The involvement of artificial intelligence in scientific research in the field of social sciences

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Abstract:
Scientific research is considered an educational and research process that aims to understand facts and build scientific knowledge in various fields. Scientific research depends on organizing facts in an accurate and acceptable method and in accordance with generally accepted scientific conditions. There is a modern intellectual revolution called artificial intelligence that invests in many fields, including the field of scientific research. Artificial intelligence is a branch of computer science that relies on the use of computers and programming while simulating human capabilities.

From this standpoint, the importance of this study, which centers on artificial intelligence and its investments in the field of scientific research in the social sciences, is highlighted. Through this study, we aim to clarify the aspects of the relationship between them and demonstrate the extent of the use of artificial intelligence in the field of scientific research in the social sciences.

Keywords: intelligence , artificial intelligence, research ; scientific research, social sciences

Introduction

In the digital age, artificial intelligence (AI) is no longer just a technical tool; it has become a revolutionary force that is transforming various fields, including social sciences. With the massive growth of digital data, it has become increasingly difficult for researchers to analyze information using traditional methods. This is where AI plays a crucial role, offering a paradigm shift in how data is collected, analyzed, and how hidden social patterns—often impossible to detect through conventional means—are uncovered.

Scientific research in social sciences is no longer solely reliant on classical methodologies such as surveys, interviews, and document analysis. Instead, it now incorporates advanced techniques such as machine learning, natural language processing, and big data analytics. These intelligent tools enable researchers to understand societies and human behaviors with greater accuracy by analyzing billions of words from social media platforms, studying user interactions with digital content, and even predicting social and economic changes in real-time based on massive data streams.

AI technologies facilitate sentiment analysis and the assessment of public opinion trends, providing deep insights into social, political, and cultural issues. Moreover, deep learning algorithms help in analyzing collective behavioral patterns, enabling governments and organizations to make well-informed decisions based on precise data. For instance, AI can

predict election outcomes, evaluate the psychological impact of media, and even offer solutions to reduce social and economic disparities.

However, integrating AI into scientific research is not without its challenges and ethical dilemmas. There are concerns about algorithmic bias, as AI models may inherit and reinforce existing social inequalities present in the training data. Privacy is another pressing issue, given that AI often relies on analyzing personal data, which may be sensitive. Additionally, researchers face difficulties in interpreting the decisions made by AI systems, raising questions about their reliability and transparency—issues that lie at the heart of this discussion.

1. Study Concepts: Artificial Intelligence, Scientific Research, Social Sciences

1.1. Artificial Intelligence: Artificial intelligence (AI) is a branch of computer science aimed at creating systems capable of performing tasks that typically require human intelligence, such as perception, reasoning, learning, and decision-making. AI encompasses areas such as developing algorithms and software programs that can analyze data, learn from it, and make predictions or decisions based on that analysis. AI can be classified into various subfields like machine learning, natural language processing, robotics, and computing. Consequently, the significance of AI will be evident in the near future. It can also be said that AI is the simulation of human intelligence processes by systems resembling computer systems. AI is characterized by the ability to "think" and "learn" through analyzing large amounts of data. AI can be used to automate tasks, make predictions, or identify patterns that humans may not be able to detect. AI is applied in a wide range of applications, from virtual personal assistants and chatbots to self-driving cars and medical diagnostic systems. Therefore, the future of AI is promising and holds new horizons. This article will present a study on artificial intelligence. (Artificial Intelligence, 28/11/2023)

From this definition, we understand that artificial intelligence is a set of technologies and systems aimed at giving machines the ability to perform tasks that typically require human intelligence. The primary goal of AI is to create technological systems capable of analyzing data, making decisions, and performing tasks independently**.**

1.2. Scientific Research:

Scientific research is a systematic approach to human behavior aimed at investigating the validity of a particular piece of information, testing a hypothesis, or clarifying a specific situation or phenomenon, with a focus on understanding its causes and the mechanisms for addressing it. Scientific research also aims to find successful solutions to a specific problem or to social behaviors that impact individuals and society.

For example, scientific research in the field of production development might involve testing the effectiveness of new techniques, such as using soil-free agriculture as a new system for vegetable production. The research may also include testing the success of specific varieties or types intended for this kind of agriculture.

Thus, scientific research can be defined as a behavioral system aimed at expanding human perception and enhancing the ability to benefit from available knowledge above and below the surface, with the goal of achieving sustainable civilized living for both individuals and society. Scientific research is considered a conscious procedural behavior involving diverse planning

and implementation processes to achieve the desired results. This behavioral system consists of a set of interacting elements.

1.3. Social Sciences:

Social sciences constitute a comprehensive field for studying social interactions, organizational structures, and dynamics occurring within human societies. This field aims to understand how social and cultural factors influence individual and collective behavior, and how identities and communities are shaped. It relies on various methodologies to study societal changes and transformations, seeking to uncover the interactions between individuals and the social environment to which they belong. This contributes to enhancing our understanding of complex social phenomena and their impact on human life.

2. Scientific Research in Social Sciences:

Social sciences play a vital role in understanding social interactions and building comprehensive insights into the dynamics of society. Scientific research in this field serves as a window into the complex world of human interactions, effectively contributing to the interpretation and analysis of social transformations and understanding the issues that affect the lives of individuals and communities.

The concept of scientific research in social sciences goes beyond merely collecting data and statistics; it encompasses a deep understanding of social phenomena and their interactions. The goal of scientific research in this field is to highlight social challenges, analyze structural changes in society, and examine the interactions between individuals and the social environment they deal with daily.

Social sciences encompass a wide range of disciplines, including sociology, anthropology, political science, psychology, and social economics. Researchers in these fields examine cultural, economic, and political transformations and how they affect interactions between individuals and groups.

The challenges of the modern era require deep thinking on issues such as cultural diversity, identity, social justice, and technology. Researchers in the social sciences analyze these challenges and understand their impact on society, contributing to the formulation of public policies and effective solutions for emerging societal issues.

In turn, research techniques in the social sciences provide powerful tools for data collection and analysis, whether through field studies, surveys, or statistical analysis. This methodological diversity broadens the scope of research and enhances the quality of understanding.

In conclusion, scientific research in the field of social sciences plays a crucial role in developing societies and deepening the understanding of social phenomena. The advancement of research paves the way for improving social life and achieving sustainable progress in various fields.

3. Fields of Artificial Intelligence:

Artificial intelligence is used in many fields such as military, industrial, economic, technological, medical, educational, and other service sectors. Some of its most important applications include the following: (Information, 2021, p. 05)

- Self-driving cars and drones,
- Robots, which are mechanical devices programmed to work independently of human control and designed to perform tasks and achieve the motor and verbal skills that humans carry out, as well as other applications in nuclear reactors, wire installation and repair of underground wiring, mine detection, car manufacturing, and other specialized fields.
- Nonlinear control, such as railway control,
- Smart devices capable of performing mental operations, such as inspecting industrial designs, monitoring processes, and decision-making,
- Cognitive simulation using computers to test theories about how the human mind works And the functions it performs, such as recognizing familiar faces and voices, handwriting recognition, image processing, extracting useful data and information from them, and activating memory.
- Computer applications in medical diagnosis in clinics and hospitals, as well as performing surgical operations. Artificial intelligence programs in analyzing economic data such as the stock market and developing stock trading systems. Gaming programs such as chess and video games. Google's research clusters on the computer via the internet.
- Applications for learning various natural languages and understanding the rules for written and spoken language processing and automatically responding to questions with pre-programmed answers, as well as machine translation systems for languages in real-time.
- Expert systems that can perform tasks in a manner similar to human experts and help them make precise decisions based on a series of logical operations to arrive at the correct decision or a set of logical options. This is one of the most significant areas of artificial intelligence in both the present and future.
- Smart home services, self-operating weapons, phones, televisions, and hundreds of other applications. Artificial intelligence is used in many fields such as military, industrial, economic, technological, medical, educational, and other service sectors. Some of its most important applications include the following: self-driving cars and drones, robots, which are mechanical devices programmed to work independently of human control and are designed to perform tasks and achieve the motor and verbal skills that humans carry out, as well as other applications in nuclear reactors, wire installation and repair of underground wiring, mine detection, car manufacturing, and other specialized fields. Nonlinear control, such as railway control, smart devices capable of performing mental operations like inspecting industrial designs, monitoring processes, and decision-making, cognitive simulation using computers to test theories about how the human mind works, and the functions it performs, such as recognizing familiar faces and voices, handwriting recognition, image processing, extracting useful data and information from them, and activating memory.

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Applications for learning various natural languages and understanding the rules for written and spoken language processing, automatically responding to questions with pre-programmed answers, and real-time machine translation systems for languages.

Expert systems that can perform tasks in a way similar to experts and assist them in making decisions accurately, based on a series of logical operations to reach the correct decision or a set of logical options. This is one of the most important and significant concerns of artificial intelligence today and in the future.

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Artificial intelligence plays an important role in improving and facilitating scientific research through a range of uses. Here are some ways artificial intelligence is used in scientific research:

1. **Big Data Analysis:** AI can analyze massive amounts of data quickly and efficiently, contributing to the discovery of patterns and trends that may not be visible through traditional methods.

2. **Improving Experimental Processes:** AI can be used to enhance the design of scientific experiments and analyze results more accurately, guiding research toward more beneficial directions.

3. **Research Guidance:** AI can analyze previous literature and research to identify future research trends and suggest new topics that respond to current needs.

4. **Assisting in Experiment Design:** AI can help researchers design their scientific experiments by guiding them toward the best methods and significant variables.

5. **Automated Research:** AI can generate hypotheses and research suggestions automatically based on data analysis and previous literature.

6. **Improving Classification and Filtering Processes:** AI techniques can be used to filter and classify information according to specific criteria, contributing to the effective presentation of relevant results.

7. **Machine Learning for Research Guidance:** Machine learning techniques can be applied to identify future research directions based on historical trends and models derived from data.

In summary, artificial intelligence enhances scientific research by accelerating analytical processes, improving accuracy and efficiency, and guiding research toward the most productive paths.

4-Applications of Artificial Intelligence in Higher Education:

"The diagnosis of education in developing countries, with Algeria being one of them, shows that their education systems mainly focus on issuing certificates to graduates without paying attention to the quality of knowledge and skills. Even if they try, the examination systems are designed to ensure that the curriculum aligns with the qualifications. The AI applications implemented to develop the educational process include the following:

- Educational systems that contain artificial intelligence elements, with the task of tracking and monitoring student work, providing guidance, and gathering information about the performance of each student individually.
- Computer-based educational systems with independent databases, which include knowledge bases for educational content and teaching strategies.
- Intelligent learning systems serve as a link between the behavioral style of computer-based learning and the cognitive pattern. These systems are the result of research in the field of artificial intelligence, as they include models for the area to be learned by the expert in that field. Education professionals believe that the system's efficiency, as well as components for students and teachers, should be based on the knowledge acquired rather than what was taught." (Baden, 2021, p. 160/159)

Thus, AI applications in higher education include educational systems and programs, as well as computer-based systems.

5_ Applications of Artificial Intelligence in Scientific Research in Social Sciences:

"In order to approach artificial intelligence from this perspective, we first need to understand what the fundamental basics of social society are. Defining this social model represents a challenge, given the flexibility of the term in the contemporary world. Depending on where it is used, it can represent a variety of meanings. Levinson highlighted how the social ontology has not yet integrated the works of fields such as anthropology, linguistics, psychology, and cognitive science to formulate a comprehensive definition of human society. Therefore, we will begin from the structural perspective of society and take two major sociologists and their views on the 'social.'

Karl Marx's idea of the social was closely linked to a critical social approach, where society, by nature, was tied to cooperation and connection between humans, but it was also fundamentally linked to the material domain, especially the economic domain. Society is seen as something inherent in humans, something reinforced through the process of socialization and their social reality. Thus, 'sociality' is an essential feature of human life, given to them at birth and developed throughout their lives. On the other hand, Max Weber defined 'sociality' as being linked to 'the structure of social fields existing outside individuals.' He expanded on Marx's previous deterministic economic model and introduced a structure where a wide range of social fields influences an individual's social life. In this sense, 'sociality' is created from inherent connection, cooperation, and the influence of humans on each other. It is shaped by the structures around them.

Although this definitional task of society within sociology could be greatly expanded with more influential thinkers, it highlights a crucial point. Integrating such theories into defining what it means to be social, especially in the case of artificial intelligence, is extremely difficult. Its inherent focus on structural elements limits its ability to be applied in contemporary frameworks for a more individual-centered AI approach. However, it can help us understand hybrid social structures once artificial intelligence is increasingly integrated into human society." (Hasib, 2021, p. 334/335)

For artificial intelligence to succeed in its tasks, it must operate within social environments and entities, as they are designed for human "social" purposes by nature. Other examples will

explore relationship structures that display cooperative actions in the field of multi-agent systems, showing such practices between individual artificial intelligences. At its core, social interaction and relationship between intelligent agents (or more) can be framed within larger structures where similar factors emerge." (Hasib, 2021, p. 335)

Thus, we summarize the overlap and relationship between artificial intelligence and scientific research in sociology in the following points:

- Social research helps in formulating guidelines for the development of artificial intelligence to ensure a safe social environment.
- "Artificial intelligence research has utilized some social theories to interpret research issues, while sociology has not yet incorporated AI into its methodological tools or the development of its theories."
- Sociology must develop its concepts, tools, and theories to align with the Fourth Industrial Revolution and artificial intelligence technologies, rather than remaining confined to its traditional domain.
- Sociology research has focused on local issues, neglecting global research issues that also have local implications and reflections.
- Sociology must break free from its traditional research bias that has persisted for decades and renew its research projects to align with the global situation and the developmental trends of the country.
- Furthermore, in what is called the coexistence between the two disciplines in this paper, it is essential to understand that this is not a one-way street. AI research can benefit equally from social inputs, and vice versa. With more cooperation, studies, and interdisciplinary approaches, theories can not only be redefined but also expanded through new theories and complementary knowledge, which will benefit the entire research community.
- Innovation in academic content, from the undergraduate stage to the curriculum offered at the preparatory stage for master's students, should align with Egypt's 2030 development agenda." (Hasib, 2021, p. 367)

Social research contributes to the development of artificial intelligence guidelines to ensure a safe social environment, where AI can benefit from social theories to understand research issues. Meanwhile, sociology needs to integrate AI techniques into its tools and methodologies to keep pace with the Fourth Industrial Revolution. Sociology should also expand its research areas to include global issues with local impacts, updating its methods and approaches in line with developmental trends. The collaboration between sociology and AI is a two-way street, where each can enrich the other through interdisciplinary studies, leading to the development of new theories and integrative knowledge that benefits both scientific research and society. Furthermore, continuous development requires updating academic content from the undergraduate stage to graduate-level curricula, in alignment with Egypt's 2030 sustainable development agenda.

Conclusion:

Artificial intelligence (AI) is one of the branches of computer science that provides accurate information in various fields. The use of AI in scientific research is one of the hallmarks of the

current information revolution, particularly in social sciences. AI plays a crucial role in analyzing relationships between studied variables, providing statistics on topics, and making predictions to understand human behavior and societal dynamics.

From this research paper, we conclude the following:

- AI contributes to the analysis of large-scale social data.
- AI helps in understanding patterns and trends in human societies.
- AI improves the quality of research in social sciences.
- AI reduces the time and effort for social researchers.
- AI aids in predicting future social life based on the analysis of current social studies.

Recommendations:

- It is essential to enhance collaboration between AI experts, sociologists, and researchers to optimize the use of AI in social sciences.
- The development of analytical tools in AI should be tailored to the needs of research in social sciences.
- Training courses should be offered to improve the capacity to effectively use AI applications.
- Efforts should be made to encourage research and scientific events focused on artificial intelligence.

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