

Genognosis: AI's impact on knowledge production

Research – English Summary

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Talal Nazim Al-Zuhairi, Prof. Dr.

Department of Information and Knowledge Technologies,

Al-Mustansiriya University, Iraq

drzzuhairi@gmail.com

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Nazim Al-Zuhairi



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Abstract

This study explores the impact of generative artificial intelligence on knowledge production through a new framework called "Genognosis." It examines the philosophical and historical dimensions of knowledge while addressing challenges such as forced knowledge standardization, algorithmic and linguistic bias. The study aims to analyze the transformations in human knowledge structures and introduce a model explaining the dynamic interaction between humans and AI in generating knowledge. The discussion highlights the necessity of establishing standards to ensure knowledge equity and balance between human and AI-driven knowledge production. The study recommends strengthening human oversight, diversifying data sources, promoting cultural and linguistic diversity in AI systems, and implementing ethical guidelines to regulate digital knowledge creation.

Keywords

Genognosis, Artificial Intelligence, AI, knowledge production

1. Executive Summary

This study explores the profound impact of generative Artificial Intelligence (AI) on human knowledge production, proposing a new model called **"Genognosis" (Formative Knowledge)**. It contextualizes AI's influence within the historical and philosophical framework of knowledge development, from early writing to the printing press, arguing that AI represents a new, complex turning point. The paper highlights critical challenges posed by AI, including **forced homogenization of knowledge, algorithmic bias, and linguistic/cultural bias**, which threaten cognitive justice and human creativity. The study advocates for the development of standards and a "Knowledge Charter" to ensure a balanced integration of AI, preserving human oversight and ethical considerations in the digital knowledge landscape.

2. Historical Context of Knowledge Evolution (The "Knowledge Triangle")

The source frames the current AI-driven transformation within a historical narrative of three major advancements that fundamentally reshaped human civilization and knowledge production:

1. **Invention of Writing (c. 3200 BCE in Mesopotamia):** This marked a "qualitative leap" from oral tradition to systematic documentation, enabling precise recording of history and knowledge. It facilitated the development of philosophical and logical theories, and the codification of sciences like medicine and astronomy.
2. **Invention of Paper (105 CE by Cai Lun in China):** Paper revolutionized knowledge preservation by offering a more flexible and efficient medium than clay tablets or papyrus. It significantly broadened the dissemination of knowledge, fostering intellectual and scientific creativity, particularly in Islamic civilization (e.g., "House of Wisdom" in Baghdad).
3. **Invention of the Printing Press (15th Century by Johannes Gutenberg in Europe):** The printing press completed the "Knowledge Triangle," drastically accelerating the production and widespread distribution of books. It democratized access to knowledge, fueled the scientific revolution (e.g., Copernicus, Galileo, Newton), and contributed to the rise of journalism and public opinion, marking "the dawn of the modern era."

The study asserts that AI and the internet now represent a **"new knowledge revolution,"** where digital space is the primary arena for information generation, shifting human knowledge into a new phase.

3. AI's Impact on Knowledge Generation and its Domains

AI, particularly generative models like **ChatGPT (OpenAI, 2022), Gemini, and DeepSeek**, are transforming knowledge production across various sectors:

- **Text Generation:** AI can analyze vast amounts of text data from the internet, books, and articles, using transformer technology to understand contexts and produce coherent, accurate responses that mimic human language.
- **Education:** AI tools are extensively used for preparing lectures, developing curricula, enhancing teaching resources, and assisting students with research papers and graduation projects. This raises "fundamental questions about the limits of academic

integrity and scientific differences among students." A Japanese study cited reveals that **"about 50% of university students in Japan have used applications such as ChatGPT or other forms of generative AI... as a reference for writing research papers or academic reports."**

- **Media and Journalism:** AI is integrating into all aspects of media, from news editing and fact-checking to generating journalistic reports and in-depth investigations. It allows journalists to follow events instantaneously, reduce routine tasks, and extract information efficiently. Studies suggest AI use "improves the quality of journalistic and investigative content, and increases the accuracy and speed of event coverage."

The study emphasizes that while AI offers significant benefits, its pervasive nature in scientific, educational, and media sectors also creates new challenges related to **academic integrity, intellectual property rights, and employment**, necessitating new ethical and regulatory standards.

4. Manifestations of Bias in AI Applications

The study identifies significant biases in AI applications, stemming from their design and the data they are trained on, which can perpetuate and deepen existing societal inequalities. These biases include:

1. **Data Bias:** Occurs when training data is not representative or fair, leading to prejudiced or unfair outcomes. For example, a report on facial recognition systems showed they were **"less accurate in recognizing people with darker skin compared to people with white skin,"** with accuracy rates of 34% for darker skin compared to 99% for white skin.
2. **Algorithmic Bias:** Refers to AI systems making unfair decisions due to flaws in their design or the data they rely on. This can lead to "cultural echo chambers" where AI, like recommendation systems (e.g., Netflix, YouTube), reinforces narrow preferences and familiar content, neglecting cultural diversity. A New York Times report highlighted YouTube's recommendation system promoting "controversial political content" and reinforcing specific viewpoints.
3. **Judicial Bias:** AI systems used in legal and judicial contexts can exhibit bias, leading to unfair or prejudiced rulings, often due to reliance on historical data that reflects discriminatory practices (e.g., racial or economic disparities in sentencing). The **COMPAS system, used to assess recidivism risk, "contained bias against black individuals,"** assigning them higher risk scores even when their likelihood of re-offending was lower than white individuals.
4. **Linguistic and Cultural Bias:** AI systems' reliance on narrow linguistic and cultural data (e.g., English or Western contexts) can lead to an inability to understand nuanced cultural differences, reinforcing "digital exclusion" and "cultural hegemony." The study notes that the **"accuracy and quality of information from ChatGPT, for example, differ when the query is presented in English compared to Arabic,"** attributing this to the abundance of English language sources.

5. The "Genognosis" (Formative Knowledge) Model

The "Genognosis" model proposes a fundamental shift in understanding knowledge, moving it from a static collection of information to a **"dynamic and vibrant system that is continuously reshaped."** This model emphasizes the ongoing interaction between humans and technology, redefining traditional concepts in information science and knowledge management:

1. **From Fixed Source to Dynamic:** In traditional models, a "source" was a static entity (e.g., books). In Genognosis, the source becomes "part of an active and continuously interacting knowledge system," where knowledge is a continuous process of updating, reviewing, and interacting with information and contexts (e.g., Wikipedia).
2. **Referencing as an Interactive Process:** Traditional referencing was a fixed attribution to a reliable source. Genognosis views referencing as an "interactive and renewable process" that includes continuous review, new interpretations, and adaptation to changing contexts.
3. **Distribution of Epistemic Authority:** Historically, epistemic authority was centralized in institutions (e.g., universities, publishers). With Genognosis and the rise of social media, "epistemic authority has become more distributed" among individuals and communities, transforming the role of traditional institutions and fostering collective knowledge formation.

Characteristics of Genognosis:

- **Dynamic and Evolving:** Knowledge is not static; it evolves and renews over time, adapting to changing contexts.
- **Human-AI Partnership:** AI is considered a "vital partner" in the knowledge process, offering innovative solutions and data analysis, while humans provide the creative dimension.
- **Continuous Innovation:** Knowledge generation results from a dynamic interaction between humans and AI, not isolated efforts.
- **Flexibility and Responsiveness:** Knowledge is flexible and responds quickly to environmental, technological, and social changes.
- **Shift from Static to Flexible:** Genognosis encourages utilizing continuous observations and interactions to generate knowledge that aligns with future needs.
- **Ethics and Regulation:** The interaction between humans and AI necessitates an "ethical and regulatory framework" to ensure responsible use and prevent exploitation or harmful bias.

6. Discussion: Human Role and Challenges

The study emphasizes that the traditional human role as the "guardian" and "producer" of knowledge, ensuring its reliability through verification and critique, is fundamentally changing. With generative AI, machines can produce knowledge content independently, shifting the human role from **"sole producer" to "supervisor."**

Key Challenges Highlighted:

- **Control and Quality Assurance:** Questions arise about human control over AI-generated knowledge and ensuring its conformity with ethical and scientific principles.
- **Lack of "Direct Human Experience":** A fundamental issue is AI's reliance on past data without "true understanding of the emotional, cultural, and social contexts." This can lead to biases and errors, as AI-generated content, while statistically accurate, may lack the deep understanding derived from human sensory and field experience.
- **Forced Homogenization of Knowledge:** AI systems tend to unify and replicate knowledge patterns based on input data. If this data is culturally or geographically dominant, it can lead to the "hegemony of specific knowledge models at the expense of other cultures or identities," reducing cognitive and cultural diversity.

This transformation necessitates the development of new human skills, such as information verification and understanding AI mechanisms, making humans more deeply involved in knowledge management processes.

7. Recommendations: Towards a Knowledge Charter

Given the increasing reliance on AI, the study stresses the need for a **"precise balance between the technical capabilities of these applications and human efforts"** in knowledge production. It proposes a **"Knowledge Charter"** to govern the relationship between humans and machines in the era of generative AI, recommending the following clauses:

1. **Ethical Responsibility:** Humans must remain primarily responsible for decisions made by AI systems, with clear accountability mechanisms for errors or biases.
2. **Transparency:** AI systems must be explainable, allowing users to understand decision-making processes. Standards should prevent the use of opaque or scientifically unverifiable models.
3. **Data Protection:** Emphasize the importance of protecting data privacy, particularly personal data used for AI training, ensuring anonymity and protection from unethical commercial exploitation.
4. **Integration of Human and AI Knowledge:** AI should not replace human thought but enhance creativity and scientific research through integration in research, education, and innovation.
5. **Combating Bias and Discrimination:** Regular review of AI models to prevent racial, cultural, or social biases. Companies must conduct periodic ethical tests on their smart systems.
6. **Regulation of AI-Generated Content:** Clear controls on the use of generative AI, such as prohibiting its use in spreading fake news or manipulating information. Ownership of AI-generated content must also be regulated.
7. **Human Sovereignty in Decision-Making:** Human sovereignty in decision-making must be maintained, especially in sensitive areas like justice, medicine, and politics, ensuring AI does not make critical decisions without human involvement.

8. **Legislative and Regulatory Frameworks:** Develop clear local and international laws and frameworks to regulate the development and use of generative AI, with supervisory bodies to ensure compliance with ethical and legal standards.