



ARTICLE

COMPUTATIONAL LEGAL DIAGNOSTICS AND
THE LIMITS OF HUMAN LEGAL REASONINGDuong Xuan Vinh* & Nguyen Quang Dat⁺

Abstract

Recent scholarship on artificial intelligence and law has primarily examined the use of AI to support legal decision-making, automate legal tasks, or expand access to legal services. This article advances a different analytical orientation by conceptualizing AI as a diagnostic instrument for examining the internal structure of legal systems themselves.

Drawing on interdisciplinary insights from law, socio-legal studies, and computational analysis, the article develops the concept of computational legal diagnostics to describe the use of AI techniques in identifying normative inconsistencies, regulatory overlaps, and enforcement gaps that are difficult to detect through doctrinal legal reasoning alone. Rather than treating law as a set of rules to be applied, this approach analyzes law as a complex institutional system characterized by layered norm production and uneven implementation.

Through illustrative examples drawn from a multi-tiered legal context in the Global South, the article demonstrates how AI-assisted analysis can reveal structural patterns of legal fragmentation and institutional bias embedded in contemporary regulatory frameworks. The article concludes by discussing the implications of this diagnostic use of AI for legal reform, institutional design, and the governance of AI in law, emphasizing that such systems should complement rather than replace human legal interpretation and democratic accountability.

Keywords – Artificial intelligence and law; Computational legal diagnostics; Normative inconsistency; Legal system analysis; Socio-legal studies.

I. INTRODUCTION

Modern legal systems are increasingly characterized by normative density, institutional fragmentation, and multi-layered modes of regulation. Over the past decades, the volume of statutory law, delegated legislation, and administrative rules has expanded rapidly, often in response to economic globalization, technological change, and recurrent social crises. While this expansion aims to enhance regulatory responsiveness, it has also produced complex legal architectures in which overlapping mandates, ambiguous hierarchies, and uneven enforcement have become structural features rather than exceptional problems.

Within this context, much of the contemporary scholarship on artificial intelligence and law has focused on the use of AI to improve legal decision-making at the micro level. Existing research has explored applications ranging from legal information retrieval and contract analysis to predictive analytics in adjudication and automated compliance tools. These approaches generally treat law as a set of rules to be interpreted, applied, or optimized, and they evaluate AI systems primarily in terms of accuracy, efficiency, or fairness in discrete legal tasks.⁶⁵

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⁶⁵ Ashley, K. D. (2017). *Artificial intelligence and legal analytics: New tools for law practice in the digital age*. Cambridge University Press.

This article argues that such task-oriented perspectives overlook a more fundamental and underexplored problem: the growing difficulty of perceiving, analyzing, and governing legal systems as coherent institutional wholes. Many of the most consequential legal failures today do not arise from incorrect application of individual rules, but from structural features of legal systems themselves—such as normative inconsistencies across regulatory layers, duplication of authority among agencies, and persistent gaps between written law and actual enforcement. These system-level issues often remain invisible to doctrinal legal analysis, which is traditionally oriented toward interpretation within bounded legal texts and jurisdictions.

At the same time, socio-legal scholarship has long emphasized the importance of studying law as a social and institutional phenomenon rather than a purely normative one. Research on legal pluralism, regulatory governance, and implementation has documented how law operates unevenly across contexts and how institutional arrangements shape legal outcomes. However, socio-legal approaches typically rely on qualitative methods or small-scale empirical studies, which limit their capacity to identify systemic patterns across large and complex bodies of legal materials.

This article proposes an alternative analytical orientation that brings these strands together by conceptualizing artificial intelligence as a diagnostic instrument for legal systems. Rather than using AI to automate legal reasoning or replace human judgment, the article advances the notion of computational legal diagnostics: an approach that employs AI-assisted analysis to identify structural patterns of normative conflict, regulatory overlap, and enforcement gaps within legal systems. From this perspective, AI is not a decision-maker or legal actor, but a tool for system-level observation—capable of revealing relationships and inconsistencies that are difficult to detect through conventional legal reasoning alone⁶⁶.

By reframing the role of AI in this way, the article makes three contributions. First, it shifts the focus of AI and law scholarship from task-level optimization to system-level analysis, addressing a gap between legal doctrine and institutional complexity. Second, it provides a conceptual framework that integrates insights from law, socio-legal studies, and computational analysis without collapsing legal judgment into technical calculation. Third, it offers a foundation for rethinking how AI might support legal reform and institutional design, particularly in multi-tiered legal systems where regulatory fragmentation is pronounced.

The remainder of the article proceeds as follows. Section II reviews the relevant literature on AI in law and socio-legal studies, highlighting the limitations of existing approaches in addressing system-level legal complexity. Section III develops the conceptual framework of computational legal diagnostics and specifies its core analytical dimensions. Section IV presents a methodological illustration of how AI-assisted analysis can be used to detect structural legal patterns. Section V provides an illustrative case drawn from a multi-layered legal context in the Global South. Section VI discusses the ethical and institutional implications of deploying AI as a diagnostic tool in legal governance. Section VII concludes by outlining directions for future interdisciplinary research.

II. LITERATURE REVIEW

Artificial Intelligence and Law: From Automation to Decision Support

Research on artificial intelligence and law has expanded rapidly over the past two decades, largely driven by advances in machine learning, natural language processing, and data availability. Early work in this field focused on expert systems and rule-based models designed to replicate legal reasoning within narrowly defined domains⁶⁷. More recent scholarship has shifted toward data-

⁶⁶ Bench-Capon, T., Atkinson, K., & McBurney, P. (2012). Using argumentation to model legal reasoning. *Artificial Intelligence and Law*, 20(2), 123–150.

⁶⁷ Katz, D. M., Bommarito, M. J., & Blackman, J. (2017). A general approach for predicting the behavior of the Supreme Court of the United States. *PLoS ONE*, 12(4), e0174698.

driven approaches, emphasizing applications such as legal information retrieval, contract analysis, litigation analytics, and predictive modeling of judicial outcomes.⁶⁸

A substantial body of literature evaluates AI systems in law primarily through the lens of task performance. Key concerns include accuracy, efficiency, consistency, and, more recently, algorithmic fairness and explainability. Within this paradigm, law is generally treated as an object of application: a body of rules, precedents, or texts to be interpreted, classified, or optimized through computational means. Even when normative concerns are foregrounded, they tend to focus on the risks of automating individual legal decisions, such as bias in sentencing algorithms or opacity in adjudicative support tools.⁶⁹

While these contributions have significantly advanced understanding of how AI may affect legal practice, they remain largely oriented toward micro-level legal tasks. The dominant question is whether AI can perform specific legal functions more quickly, cheaply, or consistently than human actors. Less attention has been paid to how AI might be used to analyze law as an institutional system, characterized by complex interactions among norms, authorities, and enforcement mechanisms. As a result, existing AI-and-law scholarship offers limited tools for addressing systemic legal problems that arise not from faulty decision-making, but from structural features of legal systems themselves.

2.2. Socio-Legal Studies and the Problem of Legal Complexity

In contrast to the task-oriented focus of AI-and-law research, socio-legal scholarship has long emphasized that law operates as a social institution embedded in political, economic, and cultural contexts. Studies of legal pluralism have demonstrated that formal state law often coexists with informal norms, administrative practices, and sector-specific regulatory regimes. Research on regulatory governance has further highlighted how modern legal systems increasingly rely on delegated rule-making, soft law, and networked forms of authority.

A central theme in this literature is the gap between law on the books and law in action. Scholars have documented how enforcement varies across regions, agencies, and social groups, producing uneven legal outcomes even under formally uniform legal frameworks. Other work has examined how overlapping jurisdictions and fragmented authority can generate regulatory inconsistency, forum shopping, and accountability deficits. These analyses underscore that many legal failures are systemic rather than episodic, arising from the organization of legal authority rather than the interpretation of individual norms.

However, socio-legal approaches face methodological constraints when applied to large-scale legal systems. Qualitative case studies and ethnographic methods provide rich contextual insight, but they are difficult to scale across thousands of legal texts, agencies, or enforcement actions. Quantitative studies, where available, often rely on proxies that capture only limited aspects of legal operation. As a result, socio-legal scholarship excels at explaining why legal systems behave unevenly, but struggles to systematically map where and how structural inconsistencies emerge across complex regulatory environments.

2.3. The Missing Link: System-Level Analysis of Legal Structures

Taken together, the literatures on AI in law and socio-legal studies reveal a notable analytical gap. AI-based legal research offers scalable tools for processing large volumes of legal data, but tends to abstract law from its institutional context. Socio-legal research provides rich accounts of legal institutions and practices, but lacks scalable methods for detecting system-wide patterns of inconsistency, overlap, and enforcement failure.

⁶⁸ Surden, H. (2014). Machine learning and law. *Washington Law Review*, 89(1), 87–115.

⁶⁹ Pasquale, F. (2015). *The black box society: The secret algorithms that control money and information*. Harvard University Press.

What is largely missing is a framework that combines the computational capacity of AI with an explicitly institutional understanding of law. Existing studies rarely ask how AI might be used not to apply law, but to examine the internal structure of legal systems to identify where regulatory authority overlaps, where normative hierarchies break down, or where enforcement systematically diverges from legislative intent. Without such a framework, discussions of AI and law risk oscillating between technical optimism and normative anxiety, without addressing the structural conditions that shape legal outcomes.

This article addresses this gap by proposing a system-level analytical orientation that treats legal systems as objects of diagnostic inquiry. By integrating computational methods with socio-legal insights, the approach developed here seeks to move beyond both doctrinal abstraction and task-based automation. The next section elaborates this perspective by introducing the concept of computational legal diagnostics and specifying its core analytical dimensions.

III. CONCEPTUAL FRAMEWORK: COMPUTATIONAL LEGAL DIAGNOSTICS

Reframing Law as a System of Institutional Relations

Traditional legal analysis is primarily oriented toward the interpretation and application of individual legal norms. Doctrinal reasoning typically proceeds by situating a rule within a defined hierarchy of sources, clarifying its meaning, and resolving conflicts through established interpretive techniques. While this mode of analysis is indispensable for adjudication and legal practice, it is less well suited to examining how legal systems function as integrated institutional arrangements.

From a system-level perspective, law can be understood not merely as a collection of rules, but as a network of relations among normative texts, regulatory authorities, and enforcement practices. Legal norms are produced at different institutional sites, delegated across levels of governance, and implemented unevenly across social and administrative contexts. These relations generate patterns of coordination and conflict that are often not visible when legal analysis remains confined to isolated texts or cases.

This article adopts a system-oriented view of law that foregrounds these relational properties. In doing so, it aligns with socio-legal and institutional theories that conceptualize law as a dynamic and differentiated system, while seeking analytical tools capable of operating at a scale commensurate with contemporary regulatory complexity. It is within this analytical space that artificial intelligence may play a distinctive role.

3.2. From Legal Reasoning to Legal Diagnostics

The prevailing discourse on AI in law tends to frame computational systems as substitutes or supplements for legal reasoning. Whether in the form of predictive models, decision-support tools, or automated compliance systems, AI is often evaluated by how closely it approximates or improves upon human legal judgment in specific tasks. This framing implicitly assumes that the primary challenge facing legal systems is the quality of individual decisions.

The concept of computational legal diagnostics proposed in this article rests on a different assumption. It begins from the premise that many persistent legal problems are not reducible to decision errors, but are rooted in the structural organization of legal systems themselves. Normative inconsistency, regulatory overlap, and enforcement gaps are not failures of interpretation, but symptoms of systemic misalignment among legal norms, institutions, and practices.

Legal diagnostics, in this sense, does not seek to determine what the law ought to be in a given case. Rather, it aims to identify where and how legal systems exhibit patterns of dysfunction that warrant further normative and institutional scrutiny. AI contributes to this diagnostic task not by exercising

legal judgment, but by enabling the systematic detection of relational patterns across large and complex bodies of legal material.⁷⁰

3.3. Defining Computational Legal Diagnostics

Computational legal diagnostics refers to the use of AI-assisted analytical techniques to examine the internal structure of legal systems and to identify recurring patterns of inconsistency, overlap, and disjunction between law and practice. The diagnostic function is analytical rather than normative: it seeks to make visible structural features of legal systems that are difficult to apprehend through conventional legal methods alone.

Three features distinguish this approach from existing applications of AI in law. First, its unit of analysis is the legal system rather than the legal decision. Instead of focusing on outcomes in individual cases, it examines relationships among norms, authorities, and enforcement mechanisms across institutional levels. Second, its primary output is not a recommendation or prediction, but a set of indicators highlighting areas of potential structural concern. Third, it is explicitly designed to operate in conjunction with human interpretation, providing inputs for legal, policy, and institutional analysis rather than substituting for them.

By emphasizing diagnosis over automation, this framework avoids the normative pitfalls associated with delegating legal authority to algorithmic systems, while still leveraging AI's capacity to process and relate large volumes of heterogeneous legal data.

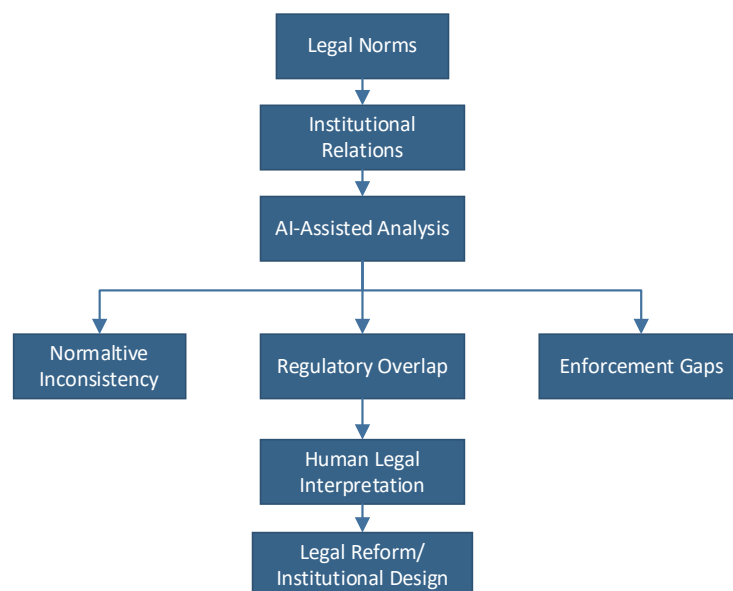


Figure 1 Computational Legal Diagnostics as a System-Level Analytical Framework.

3.4. Core Diagnostic Dimensions

To operationalize this framework, the article identifies three diagnostic dimensions that are particularly salient in complex legal systems.

Normative inconsistency refers to situations in which legal norms governing the same or related subject matters impose conflicting obligations, standards, or definitions. Such inconsistencies may be explicit, as when two regulations prescribe incompatible requirements, or implicit, arising from divergent interpretations of scope or applicability. These conflicts often emerge across regulatory layers and may persist without formal resolution.

Regulatory overlap captures the concentration of regulatory authority over the same conduct or domain in multiple institutions or normative instruments. Overlap does not necessarily imply

⁷⁰ Rissland, E. L., Ashley, K. D., & Loui, R. P. (2003). AI and law: A fruitful synergy. *Artificial Intelligence*, 150(1–2), 1–3.

conflict; in some cases, it reflects intentional redundancy. However, uncoordinated overlap can generate uncertainty, duplication of compliance burdens, and accountability gaps, particularly when regulatory mandates are fragmented across agencies.

Enforcement gaps describe systematic discrepancies between formally enacted legal norms and their implementation in practice. Such gaps may result from limited administrative capacity, unclear delegation of authority, or political and economic constraints on enforcement. Importantly, enforcement gaps are often patterned rather than random, affecting specific regions, sectors, or groups in predictable ways.

These dimensions are analytically distinct but empirically interconnected. Normative inconsistency may exacerbate enforcement gaps by creating ambiguity, while regulatory overlap may obscure responsibility for implementation. A diagnostic approach seeks to identify these interrelations rather than treating each problem in isolation.

3.5. The Role of AI in System-Level Observation

Within this framework, AI functions as a system-level observational tool. Techniques drawn from natural language processing, network analysis, and anomaly detection can be used to map relationships among legal texts, authorities, and enforcement data, thereby revealing patterns that are difficult to discern through manual analysis. Importantly, the contribution of AI lies not in determining the legal significance of these patterns, but in making them visible for further examination.

This positioning has two normative implications. First, it preserves the centrality of human judgment in interpreting and responding to diagnostic findings. Decisions about legal reform, institutional redesign, or normative prioritization remain matters of legal and political deliberation. Second, it frames transparency and methodological accountability as essential conditions for the legitimate use of AI in legal diagnostics, given the risk that diagnostic outputs may be reified or politicized.

By conceptualizing AI as a diagnostic instrument rather than a legal actor, this framework offers a way to integrate computational methods into legal analysis without displacing foundational commitments to interpretive reasoning and democratic accountability.

IV. METHODOLOGICAL ILLUSTRATION: AI-ASSISTED SYSTEM-LEVEL ANALYSIS

This section provides a methodological illustration of how computational legal diagnostics may be operationalized in practice. The purpose is not to propose a definitive technical pipeline, but to demonstrate the analytical logic through which AI-assisted methods can support system-level legal analysis. Consistent with the diagnostic orientation developed above, the methods described here are illustrative rather than prescriptive, and are intended to complement rather than replace traditional legal and socio-legal inquiry.

4.1. Analytical Scope and Data Sources

A diagnostic approach to legal systems requires engagement with heterogeneous forms of legal and institutional data. At a minimum, such analysis may draw on three categories of materials.

First, normative texts constitute the core data source. These include statutes, delegated legislation, administrative regulations, and other formal legal instruments that structure regulatory authority and impose obligations. In multi-tiered legal systems, this corpus typically spans multiple institutional levels and may involve extensive cross-referencing and delegation.

Second, institutional metadata provides information about the actors responsible for norm production and enforcement. This may include data on regulatory agencies, jurisdictional mandates, hierarchical relationships, and procedural competencies. Such information is often embedded implicitly within legal texts but can be extracted and structured for analytical purposes.

Third, enforcement-related data, where available, offers insight into how legal norms are implemented in practice. This may include inspection reports, sanctioning statistics, administrative

decisions, or judicial outcomes. While such data are often incomplete or uneven, even partial enforcement indicators can be analytically valuable when examined in relation to formal legal norms.

Importantly, the diagnostic framework does not presuppose comprehensive or high-quality datasets. Its aim is to identify structural patterns rather than to produce precise measurements, making it suitable for contexts in which legal data are fragmented or imperfect.

4.2. Analytical Logic: From Texts to Relations

The methodological core of computational legal diagnostics lies in shifting the analytical focus from individual legal texts to the relationships among them. Rather than treating statutes or regulations as isolated objects of interpretation, the approach models legal systems as networks of interconnected norms and institutions.

At an initial stage, AI-assisted text analysis techniques may be used to extract key legal elements from normative texts. These elements typically include regulated conduct, imposed obligations or permissions, designated authorities, and stated scopes of application. Natural language processing tools can assist in identifying recurring linguistic patterns and semantic markers associated with these elements, particularly across large corpora of legal texts.

Once extracted, these elements can be represented relationally. Legal texts may be linked through references, shared subject matter, or delegated authority. Regulatory bodies may be connected to specific obligations or enforcement responsibilities. The resulting representation allows legal systems to be examined as structured networks rather than as linear hierarchies.

This relational modeling enables the identification of patterns that are difficult to detect through manual analysis. For example, clusters of norms regulating the same activity across multiple instruments may indicate regulatory overlap, while conflicting obligations associated with the same actors or conduct may signal normative inconsistency.

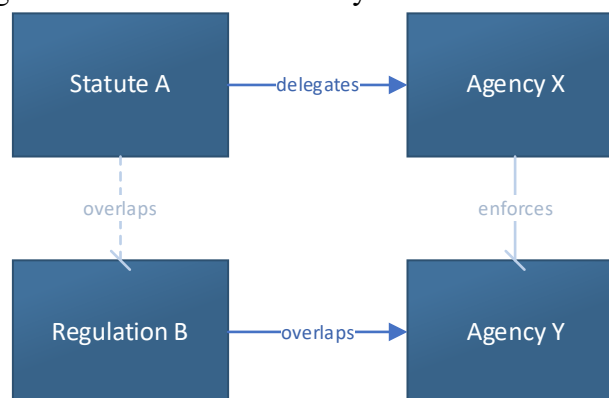


Figure 2 Illustrative Relational Representation of Normative and Institutional Overlap.

4.3. Diagnostic Techniques and Illustrative Outputs

Within this relational framework, different diagnostic techniques may be employed to examine the core dimensions identified in Section III.

To identify normative inconsistency, semantic comparison techniques can be used to detect divergences in definitions, standards, or obligations across legal texts addressing similar subject matter. These techniques do not determine which norm should prevail, but instead highlight areas where interpretive conflict is likely to arise.

Regulatory overlap may be examined through network analysis of institutional authority. By mapping which agencies are assigned regulatory or enforcement roles over the same domains, AI-assisted analysis can reveal concentrations or redundancies of authority that may otherwise remain obscured. Such mappings can also expose asymmetries between formal mandates and practical jurisdiction.

Enforcement gaps may be explored by comparing normative expectations with available enforcement indicators. Discrepancies between the density of regulation and the frequency or distribution of enforcement actions can suggest areas where legal norms lack effective institutional support. While such comparisons are necessarily imperfect, they can nonetheless direct attention to structurally under-enforced areas of law.

The outputs of these techniques are diagnostic indicators rather than determinate conclusions. They take the form of highlighted clusters, anomalies, or relational patterns that warrant further legal and institutional analysis.

4.4. Methodological Constraints and Interpretive Responsibility

It is essential to emphasize the limits of the methodological illustration presented here. AI-assisted diagnostics does not resolve legal ambiguity, assess normative validity, or determine institutional responsibility. Its analytical value lies in pattern detection rather than in legal evaluation.

Accordingly, interpretive responsibility remains with human actors. Legal scholars, policymakers, and practitioners must contextualize diagnostic findings within broader legal, political, and social frameworks. Without such interpretation, diagnostic outputs risk being misunderstood as objective assessments rather than analytically constructed indicators.

Recognizing these constraints is not a weakness of the approach, but a condition of its legitimacy.

By explicitly limiting the role of AI to system-level observation, computational legal diagnostics seeks to enhance, rather than displace, reflective legal governance.

V. CASE ILLUSTRATION: DIAGNOSTIC INSIGHTS FROM A MULTI-TIERED LEGAL SYSTEM

This section provides an illustrative case to demonstrate how computational legal diagnostics may be applied to a complex, multi-tiered legal system. The purpose of the case is not to offer an exhaustive empirical analysis, but to show how a diagnostic perspective can generate analytically meaningful insights into systemic legal structures. The illustration draws on institutional features commonly observed in legal systems of the Global South, where layered norm production, delegated rule-making, and uneven enforcement are particularly pronounced.

Institutional Context: Layered Norm Production and Delegated Authority

In many contemporary legal systems, primary legislation establishes broad regulatory objectives while delegating substantial normative authority to executive agencies. Statutes frequently authorize ministries or regulatory bodies to issue implementing decrees, guidelines, or technical standards. While such delegation is often justified on grounds of flexibility and expertise, it also produces dense regulatory environments in which multiple normative instruments govern the same substantive domain.

In this institutional context, formal hierarchies among legal norms coexist with extensive cross-referencing and overlapping mandates. Central authorities may retain formal legislative supremacy, while subnational or sectoral bodies exercise significant discretion in implementation. As a result, the legal system operates less as a linear chain of command than as a layered network of regulatory relationships.

Traditional doctrinal analysis is well equipped to resolve conflicts within clearly defined hierarchies, but it is less effective in mapping how delegated norms interact across institutional boundaries. This limitation creates an opportunity for system-level diagnostic analysis.

Identifying Normative Inconsistency Across Regulatory Layers

Applying a diagnostic lens to a corpus of regulatory texts in such a system reveals recurring patterns of normative inconsistency. For example, primary legislation may articulate general obligations using broad and open-ended language, while multiple subordinate instruments specify divergent standards or thresholds for compliance. These divergences may not rise to the level of explicit legal contradiction, yet they create practical uncertainty for regulated actors and enforcement agencies.

AI-assisted semantic analysis can help identify clusters of norms addressing similar conduct but employing materially different definitions or evaluative criteria. By comparing how key concepts are operationalized across regulatory layers, diagnostic tools can highlight areas where interpretive tension is structurally embedded rather than incidentally produced.

Importantly, such findings do not resolve which norm should prevail. Instead, they make visible the systemic conditions under which interpretive disputes are likely to recur, thereby providing a basis for further legal and institutional assessment.

Mapping Regulatory Overlap and Fragmented Authority

A second diagnostic insight concerns regulatory overlap. In multi-tiered systems, responsibility for regulating particular activities is often distributed across multiple agencies with partially intersecting mandates. While some degree of overlap may be intentional, uncoordinated authority can generate duplication of compliance requirements and diffuse accountability.

By representing regulatory authority as a relational network linking agencies to specific obligations and domains, AI-assisted analysis can reveal concentrations of overlapping jurisdiction. Such mappings may show, for instance, that several agencies are formally empowered to supervise the same conduct, yet lack clearly articulated mechanisms for coordination.

From a diagnostic perspective, the significance of overlap lies not in its mere existence, but in its institutional configuration. Overlap that is accompanied by clear coordination mechanisms may function differently from overlap that is institutionally fragmented. System-level analysis allows these distinctions to be examined more systematically than text-by-text legal interpretation.

Detecting Enforcement Gaps Through Relational Comparison

A third diagnostic dimension involves the relationship between normative density and enforcement practice. In many regulatory domains, extensive legal obligations coexist with limited or uneven enforcement capacity. This mismatch is often discussed in qualitative terms, but it can also be examined relationally.

By comparing the distribution of legal obligations across regulatory domains with available indicators of enforcement activity, AI-assisted diagnostics can identify areas where legal regulation is structurally under-enforced. For example, domains characterized by dense rule-making but sparse enforcement signals may indicate symbolic or aspirational regulation, while uneven enforcement across regions may suggest institutional capacity constraints or discretionary prioritization.

These patterns are not reducible to individual enforcement failures. Rather, they reflect systemic features of legal governance that shape how law operates in practice. Making such patterns visible can inform both scholarly analysis and policy deliberation.

Analytical Value of the Diagnostic Perspective

The illustrative case demonstrates the added value of computational legal diagnostics relative to traditional legal analysis. Doctrinal reasoning remains essential for interpreting individual norms and resolving specific disputes. However, it is less suited to capturing how large bodies of law interact across institutional levels and over time.

By contrast, a diagnostic approach enables a shift in analytical perspective—from isolated texts to relational patterns, from episodic conflict to structural configuration. AI-assisted analysis does not replace legal interpretation, but it expands the analytical horizon within which interpretation takes place.

In this sense, the contribution of computational legal diagnostics lies not in producing definitive answers, but in enhancing the capacity of legal scholars and policymakers to perceive and reflect upon the structural conditions that shape legal effectiveness and legitimacy.

VI. ETHICAL AND INSTITUTIONAL IMPLICATIONS

The conceptualization of artificial intelligence as a diagnostic instrument for legal systems raises a distinct set of ethical and institutional questions. Unlike applications of AI that directly influence legal decisions, diagnostic uses operate at a more abstract level, shaping how legal systems are perceived, evaluated, and potentially reformed. This indirect influence does not diminish their normative significance; on the contrary, it underscores the need for careful governance of how diagnostic insights are generated, interpreted, and acted upon.

The Risk of Reification and Technocratic Authority

A primary ethical risk associated with computational legal diagnostics is the reification of diagnostic outputs. Patterns identified through AI-assisted analysis may be mistakenly treated as objective or authoritative assessments of legal system performance, rather than as analytically constructed indicators shaped by methodological choices and data limitations. This risk is particularly acute in contexts where legal governance already relies heavily on technical expertise and administrative discretion.

If diagnostic findings are detached from their methodological context, they may acquire technocratic authority, narrowing the space for legal and political deliberation. What begins as an analytical tool may thus evolve into a de facto evaluative standard, subtly shifting power away from democratic institutions toward technical systems and their designers. Avoiding such outcomes requires explicit recognition that diagnostic outputs are provisional and interpretive, not determinative.

Bias at the Structural Level

Much of the ethical debate surrounding AI in law has focused on bias in data and algorithms, particularly in relation to individual decision-making. A diagnostic approach, however, foregrounds a different form of bias: bias embedded in institutional structures and normative configurations. Computational analysis may reveal patterns of legal fragmentation or enforcement asymmetry that reflect long-standing political and social inequalities.

While making such patterns visible can be normatively valuable, it also raises questions about interpretive framing. Diagnostic tools do not merely uncover bias; they shape how bias is conceptualized and prioritized. Decisions about which indicators to examine, which relationships to model, and which anomalies to highlight inevitably reflect normative assumptions about what counts as a problem in legal governance. Ethical deployment of diagnostic AI therefore requires reflexivity about these assumptions and openness to contestation.

Human Interpretation and Institutional Accountability

A central premise of computational legal diagnostics is the preservation of human interpretive authority. Diagnostic systems are designed to support, not supplant, legal reasoning and institutional judgment. This distinction has important institutional implications.

First, responsibility for interpreting diagnostic findings must remain clearly assigned to identifiable legal or policy actors. Without such assignment, diagnostic insights risk being invoked selectively or opportunistically, undermining accountability. Second, institutions using diagnostic tools should ensure transparency not only in technical methods, but also in the decision-making processes through which diagnostic outputs are translated into legal or policy action.

These requirements suggest that the governance of diagnostic AI should be embedded within existing institutional frameworks rather than outsourced to technical systems. Legal reform, regulatory redesign, and enforcement prioritization remain normative and political choices, even when informed by computational analysis.

Implications for AI Governance in Law

The diagnostic use of AI also carries implications for broader debates on AI governance in the legal domain. By positioning AI as an instrument of observation rather than decision-making, this

approach challenges regulatory frameworks that focus primarily on outcome-based risks, such as erroneous or biased legal decisions.

Instead, diagnostic applications call attention to upstream governance questions: who defines the metrics of legal system performance, who controls the analytical infrastructure, and how diagnostic insights are integrated into institutional practice. Addressing these questions requires governance mechanisms that emphasize methodological transparency, institutional oversight, and participatory accountability.

From this perspective, the ethical challenge is not to constrain AI because it threatens to replace legal judgment, but to govern AI in ways that prevent its analytical authority from becoming detached from democratic control.

Normative Modesty and Analytical Responsibility

Finally, the ethical stance underlying computational legal diagnostics may be described as one of normative modesty. The framework deliberately limits the claims that AI-assisted analysis can make about law, resisting the temptation to translate diagnostic findings into prescriptive solutions. This modesty is not a retreat from normative engagement, but a recognition that legal systems are governed through interpretation, contestation, and institutional choice.

Analytical responsibility, in this sense, entails acknowledging both the value and the limits of computational insight. Diagnostic tools can expand the capacity to perceive systemic legal patterns, but they do not resolve the normative questions those patterns raise. Maintaining this distinction is essential if AI is to contribute constructively to legal governance rather than undermining its foundational principles.

VII. CONCLUSION

This article has argued for a reorientation of how artificial intelligence is conceptualized and deployed in legal analysis. Rather than treating AI primarily as a tool for automating legal tasks or supporting individual legal decisions, it has proposed understanding AI as a diagnostic instrument for examining the internal structure of legal systems. By introducing the concept of computational legal diagnostics, the article has sought to shift analytical attention from micro-level legal performance to system-level patterns of normative inconsistency, regulatory overlap, and enforcement gaps.

The central contribution of this approach lies in its integration of computational capacity with an explicitly institutional understanding of law. Drawing on insights from law, socio-legal studies, and computational analysis, the framework developed here conceptualizes legal systems as relational and multi-layered structures whose complexities are not easily captured through doctrinal reasoning alone. AI-assisted diagnostics, when appropriately constrained, can enhance the capacity of legal scholars and policymakers to perceive structural features of legal governance that would otherwise remain fragmented or obscured.

Importantly, the article has emphasized the limits as well as the potential of this diagnostic orientation. Computational legal diagnostics does not offer normative judgments, resolve legal conflicts, or prescribe institutional reforms. Its value lies in making structural patterns visible and analytically available for further interpretation and deliberation. Preserving this distinction is essential to avoiding

The framework developed in this article opens several avenues for future interdisciplinary research. Comparative studies could examine how diagnostic patterns vary across legal systems with different institutional architectures. Methodological work could further refine techniques for mapping legal relations while addressing issues of transparency and bias. Finally, normative inquiry is needed to explore how diagnostic insights should be integrated into processes of legal reform and institutional design.

As legal systems continue to grow in complexity, the challenge is not only to apply law more efficiently, but to understand how law functions as a system of governance. By positioning AI as a

tool for legal diagnostics rather than legal decision-making, this article offers a modest but potentially transformative contribution to that broader project.

VIII. Appendix A. Illustrative Diagnostic Logic

Input:

- *Corpus of legal texts (statutes, regulations)*
- *Institutional authority metadata*
- *Enforcement indicators (where available)*

Process:

1. *Extract obligations, authorities, and scopes from legal texts.*
2. *Represent extracted elements as relational structures.*
3. *Identify clusters of overlapping regulatory authority.*
4. *Detect semantic divergence among norms governing similar conduct.*
5. *Compare normative density with enforcement indicators.*

Output:

- *Diagnostic indicators of normative inconsistency, regulatory overlap, and enforcement gaps.*