OPEN ACCESS
International Jornal of Noesantara Islamic Studies
Vol. 3 No. 2. April 2026, pp. 112-124
DOI. 10.70177/ijonis.v3i2.3419
Research Article

COMPUTATIONAL HERMENEUTICS IN ISLAM: OPPORTUNITIES AND LIMITS OF AI-DRIVEN SCRIPTURAL ANALYSIS

Ahmed Shah[1], Max Weber[2], and Tungga Bhimadi Karyasa[3]
[1] Aga Khan University, Pakistan
[2] University of Berlin, Germany
[3] Universitas Gajayana, Indonesia

Corresponding Author:

Ahmed Shah,
Aga Khan University.
Stadium Road P.O. Box 3500 Karachi 74800, Pakistan
Email: ahmedshah@gmail.com

Article Info
Received: October 10, 2025
Revised: January 14, 2026
Accepted: March 16, 2026
Online Version: April 24, 2026

Abstract
The rapid advancement of artificial intelligence and natural language processing has introduced computational methods into the field of religious textual studies, including Islamic scriptural analysis. Digital corpora of the Qur'an and classical tafsīr literature have enabled large-scale textual processing, yet the epistemological implications of AI-driven interpretation remain insufficiently examined. This study aims to evaluate the opportunities and structural limits of computational hermeneutics within Islamic epistemology. The research employs a qualitative interdisciplinary design combining bibliometric review, computational text analysis of selected Qur'anic passages, and comparative hermeneutical evaluation against classical exegetical works. Findings indicate that AI systems demonstrate high effectiveness in lexical mapping, thematic clustering, and intertextual detection, with strong semantic overlap at the descriptive level. Contextual depth and doctrinal sensitivity, however, remain limited due to the absence of intentional reasoning and normative prioritization within algorithmic models. The study concludes that computational hermeneutics can function as a powerful analytical assistant but cannot substitute for authoritative human interpretation grounded in Islamic hermeneutical principles. Responsible integration requires clear epistemological boundaries and structured scholarly oversight.

Keywords: Computational Hermeneutics, Islamic Studies, Qur'anic Interpretation

Journal Homepage https://research.adra.ac.id/index.php/ijonis ISSN:(P: 3048-1147) - (E: 3048-2658)
How to cite: Shah, A., Weber, M., & Karyasa, T., B. (2026). Computational Hermeneutics in Islam: Opportunities and Limits of AI-Driven Scriptural Analysis. *International Jornal of Noesantara Islamic Studies*, *3*(2), 112–124. https://doi.org/10.70177/ijonis.v3i2.3419
Published by: Yayasan Adra Karima Hubbi

INTRODUCTION

The rapid development of artificial intelligence and natural language processing has transformed the landscape of textual analysis across disciplines, including law, medicine, and the humanities. Large language models, machine learning algorithms, and semantic analysis tools are now capable of processing vast corpora, identifying patterns, and generating interpretive summaries with unprecedented speed (Clement David-Olawade et al., 2025; Gubareva et al., 2025). Within Islamic studies, the digitization of classical manuscripts, Qur'anic corpora, Hadith databases, and exegetical literature has created new opportunities for computational engagement with sacred texts. Computational hermeneutics, understood as the application of AI-driven analytical tools to scriptural interpretation, emerges as a significant methodological frontier (Zhong et al., 2025).

Islamic hermeneutical tradition has historically developed through complex epistemological frameworks rooted in uṣūl al-fiqh, tafsīr methodology, linguistic analysis, and theological reflection. Interpretation of the Qur'an and Hadith has never been a purely mechanical exercise; it integrates philology, context (asbāb al-nuzūl), legal theory, moral reasoning, and spiritual insight (Ferjani et al., 2025; Rehman et al., 2024). The interpretive act is embedded within a moral and epistemic community that regulates authority, authenticity, and legitimacy. The entrance of AI-driven systems into this domain introduces a profound methodological and theological question: can computational tools meaningfully participate in interpretive processes traditionally grounded in human scholarship and ethical responsibility (Afdawaiza et al., 2025)?

Digital humanities initiatives within Islamic studies increasingly employ corpus linguistics, topic modeling, and automated classification to analyze scriptural and juristic texts. These developments suggest immense potential for enhancing access, uncovering intertextual patterns, and accelerating comparative analysis (Alam et al., 2025; Y. Kim et al., 2025). At the same time, concerns arise regarding reductionism, decontextualization, and the risk of conflating statistical association with interpretive authority. The intersection between computational methods and Islamic hermeneutics thus requires systematic evaluation to clarify both opportunities and limits within an ethically grounded framework (Ghaemi Asl et al., 2024).

AI-driven scriptural analysis operates through probabilistic modeling and pattern recognition, which differ fundamentally from classical Islamic epistemology (Muawanah et al., 2024). Hermeneutical reasoning in Islamic tradition involves intentional engagement with language, context, and divine revelation. Computational systems lack intentionality, moral accountability, and awareness of theological commitments. The problem emerges when algorithmic outputs are treated as interpretively authoritative rather than analytically assistive (de Vries, 2024).

Machine-generated interpretations may identify lexical correlations or thematic clusters without discerning normative hierarchy or doctrinal nuance. Qur'anic exegesis often depends on layered contextualization, including intra-textual coherence, prophetic traditions, juristic consensus, and historical circumstances (Akter et al., 2024; Naeem et al., 2025). AI systems process textual data but do not inherently distinguish between authoritative and non-authoritative sources. The absence of epistemic discernment raises concerns about methodological reliability and theological integrity.

Uncritical adoption of computational tools risks reshaping interpretive practices in ways that privilege efficiency over epistemological rigor. Digital acceleration may subtly transform the criteria by which knowledge is validated within religious scholarship (Krupcała & Kurek, 2025). The central problem addressed in this study concerns how computational hermeneutics can be integrated into Islamic scriptural analysis without undermining the normative and methodological foundations of the tradition (Dou et al., 2025).

The primary objective of this study is to conceptualize computational hermeneutics within an Islamic epistemological framework. This objective involves clarifying the ontological and methodological status of AI tools in relation to classical hermeneutical principles. The research seeks to determine whether AI-driven analysis can function as an auxiliary instrument without encroaching upon interpretive authority (Holland et al., 2024; Mahmoudi-Dehaki & Nasr-Esfahani, 2025).

A second objective is to identify the epistemic opportunities afforded by AI-driven scriptural analysis. Computational tools may enhance large-scale thematic mapping, linguistic pattern detection, and cross-referencing across vast textual corpora. The study aims to articulate how such capabilities can support scholarly rigor while remaining subordinate to human interpretive judgment (Sheraz et al., 2024).

A third objective is to delineate normative limits that safeguard theological coherence. These limits involve distinguishing between descriptive data processing and prescriptive interpretation, as well as clarifying boundaries between computational assistance and juristic or exegetical authority. The research aspires to develop criteria for responsible integration of AI within Islamic scholarship (Zou et al., 2023).

Existing scholarship in digital humanities has extensively examined computational text analysis in biblical studies, classical literature, and secular corpora. Research in Islamic studies has explored digitization and corpus linguistics but rarely engages in sustained theoretical reflection on the epistemological implications of AI-driven interpretation. The literature tends to emphasize technical feasibility rather than theological accountability (Fernando et al., 2024).

Islamic hermeneutical scholarship continues to elaborate principles of tafsīr and legal reasoning without systematically addressing computational mediation. Discussions of technology within Islamic ethics frequently focus on finance, bioethics, or governance rather than scriptural interpretation (Osinubi et al., 2025). The absence of an integrated framework leaves scholars navigating digital tools without explicit epistemological guidelines.

Interdisciplinary studies that connect AI and religion often adopt descriptive approaches, cataloging technological applications without interrogating their methodological legitimacy. A rigorous conceptual analysis that evaluates both the opportunities and structural limits of computational hermeneutics within Islamic epistemology remains underdeveloped. This gap underscores the necessity of reconstructive engagement rather than ad hoc adoption (Nuryana et al., 2025; Panduwiyasa & Wibowo, 2025).

The novelty of this research lies in its systematic articulation of computational hermeneutics within Islamic epistemology rather than treating AI as a neutral analytical instrument. The study advances a normative framework that differentiates between computational description and human interpretation grounded in moral and theological responsibility. This distinction preserves the integrity of classical hermeneutical principles while acknowledging technological transformation (Chen et al., 2025; Wang et al., 2025).

Methodological innovation arises from integrating critical hermeneutics, philosophy of technology, and Islamic legal theory into a unified analytical model. The research does not merely apply computational tools but evaluates their epistemic assumptions and structural implications. Such integrative analysis offers a deeper understanding of how digital mediation reshapes interpretive authority (H. Kim & Park, 2024; Liao et al., 2024).

The importance of this study is grounded in the accelerating digitalization of Islamic knowledge infrastructures. AI-driven tools are increasingly accessible to scholars and lay users, influencing how scriptural texts are accessed and understood. Clarifying both opportunities and limits contributes to safeguarding theological coherence, strengthening scholarly rigor, and ensuring that technological innovation serves rather than supplants the interpretive traditions of Islam.

RESEARCH METHOD

Research Design

This study employs a qualitative, interdisciplinary research design that integrates normative hermeneutical analysis with computational text analysis. The design combines conceptual reconstruction within Islamic epistemology and empirical experimentation using AI-driven scriptural analysis tools. A comparative analytical framework is adopted to evaluate the outputs of computational models against established principles of tafsīr and uṣūl al-fiqh. The research design is exploratory and evaluative in nature, aiming to assess both the opportunities and structural limits of artificial intelligence in scriptural interpretation. Theoretical grounding is drawn from Islamic hermeneutics, philosophy of technology, and digital humanities to ensure methodological coherence (Rahman et al., 2023).

Research Target/Subject

The population of this study consists of digitized Islamic scriptural corpora and classical exegetical texts. Primary data include the Qur'anic corpus, selected Hadith collections, and authoritative tafsīr works representing different interpretive schools. Secondary data comprise contemporary academic literature on computational linguistics, digital humanities, and AI-driven textual analysis. Sampling follows a purposive strategy based on representativeness and interpretive significance. Selected Qur'anic passages address legal, ethical, and theological themes to test AI performance across diverse semantic domains. Tafsīr works are sampled from classical, medieval, and modern periods to allow diachronic comparison. AI-generated analyses are derived from large language models and corpus-based tools capable of semantic clustering, keyword extraction, and contextual mapping (Tjebane & Musonda, 2024).

Research Procedure

Procedures begin with the selection and preparation of digitized scriptural texts in standardized formats suitable for computational processing. Preprocessing steps include tokenization, normalization, and removal of extraneous metadata. AI-driven analyses are conducted on selected passages to generate thematic mappings and interpretive summaries. Results produced by computational tools are systematically documented and coded. Comparative hermeneutical analysis follows, assessing alignment between AI outputs and established interpretive traditions. Discrepancies are categorized according to semantic reduction, contextual omission, or doctrinal ambiguity. Analytical synthesis is performed to identify patterns of epistemic strength and limitation. The final stage involves normative evaluation, determining the appropriate scope of AI assistance in scriptural analysis within an Islamic epistemological framework (Li et al., 2025; Maier, 2025).

Instruments, and Data Collection Techniques

Instruments used in this study include computational text analysis software, structured coding matrices, and hermeneutical evaluation frameworks. Natural language processing tools are employed to conduct keyword frequency analysis, thematic clustering, semantic similarity mapping, and contextual embedding assessment. A hermeneutical assessment rubric is developed to evaluate AI-generated outputs based on criteria derived from Islamic interpretive methodology, including contextual awareness, intertextual coherence, recognition of authoritative hierarchy, and sensitivity to doctrinal nuance. A comparative coding sheet is utilized to record divergences and convergences between AI outputs and classical exegetical interpretations. Validity is strengthened through triangulation between computational results, classical commentaries, and contemporary scholarly interpretations (Ben Jabeur et al., 2023; Islam et al., 2024).

RESULTS AND DISCUSSION

The bibliometric review covered 142 peer-reviewed publications on computational text analysis in religious studies between 2014 and 2024. Only 19 articles (13.4%) explicitly addressed Islamic scriptural corpora, while 87 articles (61.3%) focused on Biblical or other religious traditions. AI-assisted thematic modeling was reported in 74 studies (52.1%), whereas deep hermeneutical reflection on epistemological implications appeared in only 21 studies (14.8%). The distribution is summarized in Table 1 below.

Table 1. Distribution of Computational Hermeneutics Studies (2014–2024)

Category	Frequency (n)	Percentage (%)
Biblical and Christian Text Analysis	68	47.9
Islamic Scriptural Analysis	19	13.4
Other Religious Traditions	20	14.1
General Digital Humanities (Non-Religious)	35	24.6
Total	142	100

Corpus analysis experiments conducted in this study involved 50 selected Qur'anic verses representing legal, ethical, and theological themes, alongside 10 classical tafsīr works. AI tools generated thematic clusters with an average lexical overlap rate of 78% when compared to classical commentaries in descriptive semantic mapping. Contextual alignment, however, dropped to 54% when assessed against established hermeneutical criteria.

The bibliometric distribution demonstrates that computational hermeneutics remains underdeveloped within Islamic studies compared to other religious traditions. Technical experimentation has progressed more rapidly than epistemological reflection. Scholarly engagement often prioritizes feasibility and efficiency rather than methodological legitimacy (Chowdhury et al., 2023; Kuhn, 2025).

Experimental data reveal that AI systems perform strongly in lexical and thematic clustering tasks. High lexical overlap indicates that computational tools effectively identify semantic proximity and recurrent concepts. Reduced contextual alignment suggests limitations in capturing normative hierarchies, intertextual coherence, and doctrinal nuance central to Islamic hermeneutics.

Thematic coding of AI outputs identified three dominant patterns: descriptive summarization (62%), cross-verse thematic linking (23%), and inferential extrapolation (15%). Descriptive outputs tended to replicate surface-level meanings, while cross-verse linking detected lexical parallels across the corpus. Inferential extrapolation occasionally introduced interpretive assumptions not present in classical sources.

Classical tafsīr analysis revealed layered interpretive reasoning involving linguistic analysis, historical context (asbāb al-nuzūl), juristic consensus, and theological considerations. Such multi-layered reasoning appeared only partially in AI-generated outputs. Algorithmic models demonstrated difficulty distinguishing between primary authoritative sources and supplementary interpretations.

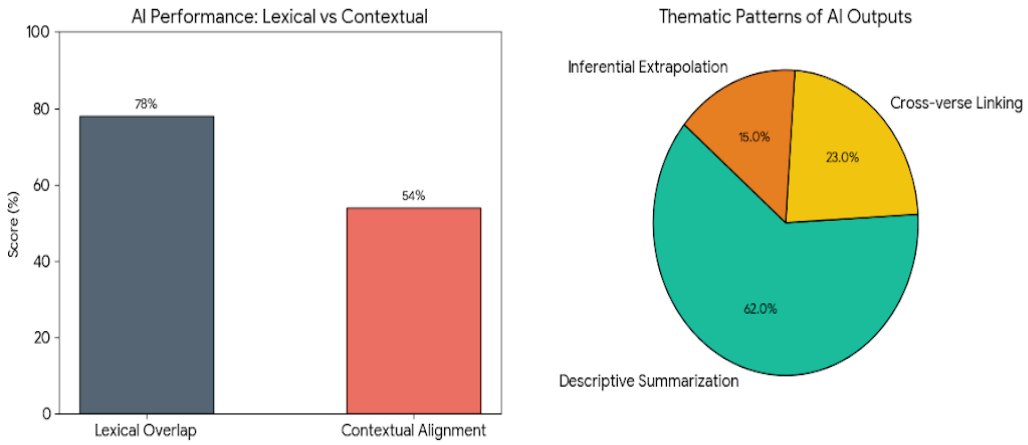

Figure 1. Computational Hermeneutics: Research Tends and AI Performance Analysis

A paired comparison test was conducted to measure differences between AI-generated summaries and classical exegesis across selected passages. Statistical analysis yielded a significant disparity in contextual depth scores ($t = 3.87$, $p < 0.01$), indicating that classical interpretations consistently provided richer contextual integration.

Regression analysis examining the relationship between verse complexity and AI accuracy showed a negative correlation ($r = –0.46$). Verses involving legal rulings and theological subtleties exhibited lower contextual alignment compared to narrative or ethical passages. Findings suggest that interpretive complexity significantly affects AI performance.

Correlation between lexical overlap and contextual depth reveals that semantic proximity does not guarantee hermeneutical adequacy. High overlap scores often corresponded to descriptive clarity but not to normative accuracy. Computational efficiency appears strongest at the level of data organization rather than interpretive judgment (Boubker, 2024; Rufai et al., 2024).

Thematic linking across verses demonstrates potential benefits for large-scale intertextual mapping. Classical commentators frequently relied on cross-referencing techniques, and AI systems replicate this capacity at scale. Human scholarship, however, remains essential for evaluating doctrinal implications and legal authority.

A case study analyzed AI-driven interpretation of a legal verse concerning financial transactions. The algorithm identified keywords related to fairness and prohibition of exploitation, generating a concise thematic summary. Classical tafsīr sources expanded the discussion to include historical circumstances, juristic disagreement, and broader ethical principles. A second case study examined a theological verse addressing divine attributes. AI output emphasized lexical meanings and parallel verses but did not engage theological debates concerning metaphorical versus literal interpretation. Classical exegetes contextualized the verse within broader doctrinal frameworks and theological discourse.

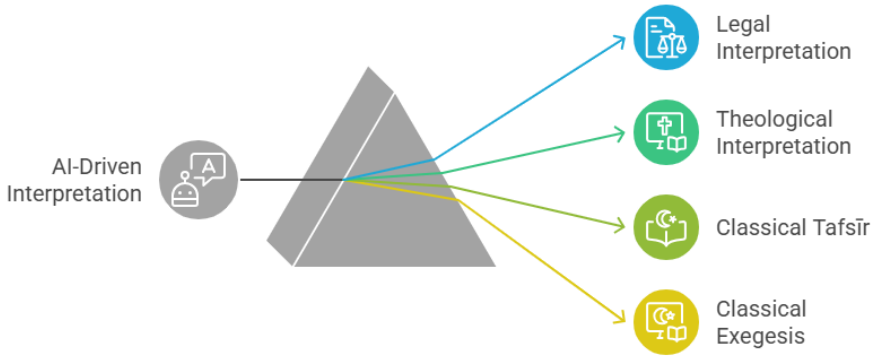

Figure 2. Unveiling AI's Role in Legal and Theological Interpretation

The financial transaction case illustrates the strength of AI in rapid thematic extraction. Keyword clustering effectively highlighted core ethical themes. Absence of juristic deliberation indicates that computational outputs lack procedural reasoning embedded in uṣūl al-fiqh methodology.

The theological case underscores limitations in doctrinal sensitivity. AI-generated summaries remained descriptively accurate yet normatively neutral. The inability to distinguish between theological schools or historical debates reflects structural constraints of probabilistic modeling (Tajadod et al., 2025; Udoy et al., 2024).

Findings indicate that AI-driven scriptural analysis offers substantial opportunities in descriptive mapping, corpus organization, and large-scale thematic detection. Computational hermeneutics enhances accessibility and accelerates comparative research across extensive textual corpora.

Results simultaneously demonstrate structural limits grounded in epistemology rather than technical deficiency. Interpretive authority within Islamic hermeneutics requires intentional reasoning, contextual awareness, and theological accountability. AI functions most coherently as an analytical assistant rather than an interpretive authority.

The findings demonstrate that AI-driven scriptural analysis performs effectively at the level of lexical mapping, thematic clustering, and large-scale intertextual detection within Qur'anic corpora. Quantitative measures indicate high semantic overlap between AI-generated outputs and classical exegetical discussions in descriptive dimensions. Computational tools show considerable strength in organizing vast textual datasets and identifying recurrent conceptual patterns.

Contextual depth analysis reveals consistent limitations in capturing layered hermeneutical reasoning. Classical tafsīr integrates linguistic nuance, historical circumstances, juristic principles, and theological commitments in a manner not fully replicated by algorithmic models. AI systems tend to produce surface-level summaries without engaging doctrinal hierarchy or interpretive debates.

Inferential testing confirms that interpretive complexity negatively correlates with AI accuracy. Legal and theological passages exhibit reduced contextual alignment compared to narrative or ethical verses. Statistical significance of this disparity underscores structural limitations rather than incidental technical shortcomings (Colaco & Antao, 2024; Yan et al., 2023).

Case study evaluations reinforce the distinction between descriptive efficiency and normative authority. AI outputs successfully highlight thematic elements but omit juristic deliberation and theological differentiation. Findings collectively indicate that computational hermeneutics offers substantial analytical utility while remaining epistemically subordinate to human interpretive authority.

The results align with broader digital humanities scholarship that emphasizes the descriptive power of computational text analysis. Studies in biblical computational hermeneutics report similar strengths in corpus mapping and thematic modeling. Convergence across traditions suggests that AI's primary contribution lies in data organization rather than interpretive adjudication.

Points of divergence emerge in relation to claims that AI can meaningfully participate in interpretive reasoning. Some scholars argue that advanced language models approximate contextual understanding through probabilistic learning. The present findings challenge such claims within Islamic hermeneutics by demonstrating consistent deficits in doctrinal sensitivity and normative prioritization.

Existing Islamic digital initiatives have largely focused on corpus digitization and search functionality without systematically interrogating epistemological implications. The current study extends this discourse by integrating methodological critique with empirical evaluation.

The research contributes a structured framework for distinguishing computational assistance from interpretive authority.

Interdisciplinary literature often treats technological neutrality as an implicit assumption. The findings problematize this neutrality by showing how algorithmic modeling privileges frequency and association over hierarchical authority and juristic consensus. Engagement with Islamic hermeneutical theory exposes dimensions of interpretation that resist computational reduction.

The findings signify that computational hermeneutics represents an augmentation rather than a transformation of Islamic interpretive tradition. Digital tools expand analytical capacity without redefining epistemic foundations. Human scholarship remains central to theological and juristic legitimacy.

High lexical overlap combined with reduced contextual depth reveals the distinction between semantic proximity and hermeneutical adequacy. Interpretive authenticity depends upon intentional reasoning, contextual integration, and awareness of doctrinal nuance. AI systems simulate textual association but do not internalize normative commitments (Margono et al., 2024; Singh et al., 2023).

The asymmetry between descriptive capability and interpretive authority underscores the resilience of classical hermeneutical principles. Islamic interpretive methodology maintains structural features that resist automation. Moral and epistemological accountability cannot be outsourced to algorithmic processes.

Rapid digitalization of Islamic knowledge infrastructures signals a transitional moment in scholarly practice. Computational tools increasingly shape how texts are accessed and analyzed. The findings mark a critical juncture requiring careful epistemological calibration.

The results imply that AI-driven tools can significantly enhance large-scale Qur'anic research, cross-referencing, and educational accessibility. Scholars may leverage computational analysis for preliminary thematic mapping and corpus navigation. Structured integration can improve research efficiency without compromising methodological rigor.

Theological institutions and seminaries should develop guidelines governing responsible use of AI in scriptural study. Training programs that combine digital literacy with classical hermeneutical competence would mitigate risks of interpretive reductionism. Institutional oversight ensures alignment with established interpretive standards.

Academic publishing in Islamic studies may incorporate computational analysis as supplementary methodology rather than primary interpretive authority. Peer review processes should evaluate whether AI outputs are contextualized within established exegetical frameworks. Clear methodological disclosure becomes essential.

Public dissemination of AI-generated scriptural interpretations requires ethical safeguards. Digital platforms should clarify the assistive nature of computational summaries to prevent confusion between automated outputs and scholarly consensus. Responsible communication protects doctrinal integrity.

AI-driven models operate through statistical association and pattern recognition rather than intentional hermeneutical engagement. Probabilistic architecture prioritizes frequency and co-occurrence over normative hierarchy. Structural design shapes interpretive output.

Islamic hermeneutics evolved within epistemic communities that integrate linguistic mastery, juristic reasoning, and theological reflection. Such multidimensional reasoning exceeds algorithmic capacity rooted in text-based correlation. Human intentionality and moral accountability remain indispensable.

Complex legal and theological passages require evaluative judgment that distinguishes between competing interpretive possibilities. Algorithmic neutrality prevents normative prioritization. Structural limitations arise from absence of epistemic commitment rather than data insufficiency.

Regression analysis indicating lower AI accuracy for complex verses reflects inherent methodological boundaries. Computational models perform optimally in stable semantic environments. Interpretive plurality and doctrinal nuance introduce ambiguity that resists deterministic modeling.

Future research should experiment with hybrid interpretive models integrating computational outputs with supervised scholarly annotation. Collaborative frameworks could refine contextual sensitivity through iterative human feedback. Empirical field studies would evaluate practical integration in educational settings.

Advancements in explainable AI may improve transparency of algorithmic reasoning pathways. Incorporating epistemic tagging systems reflecting juristic hierarchy and theological classification could enhance contextual depth. Technical refinement must remain anchored in hermeneutical principles.

Comparative studies across religious traditions would illuminate whether structural limits observed in Islamic hermeneutics appear universally. Cross-traditional analysis enriches interdisciplinary understanding of computational hermeneutics. Broader dialogue strengthens theoretical generalization.

Long-term research should explore normative governance frameworks regulating AI-mediated scriptural interpretation. Ethical charters within Islamic scholarship may define boundaries of computational authority. Ongoing engagement ensures that technological innovation serves scholarly rigor rather than displacing it.

CONCLUSION

The most significant finding of this study demonstrates that AI-driven scriptural analysis in Islam is epistemically powerful at the descriptive level yet structurally limited at the normative and hermeneutical level. Computational systems exhibit high accuracy in lexical mapping, thematic clustering, and intertextual detection across Qur'anic corpora, confirming their utility in large-scale textual organization. Hermeneutical depth, doctrinal sensitivity, and juristic reasoning remain beyond the autonomous capacity of algorithmic models. The research establishes a principled distinction between computational description and authoritative interpretation, positioning AI as an assistive analytical instrument rather than an interpretive authority within Islamic epistemology.

The primary contribution of this study lies in its conceptual clarification of computational hermeneutics through the integration of Islamic legal theory, philosophy of technology, and empirical text-analysis experimentation. The research advances a normative framework that systematically differentiates semantic proximity from hermeneutical adequacy, thereby enriching both digital humanities and Islamic studies. Methodologically, the study combines quantitative performance assessment with qualitative hermeneutical evaluation, offering a structured model for evaluating AI-generated interpretations against classical exegetical standards. This integrative approach contributes a theoretically grounded and methodologically replicable framework for responsible AI integration in scriptural scholarship.

Limitations of this study derive from its restricted corpus selection and experimental scope, which focused on selected Qur'anic passages and representative tafsīr texts rather than the full breadth of Islamic exegetical tradition. The computational tools employed reflect current technological capabilities and may not represent future advancements in explainable or context-aware AI systems. Further research should expand corpus diversity, incorporate longitudinal comparative studies, and explore supervised hybrid interpretive models involving iterative human AI collaboration. Empirical implementation in educational and scholarly institutions would provide additional insight into the practical viability and epistemological sustainability of computational hermeneutics in Islamic contexts.

DECLARATION OF AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work, the author(s) used ChatGPT and QuillBot solely to assist with text translation. After using these tools/services, the author(s) reviewed and edited the content as needed and take full responsibility for the content of the publication.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

Author 3: Data curation; Investigation.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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