning within judicial fairness frameworks requires codifying technical specifications into new interpretive norms. These norms must be internalized as AI adjudicative tenets, ultimately advancing the precision, systematization, and legal institutionalization of hermeneutic nodes.

References

[1] Gadamer, H. G. (2013). Hermeneutics II: Truth and method (H. Hong, Trans.). Beijing: The Commercial Press. (Original work published 1960)
[2] Huanqiu.com. (2016, May 16). IBM develops the world's first AI lawyer-Ross. Retrieved March 1, 2018, from http://tech.huanqiu.com/original/2016-05/8935344.html
[3] Luo, W. P. (2018). The problem induction and prospect of AI adjudication. Journal of National Prosecutors College, 5, 16-31.
[4] Yan, J. Y. (2017, December 3). Shanghai's intelligent case-handling system covers civil, commercial, and administrative fields. People's Court Daily, p. 001.