Bridging the Gap between Human and Artificial Perspectives

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ABSTRACT

The coming years, advanced machines are expected to either supplant or augment human abilities across numerous domains. Artificial intelligence (AI) refers to the cognitive capabilities demonstrated by machines or software and constitutes a significant branch of computer science. The field of artificial intelligence has gained considerable traction within computer science, as it has positively influenced various aspects of human life. Over the past twenty years, AI has significantly enhanced the performance of sectors such as manufacturing, services, and education. Research in artificial intelligence has led to the emergence of rapidly evolving technologies, including expert systems. The application of AI is making a substantial impact across diverse fields, as expert systems are increasingly utilized to address complex challenges in areas such as education, engineering, business, medicine, and weather forecasting. Sectors that incorporate artificial intelligence technology have experienced improvements in both quality and efficiency. This paper provides a comprehensive overview of this technology, exploring the scope of artificial intelligence across different domains, with a particular focus on its application in education, including its definition, search methodologies, innovations, and future prospects.

***Keywords**: Artificial Intelligence, Education, Innovations, Future Prospects, Weather Forecasting.*

Introduction

What Is Artificial Intelligence?

The concept of artificial intelligence encompasses any computer system that exhibits traits akin to those of the human brain, such as critical thinking, decision-making capabilities, and enhanced productivity. The core of AI is rooted in human insights that can be articulated in a way that enables machines to perform tasks ranging from the simplest to the most complex.

The synthesized insights stem from cognitive processes, which include research, analysis, logical reasoning, and observation. Various functions, such as robotics, control systems, computer vision, scheduling, and data mining, are encompassed within the domain of artificial intelligence.

What Is Human Intelligence?

The roots of human intelligence and behaviour can be attributed to a distinctive interplay of genetic factors, personal upbringing, and experiences in diverse situations and environments. This development is fundamentally reliant on an individual's capacity to influence their surroundings through the utilization of newly acquired knowledge.

The information available is diverse in nature. It may include insights about individuals with comparable skills or backgrounds, or it could disclose sensitive information that a locator or intelligence operative was assigned to gather. Ultimately, it has the potential to provide valuable insights into interpersonal dynamics and the configuration of interests.

What Constitutes "Real Intelligence"?

At the core of our goal to develop agi systems that emulate human-like intelligence lies the assumption that human (general) intelligence represents the "true" form of intelligence. This notion is subtly reflected in the term "artificial intelligence," which implies that it is not entirely genuine, contrasting it with no artificial (biological) intelligence. As humans, we perceive ourselves as the most intelligent entities observed in the universe. Consequently, we tend to view ourselves as rational beings capable of

addressing a diverse array of complex challenges in various situations, drawing upon our experiences and intuition, along with principles of logic, decision analysis, and statistics. Thus, it is understandable that we struggle to accept the possibility that we may not be as intelligent as we often claim, which could be seen as "the next insult for humanity" (van belkom, 2019).

Recent developments in information technology and artificial intelligence have the potential to enhance the coordination and integration between humans and technology. Consequently, significant focus has been placed on the creation of Human-Aware AI, which is designed to function as a "team member" that aligns with the cognitive strengths and limitations of human collaborators. Metaphors such as "mate," "partner," "alter ego," "Intelligent Collaborator," "buddy," and "mutual understanding" highlight the emphasis on collaboration, similarity, and equality within these "hybrid teams." For human-aware AI partners to effectively operate as "human collaborators," they must possess the ability to perceive, comprehend, and respond to a diverse array of intricate human behavioral traits, including attention, motivation, emotion,

Creativity, planning, and argumentation (e.g., Krämer et al., 2012; van den Bosch and Bronkhorst, 2018; van den Bosch et al., 2019). Thus, these "AI partners" or "team mates" must be equipped with human-like (or humanoid) cognitive capabilities that facilitate mutual understanding and collaboration, often referred to as "human awareness."

Evolution of AI Definition

The concept of artificial intelligence has a historical lineage that extends far beyond common perceptions, encompassing disciplines such as science and philosophy dating back to ancient Greece. However, its contemporary form is significantly influenced by Alan Turing and the Dartmouth College conference in 1956, where the term "Artificial Intelligence" was officially introduced and defined by John McCarthy as "the science and engineering of making intelligent machines." Russell and Norvig (2020) characterized this event as the "birth of artificial intelligence." Initially, AI paradigms focused on high-level cognition, emphasizing the capacity for multi-step reasoning and the comprehension of natural language, rather than merely recognizing concepts, perceiving objects, or executing complex motor skills, which are capabilities shared by many animals.

The differentiation between weak AI and strong AI pertains to the adherence to rules, specifically how machines engage with these rules. This engagement distinguishes rule-based decision-making, where machines strictly follow the guidelines established by developers, from rule-following decision-making, where machines adhere to rules that are not explicitly defined. Rule-based decision-making aligns with weak AI, while rule-following decision-making represents a movement towards strong AI. An illustration of rule-following decision-making is found in neural networks (NN), which enable algorithms to learn autonomously. Strong AI would entail machines creating and adhering to their own rules, a capability that remains unattainable at the current stage of AI development. Since its inception in the 1950s, AI has experienced numerous fluctuations, often characterized as "summers and winters." However, since 2010, AI has re-entered a summer phase, primarily due to significant advancements in computing power and access to vast datasets. This revival in AI research can be attributed to three key breakthroughs: (1) the emergence of a more advanced class of algorithms; (2) the introduction of affordable graphics processors capable of executing extensive calculations in mere milliseconds; and (3) the availability of large, accurately annotated databases that facilitate more sophisticated learning for intelligent systems (Jain et al., 2004; Khashman, 2009; PWC, 2019).

Applications of Artificial Intelligence

- **AI in Astronomy:** Artificial Intelligence proves to be invaluable in addressing intricate challenges within the universe. This technology aids in comprehending various aspects of the cosmos, including its functioning and origins.

- **AI in Healthcare:** Over the past five to ten years, AI has increasingly benefited the healthcare sector and is poised to exert a considerable influence on this field.

- Healthcare providers are leveraging AI to enhance the speed and accuracy of diagnoses compared to human capabilities. AI assists medical professionals in identifying conditions and alerts them when a patient's health deteriorates, ensuring timely medical intervention prior to hospitalization.

- **AI in Gaming:** Artificial Intelligence finds application in the gaming industry, where AI systems can engage in strategic games such as chess, necessitating the evaluation of numerous potential moves.

- **AI in Finance:** The synergy between AI and the finance sector is particularly strong. Financial institutions are integrating automation, chatbots, adaptive intelligence, algorithmic trading, and machine learning into their operational frameworks.

- **AI in Data Security:** Data protection is essential for all organizations, especially as cyber threats escalate in the digital landscape. AI technologies can enhance data security measures. Tools like AEG bot and AI2 Platform are employed to more effectively identify software vulnerabilities and cyber threats.

- **AI in Social Media:** Social media platforms, including Facebook, Twitter, and Snapchat, manage billions of user profiles that require efficient storage and organization. AI facilitates the management of vast datasets and can analyse information to uncover emerging trends, popular hashtags, and user preferences.

- **AI in Travel and Transport:** The travel industry is increasingly adopting AI technologies. AI can perform a variety of tasks related to travel, from arranging itineraries to recommending hotels, flights, and optimal routes for customers. Additionally, travel companies are utilizing AI-driven catboats to provide human-like interactions with clients, ensuring prompt and effective responses.

Conclusion

This systematic literature review offers a comprehensive overview of the current landscape of artificial intelligence (AI) research within information systems (IS). The study identified 98 primary studies from a total of 1,877 AI-related articles published over a fifteen-year span (2005 – 2020) and analysed them based on several criteria: (i) definitions of AI, (ii) annual publication frequency, (iii) publication outlets, (iv) research methodologies and data collection techniques, (v) types of contributions, (vi) categories of AI, and (vii) associated business value. A significant conclusion drawn from this review is the necessity to (i) enhance the volume of rigorous academic investigations into AI, particularly concerning tools and models, (ii) provide more precise definitions of AI in research, even when not the primary focus, and (iii) build upon existing knowledge. The exploration of AI within IS remains largely underdeveloped. Although there exists a considerable body of literature addressing AI, a thorough review of its implications in IS is notably absent. This is particularly evident in the inconsistent definitions of AI within the field. This study contributes to the understanding of AI in IS by developing one of the few systematic literature reviews on the topic and offering a structured analysis of prevailing trends and existing gaps. The findings yield new insights into IS by clarifying AI definitions, mapping activities related to AI, and examining the value associated with AI. We have identified knowledge gaps in the intersection of AI research and IS, which can serve as a foundation for both IS researchers and practitioners to enhance the socio-technical understanding of AI. Consequently, we advocate for future IS research to focus on the definitions of AI as articulated in contemporary studies.

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