

Algorithmic *Ijtihād* and the Epistemological Transformation of Islamic Law in the Era of Big Data: A Philosophical Analysis

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A B S T R A C T

The rapid advancement of big data technologies and algorithmic systems has significantly reshaped the modes through which Islamic legal knowledge is produced, creating an urgent need for epistemological inquiry into their implications for contemporary *ijtihād*. This study aims to examine how the epistemology of *ijtihād* transforms under the influence of large-scale data processing and algorithmic reasoning, and to propose the concept of Algorithmic *Ijtihād* as a new framework within Islamic legal thought. Employing a qualitative research design, this study adopts a philosophical and conceptual analysis that relies on documentary sources, including classical works of *uṣūl al-fiqh* and modern scholarship on digital epistemology. The analysis maps the epistemic structure of classical *ijtihād*, identifies the distinctive characteristics of big data epistemology, and evaluates the emerging role of algorithms as potential co-epistemic agents in Islamic legal reasoning. The findings reveal that big data shifts Islamic legal inferencing from a symbolic-deductive model toward a correlational-predictive one, enabling algorithms to influence the process of *istinbāt* by generating data-driven legal insights. The proposed concept of Algorithmic *Ijtihād* contributes to Islamic legal theory by highlighting the need for integrating computational inference with normative verification grounded in *maqāṣid al-sharī'ah*. Practically, this framework suggests that fatwa institutions must develop "normative auditing protocols" to validate algorithmic outputs, ensuring that computational efficiency does not compromise the ethical legitimacy of Sharia governance. The study concludes that adopting algorithmic systems in Islamic legal decision-making requires rigorous ethical and epistemic safeguards to mitigate bias and maintain the legitimacy of scholarly authority.

1. Introduction

The development of big data has brought about fundamental changes in the way knowledge is constructed and validated. In this new epistemological landscape, data is no longer understood as an end product, but rather as the primary basis for the construction of knowledge itself (Kitchin, 2014). This transformation has also brought about new patterns of reasoning based on algorithms, machine learning, and large-scale pattern analysis. This shift has affected various disciplines, including law, where a number of processes that previously relied on human reasoning are now being replaced by automated systems. In the realm of Islamic law, which traditionally relies on revelatory texts, rational analogy (*qiyās*), and *maqāṣid al-sharī'ah* as its framework of thought, this technological development raises fundamental questions about the ability of classical epistemology to adapt when most of the functions of knowledge production are carried out by machines.

Ijtihād, which for centuries has been the primary instrument for establishing law, now faces digital instruments capable of analyzing thousands of texts, compiling global fatwas, and reading patterns of religious practice in the digital space. This technology not only accelerates the process of legal reasoning but also has the potential to shake the epistemological foundations and authoritative standing of the *mujtahid*. This aligns with recent findings (Azhar et al., 2025) which show that large-scale data processing has entered the discourse of interpretation, jurisprudence, and fatwa, even though its epistemic basis has not yet been clearly formulated.

Scientific studies on the digitization of Islamic law have indeed developed, but most previous studies tend to highlight the practical aspects of technology use, such as the digitization of fatwas or the use of online sharia platforms (Firdaus & Achmad, 2015; Putri & Thahir, 2025). These studies did not discuss the philosophical or epistemological implications of using this technology. Several studies touched on the role of AI in *ijtihad*, such as the work of (Halim, 2024) and (Nurdin & Noprianto, 2025), still view technology as merely a tool for *mujtahids* and have not yet treated it as an epistemic entity with its own working mechanisms. Discourse on algorithms as agents of epistemology that have the potential to take over part of the *istinbāt* process is still very limited. In addition, issues regarding algorithmic bias and epistemic opacity namely, the closed nature of the decision-making process by machines have not yet become part of serious discussion in contemporary *ushul fiqh* studies.

Based on the limitations of this research, there appears to be a significant conceptual gap in understanding the implications of big data on the epistemology of *ijtihad*. To date, there has been no research that comprehensively examines changes in the structure of *ijtihad* reasoning when faced with predictive and statistical algorithmic logic. The discourse on algorithmic thinking as a new mode of reasoning has not been integrated into modern *usul al-fiqh* methodology. Nor has any theory been found that formulates algorithmic *ijtihad* as an epistemic bridge between classical reasoning methods and the process of massive data analysis. In addition, problems such as data bias, context impoverishment, and loss of transparency in the *istinbāt* mechanism have not been widely studied from the normative perspective of Islamic law.

The urgency of research on this issue is becoming increasingly apparent as the use of machine-assisted fatwa systems by Islamic institutions increases (Irma & Thahir, 2025). In

recent years, various digital platforms such as AskTheQuran and FatwaGPT have been developed to provide religious answers based on AI technology. However, to date there is no academic consensus on the epistemic validity of the answers or recommendations generated by these machines. If algorithmic logic is not critically understood, there is a risk of technological autonomy that could shift the authority of religious scholars in the structure of Islamic legal authentication. This situation is becoming increasingly complex because Muslim communities, especially the younger generation, are increasingly dependent on digital technology to obtain religious references.

Global data shows the scale of epistemic change that has occurred. McKinsey Global (Institute, 2023) reported that the data generated per day reached more than 328.77 million terabytes, with the legal sector being one of the fields that adapted most quickly to data-based technology. Pew Research (Center, 2024) emphasizes that more than 70% of Muslim youth access religious information through digital platforms. This shift in preference shows that algorithms are increasingly playing a major role as mediators in the dissemination and formation of Islamic knowledge. Without a solid epistemological framework, Islamic law has the potential to be reduced to mere data-based predictions, rather than the product of deliberative reasoning that is the hallmark of the *ijtihad* tradition.

Based on this context, this study aims to explain how the epistemology of *ijtihad* has changed amid the disruption of big data and AI technology. Specifically, this article addresses three main research questions: (1) How does the logic of big data alter the epistemic structure of *istinbāt* compared to classical methods? (2) To what extent can algorithms function as valid co-epistemic agents in Islamic legal reasoning? and (3) What theoretical framework is required to integrate computational inference into Islamic legal theory while preserving normative legitimacy? From a theoretical perspective, this study contributes to expanding the scope of Islamic epistemology by incorporating the dynamics of knowledge in the digital age into *usul al-fiqh*. From a practical perspective, this study provides an ethical and conceptual foundation for the development of an Islamic legal AI system that is more transparent, accountable, and in line with the principles of *maqasid*. Furthermore, this study can serve as a reference for fatwa institutions and Islamic educational institutions in responding to the paradigmatic changes brought about by technology

2. Method

This research is designed as a qualitative study oriented towards philosophical and epistemological analysis within the framework of Islamic law. Its main focus is not on empirical measurement, but rather on deep understanding and reconstruction of the epistemic foundations of *ijtihād* when dealing with developments in big data technology. Thus, this study focuses on the process of conceptual review, critical interpretation, and evaluation of the knowledge structure in Islamic law, which is now influenced by computational logic. This approach emphasizes that philosophical arguments, rather than statistical data, are the main basis for developing a new understanding of how *ijtihād* is transforming in the digital age.

The analytical approach used is interdisciplinary, structured into three systematic stages of inquiry. First, Epistemic Mapping is applied to examine the structure of traditional *ijtihād* knowledge, including how legal sources, patterns of inference such as *qiyās* and *istiḥsān*, and the authority of *mujtahids* are formed. Second, Technological Contextualization utilizes

information theory (Floridi, 2014) and (Leonelli, 2016) to understand the mechanisms of data-based knowledge production and how algorithms construct inferential patterns that differ from *uṣūl al-fiqh*. Third, Conceptual Synthesis integrates these insights to formulate new categories such as 'Algorithmic Ijtihād' and 'Digital Epistemic Bias'. This synthesis employs a philosophical hermeneutic approach to interpret the relationship between the human interpreter and the digital 'co-agent' in the process of meaning-making.

The research data was obtained from textual sources and academic literature, which covered three main groups. First, classical references on *uṣūl al-fiqh*, such as al-Ghazālī's work in *al-Mustasfā*. (Al-Ghazali, 1993), al-Shāṭibī in *al-Muwāfaqāt* (al-Shāṭibī, 2003), and early legal methodology literature such as *al-Risālah* by al-Shāfi'ī. Second, contemporary studies in epistemology and philosophy of technology, including *The Fourth Revolution* by (Floridi, 2014), analysis (Brey, 2021) regarding algorithmic bias and philosophical research (Leonelli, 2016) about data as an epistemic object. Third, recent interdisciplinary research examining the relationship between AI and Islamic law, as conducted by (Halim, 2024) and (Nurdin & Noprianto, 2025). Data analysis proceeded by extracting core epistemic claims from each source, juxtaposing the symbolic logic of classical texts against the probabilistic logic of AI studies, and synthesizing these to identify the structural shifts in authority and reasoning.

3. Results and Discussion

3.1. The Epistemological Structure of Classical Ijtihad

The epistemology of *ijtihād* in the classical Islamic legal tradition is structured around three interrelated methodological approaches, namely *bayānī*, *qiyāsī*, and *istislāhī*. These approaches collectively form a coherent epistemic system that governs how legal knowledge is derived, validated, and legitimized within the framework of *uṣūl al-fiqh*. Rather than functioning as isolated methods, they operate as complementary modes of reasoning that reflect the balance between textual authority, rational inference, and ethical consideration.

The *bayānī* approach constitutes the foundational layer of classical *ijtihād*. It is primarily concerned with uncovering legal meanings embedded within the Qur'ān and Sunnah through linguistic analysis. In this method, language functions as the primary epistemic medium, making grammar (*naḥw*), morphology (*ṣarf*), semantics, and rhetoric essential tools for legal interpretation. Mujtahids employing *bayānī* reasoning examine the literal and contextual meanings of legal texts, including considerations of generality and specificity (*'āmm-khāṣṣ*), ambiguity (*mujmal*), and implication (*mafhūm*). The authority of *bayānī* reasoning lies in its close attachment to revelation, ensuring that legal conclusions remain anchored to divine sources.

When explicit textual guidance is absent or insufficient, classical jurists turn to the *qiyāsī* approach, which represents rational-analogical reasoning in Islamic law. *Qiyās* operates by extending an established ruling from an original case (*aṣl*) to a new case (*far'*) based on a shared effective cause (*'illah*). This method reflects a causal epistemology, where legal norms are not merely textual prescriptions but rationally intelligible principles capable of extension. The *qiyāsī* approach demonstrates that classical *ijtihād* is not purely textual but also deeply rational, relying on human intellectual capacity to identify legal causality and coherence across changing social contexts (al-Shāṭibī, 2003).

Complementing these two approaches is the *istislāhī* method, which places *maṣlaḥah* (public welfare) at the center of legal reasoning. *Istislāhī* reasoning becomes particularly significant in novel situations where neither direct textual evidence nor clear analogical precedents are available. In this approach, the mujtahid evaluates potential benefits and harms by considering the higher objectives of the Sharī'ah (*maqāṣid al-sharī'ah*), such as the preservation of religion, life, intellect, lineage, and property. This method underscores the ethical and teleological dimension of Islamic law, ensuring that legal rulings serve human well-being and social justice rather than rigid formalism.

Taken together, these three approaches reveal that the epistemological structure of classical *ijtihād* is both symbolic and rational, combining textual interpretation, logical inference, and ethical judgment. Central to this structure is the human agent, namely the mujtahid, who functions as the primary epistemic authority. The mujtahid is not only an interpreter of texts but also a moral reasoner and guarantor of legal legitimacy. Classical *ijtihād*, therefore, rests on a human-centered epistemology in which legal knowledge is inseparable from scholarly competence, ethical responsibility, and interpretive accountability.

3.2. The Epistemological Character of Big Data

The epistemology of big data operates within a logical and methodological framework that is fundamentally different from the modes of reasoning traditionally employed in *uṣūl al-fiqh*. In this paradigm, knowledge is not primarily produced through deductive reasoning based on authoritative premises, nor through analogical extension as found in *qiyās*. Instead, knowledge emerges from the identification of patterns through algorithmic systems capable of processing massive datasets. Inference in big data epistemology is therefore grounded in statistical correlations rather than causal explanation, shifting the basis of knowledge from “why” questions to “what works” or “what is likely to occur” patterns (Floridi, 2014).

This correlational logic marks a decisive departure from classical epistemologies that prioritize intelligibility and causal reasoning. In *qiyās*, for example, the identification of an effective cause (*'illah*) is central to extending legal rulings. By contrast, big data systems do not require an explicit causal framework to generate conclusions. Algorithms can produce highly accurate predictions without offering reasons that are conceptually transparent to human agents. As a result, the epistemology of big data is often described as non-symbolic, meaning that it does not rely on linguistic, logical, or conceptual symbols that can be easily interpreted or evaluated by human reasoning. This non-symbolic character contributes to epistemic opacity, where outputs are accepted based on performance rather than intelligibility.

Another defining feature of big data epistemology is its post-hypothetical nature. Unlike classical scientific or legal reasoning, which begins with hypotheses derived from theory or normative assumptions, big data analysis allows patterns to emerge directly from the data itself (Leonelli, 2016). Rather than testing predefined propositions, algorithms detect regularities, trends, and associations that were not anticipated in advance. This reversal of the traditional epistemic sequence—where data precedes theory rather than the other way around—fundamentally reshapes how knowledge is validated. Truth, in this context, is increasingly associated with predictive accuracy rather than explanatory depth.

The operational foundation of this epistemology lies in the three defining characteristics of big data: volume, velocity, and variety. The enormous volume of data enables

algorithms to draw inferences from datasets far beyond the capacity of human cognition. Velocity allows data to be processed and updated in real time, enabling continuous recalibration of knowledge outputs. Variety ensures that data is drawn from heterogeneous sources, including texts, images, behaviors, and digital interactions. Together, these characteristics allow algorithms to construct dynamic and adaptive forms of knowledge that are constantly evolving.

In contrast to classical *ijtihād*, which treats revealed texts as the primary epistemic source and social reality as contextual input, big data epistemology places data itself at the center of knowledge production. Texts, practices, and behaviors are all reduced to data points that can be quantified, categorized, and recombined. This data-centric ontology alters the status of sources, transforming qualitative meaning into computational input. Consequently, epistemic authority shifts away from interpretive expertise toward computational capability.

This shift produces a new epistemic dynamic that is ontologically and methodologically distinct from classical Islamic legal reasoning. Ontologically, reality is understood not as a meaningful order to be interpreted but as a dataset to be processed. Methodologically, reasoning is no longer anchored in normative justification but in algorithmic optimization. While this epistemology offers unprecedented efficiency and predictive power, it also raises profound questions about meaning, accountability, and legitimacy—questions that become especially critical when big data logic enters normative domains such as Islamic law.

3.3. Epistemological Shift Toward Algorithmic *Ijtihād*

The incorporation of big data and algorithmic systems into Islamic legal reasoning signifies a profound epistemological shift in the structure of *istinbāt al-hukm*. This transformation is not merely technical but structural, affecting how legal knowledge is generated, validated, and authorized. One of the most visible changes occurs in the input-output pattern of legal reasoning. In classical *ijtihād*, the reasoning process begins with a relatively limited set of epistemic inputs, primarily textual evidence (*naṣṣ*) and contextual social information, which are then interpreted directly by the mujtahid through established methodological tools. In contrast, algorithmic systems operate by integrating vast and heterogeneous datasets—ranging from digitized legal texts and fatwas to social behavior and usage patterns—which are processed computationally before reaching the human jurist.

As a result, the role of the mujtahid undergoes a significant reconfiguration. Rather than engaging directly with primary texts at the initial stage of reasoning, mujtahids increasingly interact with pre-processed outputs generated by algorithmic analysis. These outputs may take the form of pattern recognition, probabilistic rankings of legal opinions, or predictive legal recommendations. This mediation introduces a new epistemic layer between source and interpreter, fundamentally altering the transparency and immediacy that characterized classical legal reasoning.

A second and more substantive transformation lies in the nature of inference itself. Algorithmic systems do not operate through *ta'līl*, the causal reasoning central to *uṣūl al-fiqh*, where legal rulings are extended based on identifiable and normatively meaningful effective causes (*'illah*). Instead, algorithmic inference relies on statistical correlations and predictive modeling. Legal conclusions are derived not from an understanding of why a rule applies, but

from patterns indicating that certain rulings are likely to be associated with particular situations. This shift moves Islamic legal epistemology away from causal intelligibility toward probabilistic calculation.

This transformation has far-reaching implications for the classical distinction between *qaṭʿī* (definitive) and *ẓannī* (speculative) knowledge. In traditional jurisprudence, *ẓannī* knowledge arises from factors such as linguistic ambiguity, conflicting evidences, or uncertainties in transmission. Such speculation is epistemically bounded and normatively managed through established principles of preference (*tarjīh*) and legal disagreement (*ikhtilāf*). In an algorithmic context, however, *ẓann* emerges from statistical probability rather than textual indeterminacy. The uncertainty here is not semantic but computational, rooted in the limitations of data quality, model design, and predictive accuracy.

This development gives rise to what may be described as computational *ẓann*, a novel epistemic category produced by algorithmic reasoning. Unlike classical speculative knowledge, computational *ẓann* cannot be evaluated solely through traditional tools such as *isnād* criticism or linguistic analysis. Instead, it requires distinct verification protocols that address issues such as data bias, model transparency, and algorithmic reliability. As Brey (2021) notes, algorithmic decision-making introduces new forms of epistemic authority that are often opaque and difficult to scrutinize using conventional normative criteria.

Consequently, algorithmic *ijtihād* represents not simply an extension of classical methodology but a reconfiguration of the epistemic foundations of Islamic law. While it offers unprecedented efficiency and breadth of analysis, it also challenges established notions of legal certainty, interpretive accountability, and scholarly authority. Addressing this shift requires the development of new epistemological safeguards that can integrate computational inference within the normative structure of *uṣūl al-fiqh* without undermining its ethical and rational commitments.

3.4. Algorithms as Epistemic Agents in Islamic Law

In the digital context, algorithms no longer function merely as passive technical instruments but increasingly operate as epistemic agents that actively shape the structure and content of Islamic legal knowledge. Their epistemic role emerges from their capacity to process, classify, and synthesize vast datasets derived from classical legal texts, thousands of fatwas, judicial opinions, and contemporary religious practices. Through computational analysis, algorithms are able to generate legal outputs that closely resemble the products of human *ijtihād*, thereby blurring the boundary between human reasoning and machine-assisted inference.

One of the most significant epistemic functions of algorithms lies in their ability to curate legal knowledge. By aggregating fatwas from multiple regions, institutions, and schools of law (*madhāhib*), algorithms can identify dominant jurisprudential trends and rank legal opinions based on frequency, popularity, or statistical relevance. This process of curation is not neutral. When algorithms privilege statistically dominant views, minority opinions—despite their strong normative or textual grounding—may be marginalized or rendered invisible. As a result, the plurality (*taʿaddudiyyah*) that has historically characterized Islamic jurisprudence risks being reduced to algorithmically optimized consensus.

Furthermore, algorithms influence legal reasoning by reshaping the hierarchy of sources. In classical *uṣūl al-fiqh*, epistemic authority is determined by proximity to revelation, methodological rigor, and scholarly competence. In algorithmic systems, however, authority tends to shift toward data availability and computational efficiency. Legal texts, lived religious practices, and user-generated queries are transformed into quantifiable inputs, treated as equivalent data points within a computational model. This flattening of epistemic hierarchies introduces a new logic of authority, where relevance is measured statistically rather than normatively.

Digital fatwa platforms exemplify this transformation. By detecting jurisprudential patterns across diverse legal schools and synthesizing the views of classical scholars, these systems present legal recommendations in a structured and seemingly objective format. To users, such outputs often appear authoritative precisely because they are algorithmically generated, carrying an implicit assumption of neutrality and comprehensiveness. However, this perceived objectivity conceals the underlying epistemic choices embedded in model design, data selection, and weighting mechanisms.

The epistemic agency of algorithms also manifests in their capacity to shape the framing of legal questions. By standardizing query formats and categorizing issues according to predefined parameters, algorithms indirectly influence which aspects of a legal problem are emphasized and which are excluded. This framing effect can subtly guide legal reasoning toward certain outcomes while foreclosing alternative interpretive possibilities. In this sense, algorithms do not merely respond to legal questions; they participate in defining the contours of legal inquiry itself.

Despite these transformative effects, algorithmic epistemic agency remains fundamentally different from human scholarly agency. Algorithms lack moral intentionality, ethical judgment, and contextual understanding—qualities that are central to the role of the mujtahid. Their agency is derivative and constrained by the data and objectives encoded by human designers. Nevertheless, the influence they exert on legal meaning-making is real and substantial, particularly in digital environments where algorithmic outputs are increasingly relied upon by both institutions and lay audiences.

Recognizing algorithms as epistemic agents therefore does not imply granting them independent legal authority. Rather, it highlights the need for critical awareness of how computational systems mediate legal knowledge. In the context of Islamic law, this recognition calls for the development of normative frameworks capable of regulating algorithmic participation in *ijtihād*, ensuring that computational efficiency does not override interpretive responsibility, ethical reasoning, and the pluralistic spirit of the Islamic legal tradition.

3.5. Epistemic Risks and Normative Challenges

The integration of big data and algorithmic systems into Islamic legal reasoning introduces a range of epistemic risks and normative challenges that require serious theoretical and practical consideration. While algorithmic tools promise efficiency and comprehensiveness, their uncritical adoption may undermine foundational principles of Islamic legal epistemology. Two of the most significant risks are algorithmic bias and epistemic opacity, both of which have distinctive implications within the normative structure of Islamic law.

Algorithmic bias arises when computational systems generate skewed or unrepresentative outputs due to imbalances embedded within their training data. In the context of Islamic law, this bias may occur when datasets disproportionately reflect fatwas, legal opinions, or practices from particular countries, institutions, or schools of thought. As a result, algorithmic outputs may systematically privilege dominant traditions while marginalizing minority jurisprudential positions that are nonetheless valid within the classical legal tradition. Unlike in secular legal AI—where bias is primarily framed as a concern of fairness, discrimination, or human rights—algorithmic bias in Islamic law poses a deeper theological risk. When algorithmically generated legal conclusions are presented as authoritative, there is a danger that divine legitimacy is inadvertently attributed to what is, in reality, a partial and historically contingent dataset. This phenomenon may be described as theological distortion, where computational dominance is mistaken for normative truth.

A second major challenge is epistemic opacity, often referred to as the “black box” problem. Many algorithmic systems, particularly those based on machine learning, operate through complex internal processes that are not easily interpretable even by their designers. This opacity directly conflicts with the epistemological demands of Islamic law, which emphasize transparency, traceability, and accountability in legal reasoning. Classical jurisprudence requires that legal rulings be supported by a clear chain of evidence (*isnād*) and articulated reasoning (*ta’līl*) that can be examined, debated, and contested by other scholars. Algorithmic outputs, however, often provide conclusions without revealing the inferential pathways that produced them, thereby undermining the possibility of scholarly verification and critique.

Beyond bias and opacity, the use of big data also raises concerns about contextual impoverishment. Algorithms tend to abstract legal problems from their socio-historical contexts by reducing complex human experiences to quantifiable data points. In Islamic law, however, context (*siyāq* and *ḥāl*) plays a crucial role in determining legal meaning and applicability. The loss of contextual sensitivity risks producing rulings that are technically consistent but normatively detached from lived realities. This detachment may further erode the ethical dimension of *ijtihād*, which traditionally integrates legal reasoning with moral responsibility.

These epistemic risks collectively challenge the legitimacy of algorithmic participation in Islamic legal reasoning. If left unaddressed, they may lead to an erosion of scholarly authority, a narrowing of jurisprudential diversity, and a weakening of normative accountability. Consequently, the incorporation of big data into Islamic law cannot be treated as a purely technical matter. It demands the development of normative safeguards grounded in *uṣūl al-fiqh* and *maqāṣid al-sharī‘ah*, including mechanisms for bias auditing, interpretability requirements, and human oversight.

Ultimately, acknowledging these epistemic risks does not necessitate rejecting algorithmic tools altogether. Rather, it underscores the need for a critically informed framework that can harness computational capabilities while preserving the ethical, pluralistic, and transparent character of Islamic legal reasoning.

3.6. The Epistemological Framework of Algorithmic *Ijtihād*

In response to the epistemic transformations introduced by big data and algorithmic reasoning, this study proposes the concept of Algorithmic *Ijtihād* as a new epistemological framework within Islamic legal theory. Rather than perceiving algorithms as mere technical instruments, this framework conceptualizes *ijtihād* as a collaborative epistemic process between human scholars and computational systems. In this model, algorithms are assigned the role of conducting initial analytical tasks – such as data aggregation, pattern detection, and probabilistic mapping – while ultimate normative authority remains firmly in the hands of human jurists.

At the core of this framework is a reconfiguration of the sources and stages of legal knowledge production. Data is acknowledged as one of the epistemic foundations of contemporary reasoning, reflecting the realities of a digitally mediated world. However, data does not replace classical sources of Islamic law, nor does it operate autonomously. Instead, algorithmic outputs are situated within a normative hierarchy governed by *maqāṣid al-sharīʿah*, which function as the primary ethical and teleological regulator of legal reasoning. This ensures that efficiency, prediction, and statistical relevance do not override justice, moral accountability, and human welfare.

Algorithmic *Ijtihād* also introduces a novel relationship between symbolic knowledge, empirical data, and computational inference. Symbolic knowledge – derived from revealed texts and classical legal reasoning – retains its normative primacy. Empirical data provides contextual breadth, capturing patterns of practice and social realities at an unprecedented scale. Computational inference acts as a mediating layer that organizes and interprets this data, generating preliminary insights that can inform legal deliberation. In this structure, algorithms function as initial interpreters of data, not final arbiters of legal judgment.

This relationship marks a departure from the traditional tool-user model. Algorithms are no longer passive extensions of the jurist's intellect but active epistemic partners that shape the preliminary contours of legal analysis. Nevertheless, this partnership is carefully delimited. The framework explicitly rejects data determinism, the notion that statistically dominant patterns should automatically dictate normative conclusions. Algorithmic outputs, regardless of their predictive accuracy, must undergo processes of *taʿlīl* (causal reasoning), ethical evaluation, and substantive verification by qualified mujtahids.

Human verification within this framework serves multiple functions. First, it reintroduces causal and moral reasoning that algorithmic systems cannot independently provide. Second, it ensures interpretive accountability, allowing legal conclusions to be explained, debated, and revised within the scholarly community. Third, it preserves the pluralistic character of Islamic law by preventing the marginalization of minority opinions that may lack statistical dominance but possess strong normative grounding.

Importantly, Algorithmic *Ijtihād* does not aim to modernize Islamic law by subordinating it to technological rationality. Rather, it seeks to domesticate algorithmic reasoning within the epistemological and ethical architecture of *uṣūl al-fiqh*. By doing so, it offers a framework capable of engaging digital complexity without sacrificing interpretive depth, moral intentionality, or scholarly authority.

In sum, the epistemological framework of Algorithmic *Ijtihād* represents an attempt to balance innovation with continuity. It acknowledges the transformative power of algorithms while reaffirming that legal legitimacy in Islam ultimately depends on human moral agency, normative reasoning, and commitment to the higher objectives of the Shari'ah.

3.7. Implications of Algorithmic Epistemic Agency for Islamic Legal Authority

The epistemic transformations introduced by big data and algorithmic systems carry profound implications for the structure of Islamic legal authority. As algorithms increasingly function as epistemic agents that mediate legal knowledge, traditional models of authority – historically grounded in scholarly expertise, methodological rigor, and moral accountability – face significant reconfiguration. This shift necessitates an institutional and educational response to ensure that technological mediation does not undermine the normative foundations of Islamic law.

One of the most immediate implications concerns the role of fatwa institutions. As algorithmic tools are integrated into legal research, fatwa production, and public religious guidance, institutions must develop systematic mechanisms to evaluate and audit algorithmic outputs. Such mechanisms are essential to prevent normative deviations that may arise from biased data, opaque reasoning processes, or uncritical reliance on predictive models. Without institutional oversight, there is a risk that algorithmic recommendations will be treated as authoritative simply due to their computational sophistication, rather than their conformity to *uṣūl al-fiqh* and *maqāṣid al-shari'ah*.

In addition to institutional reform, these epistemic changes have important implications for *ijtihād* education and scholarly formation. Mastery of digital literacy and a foundational understanding of artificial intelligence must become integral components of contemporary *ijtihād* training. This does not imply that future mujtahids must become programmers or data scientists. Rather, they must be capable of critically engaging with algorithmic systems – understanding their epistemic assumptions, limitations, and potential risks. Without such competence, there is a real possibility that computational authority will gradually displace traditional scholarly authority, not through explicit replacement but through epistemic dependency.

The growing reliance on legal AI also raises pressing ethical and regulatory concerns. In the context of Shari'ah law, algorithmic systems must be governed by ethical standards that are explicitly aligned with *maqāṣid al-shari'ah*. These standards should address issues such as data integrity, transparency, accountability, and the protection of jurisprudential diversity. The absence of a clear ethical framework risks reducing Islamic law to a technologically optimized system detached from its moral and spiritual objectives. Moreover, unregulated use of legal AI may lead to data misuse, commercialization of religious authority, and erosion of public trust in fatwa institutions.

Another critical implication relates to the redefinition of legitimacy in Islamic legal reasoning. Traditionally, legitimacy is derived from the scholar's methodological competence, moral integrity, and accountability to the scholarly community. In algorithmic environments, legitimacy may increasingly be associated with efficiency, scale, and predictive accuracy. This shift poses a challenge to the normative identity of Islamic law, which has historically resisted purely instrumental rationality. Maintaining legitimacy in the digital age therefore requires

reaffirming that algorithmic outputs are advisory rather than authoritative, and that final legal judgment remains a human moral responsibility.

Ultimately, these developments underscore the urgent need for a robust epistemology of technology within Islamic legal thought. Such an epistemology must critically examine how knowledge is produced, mediated, and legitimized in digital contexts, while safeguarding the ethical core of Islamic jurisprudence. The future of Islamic law depends not on rejecting technological innovation, but on integrating it in a manner that preserves interpretive accountability, pluralism, and commitment to the higher objectives of the Shari'ah. Balancing traditional authority with digital innovation thus emerges as one of the central challenges – and opportunities – of contemporary Islamic legal development.

4. Conclusion

The findings of this study demonstrate that the emergence of big data and algorithmic technologies has generated a substantive transformation in the epistemological structure of *ijtihād*. Islamic legal reasoning is no longer confined to a predominantly text-centered and symbolically mediated model, but is increasingly shaped by computational inference that relies on statistical correlations, pattern recognition, and predictive analytics. This shift represents not merely a technological enhancement of legal methodology, but a deeper epistemic reorientation that affects how legal knowledge is produced, evaluated, and authorized within Islamic law.

Through a conceptual analysis of both classical *uṣūl al-fiqh* literature and contemporary philosophical discussions on big data and artificial intelligence, this study reveals that algorithms function not only as technical tools but also as co-epistemic agents. Their participation in the processes of *istinbāt al-ḥukm* alters the configuration of Islamic legal authority by introducing new forms of mediation between legal sources and juristic judgment. Algorithmic systems increasingly influence which legal opinions are foregrounded, how uncertainty is calculated, and how legal legitimacy is perceived by institutions and the wider Muslim public.

To address these changes, this study proposes the concept of Algorithmic *Ijtihād* as a new epistemological framework capable of integrating computational reasoning into Islamic legal theory without undermining its normative foundations. This framework conceptualizes *ijtihād* as a collaborative process between humans and machines, in which algorithms conduct preliminary analytical tasks while ultimate normative authority remains with human jurists. Crucially, this collaboration is regulated by *maqāṣid al-shari'ah*, which function as the ethical and teleological controller of legal reasoning. In this way, Algorithmic *Ijtihād* bridges Islamic legal epistemology with contemporary AI ethics, ensuring that efficiency and predictive accuracy do not eclipse justice, moral responsibility, and human welfare.

The study also highlights significant epistemic risks associated with algorithmic reasoning, particularly algorithmic bias and epistemic opacity. These risks are especially consequential in Islamic law, where biased datasets may result in theological distortion and opaque reasoning processes contradict the tradition's emphasis on transparency, accountability, and traceable justification. Accordingly, the findings confirm the necessity of strict normative verification protocols, including human oversight, causal reasoning (*ta'līl*), and ethical evaluation, to prevent data determinism and preserve jurisprudential plurality.

From an academic perspective, this study contributes to existing scholarship by demonstrating that digital technology does not merely transform the tools of legal reasoning, but also challenges core concepts such as the definition of the mujtahid, the nature of legal certainty, and the foundations of Islamic legal legitimacy. By situating algorithmic reasoning within the broader epistemological discourse of Islamic law, the study expands the scope of contemporary *uṣūl al-fiqh* and opens new avenues for interdisciplinary engagement between Islamic studies, philosophy of technology, and AI ethics.

Nevertheless, this study is not without limitations. Its primary constraint lies in its conceptual and theoretical orientation, which has not yet been tested through empirical investigation or applied case studies. Consequently, future research should move beyond conceptual formulation toward practical implementation. Specifically, further studies should focus on developing concrete Standard Operating Procedures (SOPs) for Fatwa Councils that utilize AI-assisted systems, conducting empirical audits of existing fatwa-bots to identify theological and epistemic bias, and establishing a cross-disciplinary certification body to evaluate the compliance of Islamic legal algorithms with *uṣūl al-fiqh* and *maqāṣid al-sharī'ah*. Such efforts are essential to ensure that the future development of Islamic law in the digital age remains both epistemically sound and normatively legitimate.

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