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TRACING THE ISLAMIC INTELLECTUAL LEGACY IN THE CONCEPTUAL FOUNDATIONS OF GENERATIVE ARTIFICIAL INTELLIGENCE

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Abstract:

The rapid development of Generative Artificial Intelligence (GenAI) has transformed the global technology landscape through the development of Large Language Models (LLMs), Deep Learning (DL) and multimodal content generation systems. Nevertheless, mainstream historiography Artificial Intelligence (AI) often situates its development within the modern Western tradition, while there are significant contributions from Islamic civilization remain underappreciated. Therefore, this study aims to examine the conceptual relationship between Islamic intellectual traditions and the intellectual foundations of GenAI through a historical and epistemological analysis. Specifically, this study seeks to (i) identify major concepts within Islamic intellectual heritage that demonstrate conceptual relevance to GenAI, (ii) analyse their significance within the broader evolution of computational thought, and (iii) discuss their implications for contemporary debates concerning AI ethics, governance and human-centred technological development. This study adopts a qualitative historical approach through a literature analysis of scholarly works related to the history of science, Islamic philosophy and GenAI. This article argues that Islamic intellectual traditions have indirectly contributed to the conceptual foundations of GenAI through the development of formal logical reasoning systems, algebraic

methodologies and algorithms, as well as language and knowledge analysis structures. Although Islamic scholars did not develop GenAI in its modern form, their frameworks of thought formed part of the epistemological and technical foundations that ultimately influenced the development of modern computing and GenAI. This study also asserts that Islamic traditions offer important ethical and epistemological dimensions in understanding the limitations of AI as well as the importance of human oversight in future technological development.

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Algorithms, Artificial Intelligence, Generative AI, Islamic Civilization, Islamic Epistemology



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Introduction

The rapid development of Generative Artificial Intelligence (GenAI) systems involving Large Language Models (LLMs), Deep Learning (DL) architectures and multimodal content generators has become one of the most significant technological transformations of the 21st century. Systems such as GPT-4, Gemini and Claude demonstrate advanced capabilities in generating coherent text, performing contextual reasoning and producing outputs that resemble human-like creativity (Russell & Norvig, 2021). These developments have generated extensive debates across disciplines such as computer science, philosophy, education and ethics, particularly concerning the implications of AI for knowledge production and human cognition. Existing scholarship on artificial intelligence (AI) has predominantly been framed within the context of Western scientific and technological development, focusing on milestones in computational theory, machine learning (ML) and cognitive science. While these contributions are undoubtedly significant, such narratives often overlook the broader historical and intellectual traditions that have contributed to the evolution of systematic reasoning, knowledge organisation and logical inquiry. In particular, the intellectual heritage of Islamic civilization between the 7th and 14th centuries represents a critical yet underexplored dimension in the historical development of scientific and computational thought.

During this Islamic Golden Age, various disciplines such as mathematics, logic, linguistics, philosophy and astronomy developed systematically through knowledge institutions such as Bayt al-Hikmah (House of Wisdom) in Baghdad (Pratama et al., 2023). The institution was founded in the Abbasid era and became a center for the translation, development of knowledge and dissemination of scientific works that were later translated into Latin and influenced the awakening of European intellectuals (Gutas, 1998). The development of libraries and the culture of copying manuscripts in Islamic civilization also played an important role in the development of knowledge. The Islamic scholarly tradition is not only focused on the field of

religion, but also involves the development of mathematics, physics, astronomy, economics and philosophy as a whole (Pratama et al., 2023). As a result, various works of Islamic scholars became the world's leading reference for several centuries and formed part of the foundations of the modern scientific revolution.

Beyond scientific discoveries alone, Islamic civilization developed sophisticated epistemological traditions that integrated revelation, rational inquiry and empirical observation into a coherent framework for knowledge production. These traditions not only generated significant advances in mathematics, astronomy, medicine and philosophy, but also cultivated systematic approaches to classification, logical reasoning, linguistic analysis and information verification. Such intellectual developments later became part of the broader transmission of knowledge to medieval Europe through translation movements centred in Andalusia, Sicily and other intercultural scholarly networks. Consequently, the influence of Islamic civilization should be understood not merely through individual scientific achievements but through its contribution to the evolution of organised systems of knowledge that subsequently informed later scientific developments.

Despite the growing body of literature on GenAI ethics from Islamic perspectives, relatively few studies have examined the historical and epistemological relationship between Islamic intellectual traditions and the conceptual foundations of GenAI. Existing research generally follows three distinct directions. First, many studies focus on the technical evolution of AI and ML without considering broader intellectual histories beyond Western scientific development. Second, research within Islamic studies predominantly examines ethical issues surrounding AI, including maqasid al-shariah, Islamic legal rulings and responsible AI governance, while paying comparatively limited attention to the intellectual traditions that preceded contemporary computational thought. Third, studies discussing the scientific achievements of Muslim scholars often remain historical in orientation without establishing meaningful conceptual engagement with present-day AI paradigms. Consequently, an important interdisciplinary gap remains between AI historiography, Islamic epistemology and contemporary discussions of GenAI.

Addressing this gap does not require demonstrating a direct historical or technological lineage between classical Islamic scholarship and modern GenAI. Rather, it requires identifying conceptual continuities and intellectual antecedents that illuminate how systematic traditions of logic, reasoning, mathematical abstraction, knowledge organisation and ethical reflection developed across different historical contexts. Such an approach enables a more balanced historiography of AI while avoiding deterministic or anachronistic interpretations of technological development. Accordingly, this article contributes to existing scholarship in three important ways. First, it develops a historical-conceptual analysis that positions Islamic intellectual traditions within the broader genealogy of computational thought rather than treating them solely as isolated historical achievements. Second, the article systematically distinguishes conceptual parallels from claims of direct technological inheritance, thereby addressing a common methodological weakness found in comparative studies between classical civilizations and contemporary AI. Third, it proposes that Islamic epistemology offers not only historical insights but also enduring conceptual and ethical perspectives that remain relevant for understanding the responsible development of GenAI.

Research Objective

Therefore, this study aims to examine the conceptual relationship between Islamic intellectual traditions and the intellectual foundations of GenAI through a historical and epistemological analysis. Specifically, the study seeks:

- (i) to identify major concepts within Islamic intellectual heritage that demonstrate conceptual relevance to GenAI,
- (ii) to analyse their significance within the broader evolution of computational thought, and
- (iii) to discuss their implications for contemporary debates concerning AI ethics, governance and human-centred technological development.

Islamic Epistemological Tradition and the Basis of GenAI Thought

The Islamic epistemological tradition offers a structured framework for understanding the nature, acquisition, and processing of knowledge. Rather than viewing knowledge as isolated data points, classical Islamic scholarship developed rigorous methodologies that harmonized rational reasoning (*'aql*), formal logic (*mantiq*), and systematic inquiry (*'ilm*). These foundational concepts closely parallel the core architecture of modern GenAI, which fundamentally depends on structured knowledge representation, logical inference and information organization. By examining these core concepts alongside the rational philosophies of scholars such as al-Farabi, Ibn Sina and al-Ghazali, this section establishes how classical Islamic epistemological principles resonate with the theoretical underpinnings of contemporary computational thought.

The Concepts of 'Ilm, 'Aql and Mantiq in the Islamic Intellectual Tradition

The relationship between the Islamic intellectual tradition and modern GenAI needs to be understood through the framework of Islamic epistemology that emphasizes the concepts of *'ilm* (knowledge), *'aql* (reason) and *mantiq* (logic). Al-Ghazali defined knowledge as the reality of all things, while Ibn Khaldun described knowledge as that which can be learned or explored by human beings through reason, the senses, experience or with the guidance of divine revelation. Meanwhile, Bakar defines knowledge as a term originating from the Word of Allah, whose meaning is vast and ultimately known in its entirety only by Allah. Knowledge emerges and develops upon certain foundations, and it is closely associated with theories concerning the nature, sources and origins of knowledge, which are collectively referred to as epistemology (Aziz et al., 2021). In the classical Islamic tradition, knowledge is not just the process of acquiring information but is considered the basis of human dignity and religious demands (Nasr, 1992). Bakar (1998) also rejects the separation between religious knowledge and secular knowledge that characterizes modern education, and calls upon Muslims to return to the Islamic intellectual tradition, which harmoniously integrates the roles of reason and revelation in the pursuit of knowledge. The Qur'anic command of *iqra'* established a culture of knowledge that encourages learning, research, intellectual development, and the creation of new knowledge for the betterment of society (Adan, 2023). The philosophy of *iqra'* extends beyond reading to encompass the pursuit of equity, empowerment and justice through education and intellectual engagement (Adan, 2023). This orientation contributed to the emergence of systematic knowledge traditions within Islamic civilization and bears conceptual similarities to GenAI, which likewise depends on the acquisition, organization and processing of information. Although GenAI functions through computational and ML mechanisms, the

effectiveness of GenAI ultimately rests upon structured knowledge systems and well-organized data resources.

In addition to the concept of knowledge, the Islamic tradition also places great emphasis on the concept of '*aql*' or reason. The intellect is considered the primary human faculty for understanding reality, reasoning and interpreting revelation. According to al-Ghazali (2005), reason constitutes a major source of knowledge and the basis for human ability to think rationally. In the modern context, this approach has similarities with GenAI research that attempts to understand the reasoning processes, inferences and structures of human thought. The Islamic tradition also developed the discipline of *mantiq* which was influenced by Aristotle's logic but was significantly expanded by Muslim scholars (Azhar & Ismail, 2021).

The discipline provides a systematic framework for assessing the validity of arguments, classifying propositions and constructing structured inferences. From a structural standpoint, *mantiq* has similarities to the rule-based reasoning used in early symbolic AI in that both emphasize the formal process of decision-making. In addition, the discipline of *usul al-fiqh* shows the development of a complex system of reasoning in the Islamic tradition. Methods such as *ijma'* (consensus), *qiyas* (analogical reasoning) and *istislah* (consideration of public interest) are used to produce legal decisions through an organized process of inference (Che Omar & Mat Hussin, 2020). This structure has similarities to knowledge representation and expert systems in GenAI in that they both involve information management, conflict resolution and inference based on specific rules.

Al-Farabi, Ibn Sina and Al-Ghazali in the Tradition of Rational Thought

The development of Islamic epistemology was further strengthened by philosophical figures such as al-Farabi, Ibn Sina and al-Ghazali who developed theories related to logic, knowledge and the structure of human thought. Al-Farabi is known for his systematic classification of knowledge and theory of demonstration, while Ibn Sina expanded on Aristotelian logic and discusses the concept of self-consciousness through the theory of Floating Man (Leaman, 1999). At the same time, al-Ghazali discussed the relationship between knowledge, intention and rationality in the process of understanding the truth (Watt, 1963).

Although their thinking is not directly related to the development of GenAI technology, their approach to logic, knowledge structures and cognitive processes became part of the foundation of the development of formal logic and rational thinking that ultimately influenced the development of modern computational logic (Russell & Norvig, 2021). The contributions of these figures show that Islamic civilization has developed an intellectual tradition that pays serious attention to the process of reasoning, the classification of knowledge and the structure of human thought. These elements then became among the essential components in the development of GenAI systems.

Fundamentals of Mathematics and Algorithms in Islamic Civilization

The mathematical breakthroughs of Islamic civilization provided pivotal foundations for the evolution of modern computational logic and quantitative analysis. Central to this intellectual tradition was the development of systematic, step-by-step problem-solving methods and algebraic operations that transformed abstract reasoning into structured execution. This section explores how classical Islamic contributions to mathematics and algorithmic thinking,

pioneered by scholars such as al-Khawarizmi, established early conceptual frameworks that continue to underpin modern machine learning architectures and GenAI systems.

Al-Khawarizmi and the Birth of Algorithmic Thinking

Muhammad ibn Musa al-Khawarizmi was one of the most important figures in the history of mathematics and computing (780–850 AD). He was a Muslim scholar who played a major role in the development of algebra, astronomy and modern arithmetic systems (Encyclopaedia Britannica, 2025). His work, *al-Kitab al-Mukhtasar fi Hisab al-Jabr wal-Muqabala*, introduced a systematic method for solving linear and quadratic equations. Through this work, the terms *al-jabr* and *al-muqabala* were introduced as a basis for modern algebra (Saputra, 2023). The method developed by al-Khawarizmi did not merely solve mathematical problems but also formed the step-by-step thinking structure that became the basis of modern algorithms. The term “algorithm” itself derives from his name which translates into Latin as “Algorismus” (Mehri, 2017). The step-by-step approach introduced by al-Khawarizmi later developed into an important foundation in computer science, ML and GenAI.

Additionally, algebra plays a very important role in the development of GenAI because most ML and DL systems rely on complex mathematical operations. GenAI systems rely on algebraic structures to process data, identify patterns and construct predictive models (Rahmanita et al., 2023). In this context, al-Khawarizmi’s contribution is not only relevant in the history of mathematics but is also part of the conceptual foundation that enables the development of GenAI technology. The development of GenAI shows how algorithms have evolved from basic computational systems to intelligent models capable of autonomously producing text, images and digital content. AI is defined as the development of computer systems capable of performing tasks resembling human abilities such as visual recognition, language processing, decision-making and language translation (Vashishth et al., 2023). The evolution of AI from symbolic AI to DL and subsequently AI shows that mathematical algorithms remain the main foundation in the development of such systems.

Although AI demonstrates exceptional capabilities in pattern recognition and language generation, the system still has certain limitations in understanding the true meaning and performing high-level reasoning. The study of Mahowald et al. (2024) also shows that LLMs have limitations in understanding the relationship between language and human thought in depth. This shows that modern AI still relies on statistical processing and inference based on large training data, rather than real understanding like the human intellect. Nevertheless, the development of GenAI remains dependent on algorithmic structures and mathematical approaches inherited from earlier intellectual traditions. In this regard, al-Khawarizmi’s contribution to the development of algebra and algorithms became one of the most important foundations in the history of modern computing. The influence of his thought proves that the Islamic intellectual tradition has a significant relationship with current technological developments although it is often given less attention in mainstream AI historiography.

Islamic Tradition and the Ethical Dimension of GenAI

As GenAI systems rapidly transform information production and decision-making, establishing robust ethical governance becomes critical. The Islamic intellectual tradition offers a normative framework rooted in human moral accountability (*amanah*), intellectual preservation (*hifz al-‘aql*), and social well-being through maqasid al-shariah. This section examines how these

classical ethical and legal paradigms address contemporary concerns surrounding GenAI governance, algorithmic fairness and human oversight. By evaluating principles of responsibility (*mas'uliyah*) alongside traditional information verification methods like *isnad*, this subsection demonstrates how Islamic ethics provides essential guidance for the responsible, human-centered development of GenAI.

AI as a Tool and Not a Substitute for Human Intelligence

The Islamic intellectual tradition regards the human intellect as the supreme gift related to the ability to understand the truth, make moral judgments and form intentions. In this framework, GenAI should be understood as a tool rather than as a substitute for human intellect. Al-Farabi and Ibn Sina emphasize that the human intellect has a rational, intuitive and spiritual dimension that cannot be reduced to a purely mechanical process (Walzer, 1985). Therefore, even though GenAI is capable of generating text, making predictions and executing statistical inferences, such systems still do not have the awareness, intention and moral responsibility of humans.

This perspective is important in understanding the place of GenAI in modern society. GenAI serves as a technological instrument that helps humans process information and improve efficiency, but final decisions regarding values, ethics and responsibilities still require human oversight. In the Islamic tradition, the human intellect is associated with the concepts of *taklif* and *amanah*, which are moral responsibilities that cannot be transferred to automatic machines or systems (Wan Ismail & Berghout, 2025). In this context, the role of reason as an instrument of *tafakkur* (critical reflection) and *tadabbur* (contemplative understanding) is at risk of being eroded when the analytical function is replaced by the automatic response of the system. This situation directly challenges the principle of *hifz al-'aql* which demands the active and continuous development of intellectual powers (Kasneci et al., 2023). In addition, these findings also support the view of Tlili et al. (2023), who emphasize that GenAI should serve as a learning support tool rather than replacing the efforts of human intellect. Excessive dependence on GenAI may weaken critical thinking processes, *tadabbur* and *ijtihad*, thus making students passive when the responsibility of thinking is completely left to technology.

Maqasid al-Shariah and GenAI Governance

The Islamic tradition of ethics provides an important normative framework in the development and governance of modern AI. The principles of maqasid al-shariah, which emphasizes the preservation of religion, life, intellect, property and lineage can be used as the basis in the development of an ethical GenAI system oriented towards human well-being. In the context of modern AI, principles such as fairness (*'adl*), transparency (*bayan*) and prevention of harm (*dar al-mafsadah*) have a direct connection to the current debate on algorithmic fairness, explainability and AI security (Habib, 2025). This approach shows that Islamic traditions are not only historically relevant but also have an important contribution in shaping the ethical framework of contemporary GenAI.

In addition, the Islamic tradition also emphasizes accountability (*mas'uliyah*) and human responsibility in making decisions. In Islamic law, moral responsibility is only borne by humans who have intention and awareness (Raquib et al., 2022). Therefore, the use of AI in critical fields such as education, health and law requires continuous human oversight to ensure that the results produced do not contradict the principles of justice and humanity.

Limitations of GenAI and the Importance of Human Oversight

Although modern GenAI demonstrates increasingly sophisticated capabilities, such systems still have various limitations. GenAI operates through pattern recognition and statistical inferences based on large training data, rather than through a real understanding of meaning and reality. Because of this, GenAI remains prone to problems such as hallucinated information, algorithmic bias and difficulty explaining the reasoning process transparently (Russell & Norvig, 2021).

In this regard, the Islamic scholarly tradition offers a relevant methodological approach through the concepts of source verification, *isnad* and critical evaluation of information (Madolimov, 2024). The Islamic scholarly tradition emphasizes that information needs to be checked for authenticity before it is received or disseminated. This approach has similarities with current requirements in GenAI development that emphasize the importance of factchecking, data transparency and system reliability. This discussion shows that the development of future GenAI will not only require technical advancement, but also an epistemological and ethical framework capable of ensuring that technology is used responsibly. In this context, the intellectual heritage of Islam offers a significant source of thought to shape the development of GenAI that is more ethical and oriented towards human well-being.

Conceptual Parallels between Islamic Intellectual Traditions and GenAI

The concepts of *ilm*, *aql* and *mantiq* collectively emphasize the systematic acquisition of knowledge, rational inquiry and logical reasoning, all of which constitute essential components of GenAI systems. Likewise, methodologies developed within *usul al-fiqh*, particularly those involving analogical and inferential reasoning, demonstrate structured approaches to decision-making that resemble the operation of modern expert systems. The contributions of Muslim scholars such as al-Khawarizmi further highlight the historical significance of algorithmic thinking, while institutions such as Bayt al-Hikmah reflect early forms of knowledge management and preservation. In addition, the sophisticated linguistic analyses developed within the Arabic scholarly tradition share conceptual affinities with natural language processing (NLP), whereas the *isnad* verification system provides an early model for information validation and reliability assessment. Collectively, these examples suggest that Islamic civilization cultivated intellectual traditions that promoted systematic thinking, knowledge organization and ethical deliberation, principles that remain highly relevant to the theoretical foundations and responsible development of GenAI technologies. Table 1 illustrates that several foundational concepts within the Islamic intellectual tradition exhibit notable conceptual similarities with contemporary AI frameworks.

Nevertheless, important epistemological differences remain between Islamic intellectual traditions and modern GenAI. Islamic epistemology ultimately recognises revelation (*wahy*), reason (*aql*) and empirical observation as complementary sources of knowledge, whereas GenAI systems generate outputs through statistical pattern recognition derived from extensive computational training data. Unlike human cognition, AI systems possess neither intentionality nor moral consciousness. Consequently, while structural similarities may exist in processes of reasoning, classification and information management, GenAI cannot replicate the ethical responsibility, spiritual awareness or intentional judgement that characterise human intellectual activity within the Islamic worldview. This distinction reinforces the principle that AI should

remain an assistive technology operating under meaningful human oversight rather than an autonomous substitute for human intellectual authority.

Table 1: Conceptual Parallels Between Islamic Intellectual Traditions and GenAI

Islamic Concept / Scholar	Related AI Concept	Nature of Relationship
<i>‘Ilm</i> (Knowledge)	Knowledge Representation	The concept of <i>‘ilm</i> in the Islamic intellectual tradition emphasizes the systematic acquisition, classification, and organization of knowledge, which parallels the structures of knowledge representation employed in GenAI.
<i>‘Aql</i> (Reasoning)	Artificial Reasoning and Inference Systems	The concept of <i>‘aql</i> relates to the human capacity for reasoning, inference, and understanding reality, aligning with the development of GenAI systems designed to emulate human reasoning processes.
<i>Mantiq</i> (Logic)	Symbolic AI and Rule-Based Systems	The discipline of <i>mantiq</i> provides a formal framework for evaluating arguments and constructing logical inferences, resembling the principles underlying symbolic GenAI and expert systems.
<i>Usul al-Fiqh</i>	Decision-Making Models and Expert Systems	Methodologies such as <i>ijma’</i> (consensus), <i>qiyas</i> (analogical reasoning) and <i>istislah</i> (consideration of public interest) involve systematic inferential and evaluative processes that share conceptual similarities with modern expert systems and decision-making models.
Al-Khawarizmi’s Algebraic Method	Algorithms and Computational Thinking	The step-by-step problem-solving approach developed in algebra laid the foundation for the modern concept of algorithms and computational logic that underpin GenAI.
Bayt al-Hikmah (House of Wisdom)	Knowledge Management and Data Preservation	This scholarly institution functioned as a centre for the collection, translation, preservation, and dissemination of knowledge, resembling contemporary concepts of data management and knowledge repositories.

<i>Isnad</i> System	Verification	Fact-Checking and GenAI Reliability	The <i>isnad</i> verification system in Islamic scholarship shares similarities with contemporary requirements for information verification, transparency, traceability and reliability in GenAI systems.
<i>Maqasid al-Shariah</i>		AI Ethics and Governance	The principles of maqasid al-shariah provide a normative framework centred on justice, human well-being and harm prevention, offering valuable guidance for the ethical governance and development of GenAI.
<i>Tafakkur</i> (Critical Reflection) and <i>Tadabbur</i> (Contemplative Understanding)		Human-Centred AI	The Islamic traditions of <i>tafakkur</i> and <i>tadabbur</i> emphasize critical thinking, ethical awareness and human oversight, aligning with the principles of human-centred AI.
<i>‘Ilm</i> (Knowledge)		Knowledge Representation	The concept of <i>‘ilm</i> in the Islamic intellectual tradition emphasizes the systematic acquisition, classification and organization of knowledge, which parallels the structures of knowledge representation employed in GenAI.
<i>‘Aql</i> (Reasoning)		Artificial Reasoning and Inference Systems	The concept of <i>‘aql</i> relates to the human capacity for reasoning, inference, and understanding reality, aligning with the development of GenAI systems designed to emulate human reasoning processes.
<i>Mantiq</i> (Logic)		Symbolic AI and Rule-Based Systems	The discipline of <i>mantiq</i> provides a formal framework for evaluating arguments and constructing logical inferences, resembling the principles underlying symbolic GenAI and expert systems.
<i>Usul al-Fiqh</i>		Decision-Making Models and Expert Systems	Methodologies such as <i>ijma’</i> (consensus), <i>qiyas</i> (analogical reasoning) and <i>istislah</i> (consideration of public interest) involve systematic inferential and evaluative processes that share conceptual similarities with modern expert systems and decision-making models.
Al-Khawarizmi’s Algebraic Method		Algorithms and Computational Thinking	The step-by-step problem-solving approach developed in algebra laid the foundation for the modern concept of algorithms and computational logic that underpin GenAI.

Bayt al-Hikmah (House of Wisdom)	Knowledge Management and Data Preservation	This scholarly institution functioned as a centre for the collection, translation, preservation, and dissemination of knowledge, resembling contemporary concepts of data management and knowledge repositories.
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The conceptual relationships presented in Table 1 should be understood as heuristic and analytical rather than evidence of a direct historical or technological lineage between classical Islamic scholarship and contemporary GenAI. Projecting modern technological concepts onto classical intellectual traditions risks historical determinism and presentism. Instead, these parallels highlight fundamental convergences in logical reasoning, algorithmic thinking, knowledge organization and ethical governance. This study argues that Islamic civilization contributed to the broader evolution of systematic inquiry that formed part of the wider historical ecosystem from which computational thinking eventually emerged. Recognising this distinction ensures historical accuracy while creating scope for interdisciplinary dialogue between the history of science, Islamic intellectual heritage, and contemporary GenAI studies. The findings of this study offer broader implications for contemporary GenAI governance, where global standards increasingly emphasize transparency, explainability, accountability and meaningful human control. Notably, these modern benchmarks resonate with classical Islamic normative principles, including information verification (*tabayyun*), source authenticity (*tathabbut*), trustworthiness (*amanah*), justice (*'adl*), and responsible reasoning (*'aql*). Although originating from distinct historical and philosophical contexts, this shared commitment to ethical knowledge production demonstrates that Islamic intellectual heritage can provide valuable normative insights for formulating inclusive and culturally aligned GenAI governance frameworks.

Methodology

This study employs a qualitative historical-conceptual research design supported by a narrative literature review to examine the intellectual and epistemological relationship between Islamic intellectual heritage and the conceptual foundations of GenAI. The study focuses on interpreting the development of ideas across different historical periods rather than establishing empirical or causal relationships. The literature corpus comprises scholarly materials, including peer-reviewed journal articles, academic books, historical studies and selected classical Islamic texts relevant to knowledge, reasoning, logic, mathematics, language, ethics and scientific development. The sources were purposively selected based on their relevance to the research objectives and their contribution to understanding the historical development of systematic knowledge organisation, rational inquiry, algorithmic thinking and ethical reflection within Islamic intellectual traditions and contemporary GenAI discourse.

The selected literature was analysed using thematic content analysis through a process of critical reading, identification, categorisation, and interpretation of recurring concepts and themes. The analysis organised the literature into broader conceptual domains concerning Islamic epistemology, logical reasoning, mathematical and algorithmic thought, linguistic analysis, knowledge organisation, and ethical governance, which were subsequently examined in relation to contemporary GenAI concepts. An interdisciplinary analytical perspective integrating the history of science, Islamic epistemology, philosophy and GenAI studies was

adopted to identify conceptual convergences and intellectual antecedents across these domains. Importantly, the analysis does not seek to establish a direct historical or technological lineage between classical Islamic scholarship and contemporary GenAI. Instead, it examines the extent to which selected Islamic intellectual traditions provide historically situated conceptual parallels that can enrich understanding of the broader intellectual foundations of contemporary computational thought and inform contemporary discussions on the ethical and human-centred development of GenAI.

Conclusion

This study argues that the Islamic intellectual tradition has made an indirect but significant contribution to the conceptual underpinnings of GenAI through the development of formal logic, algebraic methodologies and algorithms as well as systematic epistemological and linguistic structures. Although Islamic scholars did not develop GenAI in its modern form, their scholarly traditions have formed part of the intellectual foundation that ultimately influenced the development of modern computing and GenAI. This analysis also shows that the history of GenAI cannot be understood exclusively through Western frameworks alone. The development of modern science is the result of the interaction of various civilizations including the Islamic Civilization which played an important role in the transfer and expansion of knowledge. Therefore, recognition of the contributions of Islamic civilization is not only important from a historical point of view, but also to build a more comprehensive understanding of the development of modern technology.

The findings of this study also have broader implications for future GenAI governance. Contemporary discussions concerning trustworthy GenAI increasingly emphasise transparency, explainability, accountability and meaningful human control. These principles resonate with long-established Islamic intellectual traditions that emphasise verification (*tathabbut*), trustworthiness (*amanah*), justice (*'adl*) and responsible reasoning (*'aql*). Beyond its historical relevance, Islamic intellectual heritage guided by *maqasid al-shariah*, accountability (*mas'uliyah*) and human oversight ensure that GenAI remains a supportive instrument for human intellect rather than a substitute for moral judgment. Ultimately, integrating Islamic epistemology with technology ethics creates a theoretical foundation for developing more humane, culturally inclusive and ethically balanced GenAI governance frameworks.

Thus, the Islamic intellectual legacy demonstrates that Muslim scholars made significant contributions to the development of knowledge systems that later influenced the foundations of modern computing and GenAI. During the golden age of the Abbasid Caliphate, scholarly activities such as reading, writing, translation and manuscript preservation played an essential role in expanding intellectual traditions and disseminating knowledge across civilizations. In the contemporary era, GenAI has emerged as a technological tool capable of accelerating writing, information processing and content generation. Nevertheless, despite its advanced capabilities, GenAI should remain a supportive instrument rather than a replacement for human intellect, critical reasoning and ethical judgment. Therefore, users must continue to emphasize ethics, intellectual responsibility and proper conduct in the use of GenAI technologies. Since this study is conceptual in nature, future research is recommended to explore more comprehensively the historical continuity between Islamic intellectual traditions and the evolution of modern computational and GenAI systems.

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