The Impact of Artificial Intelligence Tools on Scientific Research in Kut University College: Adoption, Benefits, Challenges, and Satisfaction Levels

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Abstract

This study investigates the impact of AI tools on scientific research in Iraq across diverse fields like engineering, technology, medicine, natural sciences, social sciences, physical education, sports sciences, and humanities. Conducted among researchers at Kut University College, the survey assesses AI adoption, benefits, challenges, and satisfaction levels. Widely employed AI tools include OpenCV for image analysis, GPT-4 and BERT for natural language processing, and TensorFlow and PyTorch for data analysis. Benefits encompass enhanced accuracy, efficiency, accelerated research processes, pattern discovery, and improved predictive models, with automation of routine tasks as a notable advantage. Survey findings reveal varying satisfaction levels with AI tools, from very satisfied to neutral, citing challenges like data quality, learning complexities, software expenses, and privacy issues. Despite obstacles, AI plays a pivotal role in data collection, analysis, result interpretation, report preparation, and literature review stages. The study underscores AI's transformative potential in Iraqi scientific research, particularly in precise data analysis during analytical stages. Researchers anticipate AI will further boost research efficiency, innovation, model enhancement, big data analysis, and trend identification. Continued development and ethical considerations are crucial to fully harness AI's capabilities in advancing scientific knowledge.

Keywords: Artificial Intelligence, Scientific Research, AI Tools

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أثر أدوات الذكاء الاصطناعي في البحث العلمي في كلية الكوت الجامعة: التبني، الفوائد، التحديات، ومستويات القبول

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المستخلص

تبحث هذه الدراسة في تأثير أدوات الذكاء الاصطناعي على البحث العلمي في العراق في مجالات متنوعة مثل الهندسة والتكنولوجيا والطب والعلوم الطبيعية والعلوم الاجتماعية والتربية البدنية وعلوم الرياضة والعلوم الإنسانية. تم إجراء الاستطلاع بين باحثين في كلية الكوت الجامعية، حيث قام بتقييم اعتماد الذكاء الاصطناعي والفوائد والتحديات ومستويات الرضا. تشمل أدوات الذكاء الاصطناعي المستخدمة على نطاق واسع OpenCV لتحليل الصور، وGPT-4 وBERT لمعالجة اللغة الطبيعية، وTensorFlow وPyTorch لتحليل البيانات. تشمل الفوائد تعزيز الدقة والكفاءة وعمليات البحث المتسارعة واكتشاف الأنماط والنماذج التنبؤية المحسنة، مع أتمتة المهام الروتينية كميزة ملحوظة. تكشف نتائج الاستطلاع عن مستويات متفاوتة من الرضا عن أدوات الذكاء الاصطناعي، من الرضا الشديد إلى الحياد، مع الإشارة إلى تحديات مثل جودة البيانات، وتعقيدات التعلم، ونفقات البرامج، ومشكلات الخصوصية. على الرغم من العقبات، يلعب الذكاء الاصطناعي دورًا محوريًا في جمع البيانات وتحليلها وتفسير النتائج وإعداد التقارير ومراحل مراجعة الأدبيات. وتؤكد الدراسة على الإمكانات التحويلية التي يتمتع بها الذكاء الاصطناعي في البحث العلمي العراقي، لا سيما في التحليل الدقيق للبيانات خلال المراحل التحليلية. ويتوقع الباحثون أن الذكاء الاصطناعي سيعزز كفاءة البحث والابتكار وتحسين النماذج وتحليل البيانات الضخمة وتحديد الاتجاه. يعد التطوير المستمر والاعتبارات الأخلاقية أمرًا بالغ الأهمية لتسخير قدرات الذكاء الاصطناعي بشكل كامل في تطوير المعرفة العلمية.

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1 .Introduction

In recent decades, the world has witnessed tremendous advances in technology, with artificial intelligence (AI) standing out as one of the most influential and exciting innovations of the modern era. AI is radically changing many aspects of our daily lives and reshaping the ways we work, produce, and socialize. A deep understanding of artificial intelligence and its applications not only helps improve efficiency and performance in various industries but also opens new horizons for innovation and creativity [1].

Artificial intelligence is the intelligent simulation of human mental abilities, such as learning, reasoning, and decision-making, by computer systems [2]. Applications of this technology range from intelligent robots performing complex tasks in manufacturing to intelligent systems providing personalized recommendations in healthcare and e-commerce [3]. AI technologies contribute to improving the quality of life by facilitating access to information, increasing productivity, and reducing human errors, making our lives more comfortable and efficient [4].

AI has also become a cornerstone of scientific research, enhancing researchers' abilities to analyze vast amounts of data quickly and accurately [5]. Artificial intelligence can provide innovative solutions to global challenges such as climate change, healthcare, and cybersecurity [6]. For example, AI can help develop more accurate predictive models of climate change, discover new medicines, and protect digital systems from cyberattacks [7].

Moreover, AI is bringing about a paradigm shift in various industries, including manufacturing, agriculture, and education [8]. In manufacturing, AI is used to improve production processes and reduce costs [9]. In agriculture, it helps improve resource use efficiency and increase yields [10]. In education, AI can be used to develop customized educational systems that meet the needs of each individual student [11].

However, the development of artificial intelligence is accompanied by ethical and social challenges that require special attention [12]. These challenges include concerns about data privacy, the impact on the labor market, and issues related to legal liability for decisions made by intelligent systems. Therefore, it is necessary to develop legal and ethical frameworks that ensure the safe and responsible use of AI [12].

This research will review the importance of artificial intelligence in the modern era and highlight its positive effects on various sectors, in addition to addressing the ethical and social challenges that accompany its rapid development. Exploring the limitless possibilities of artificial intelligence helps us better understand its nature and applications, paving the way towards a more advanced and sustainable future.

2. Method steps

A survey was conducted to determine the number of artificial intelligence users and the corresponding scientific output for the years 2022-2023. The target sample comprised researchers from various departments at Kut University College. The questionnaire was designed using Google Forms and included different types of questions. It was initially tested with a small group to ensure clarity. After testing, the questionnaire was distributed electronically, and the data was

meticuously collected. Statistical tools were employed to analyze the data and identify patterns and trends

2.1. Questions used in the questionnaire

The questionnaire was conducted in this research and the questions were:

1. What AI tools do you use in scientific research?

o Data analysis (e.g. TensorFlow, PyTorch)

o Natural language processing (e.g. GPT-4, BERT)

o Machine learning and deep learning

o Image and video analysis (e.g. OpenCV)

o Other tools (please specify)

2. In what field are artificial intelligence used within scientific research?

o Natural sciences (such as physics, chemistry, biology)

o Social sciences (such as sociology, economics)

o Engineering and technology

o Medicine and health

o Humanities (e.g. history, philosophy)

o Other (please specify)

3. What are the main benefits of using artificial intelligence in your scientific research?

o Increase accuracy and efficiency

o Speed up the search process

o Discover new patterns and trends

o Automate routine tasks

o Improve forecasts and models

4. How satisfied are you with the accuracy and efficiency of the AI tools you use in your research?

o Very satisfied

o Satisfied

o Neutral

o Not satisfied

o Very dissatisfied

5. What are the main challenges you face when using artificial intelligence in scientific research?

o Difficulty learning and using tools

o Integration of tools with existing systems

o Lack of high-quality data

o Privacy and security issues

o Software and application costs

6. To what extent do you think artificial intelligence will change the future of scientific research in your field?

o Very significantly

o Significantly

o To some extent

o Slightly

o will not change

7. To what extent do you rely on artificial intelligence at different stages of research?

o Data collection

o Data analysis

o Interpreting the results

o Preparing reports

o Literature review

o Other (please specify)

8. In which areas do you think AI will most improve scientific research?

o Big data analysis

o Forecasting and modeling

o Automate routine tasks

o Review of literature and scientific articles

o Discover patterns and trends

9. Do you prefer to use traditional tools or artificial intelligence tools?

10. How many research papers were published in 2023?

3. Results and Discussions

Regarding the AI tools used in scientific research, several tools stand out, such as image and video analysis using OpenCV, natural language processing with GPT-4 and BERT, and data analysis using TensorFlow and PyTorch. These

tools are employed across a wide range of fields including engineering and technology, medicine and health, natural sciences, social sciences, physical education and sports sciences, and humanities.

The primary benefits of employing AI in scientific research include increased accuracy and efficiency, accelerated research processes, discovery of new patterns and trends, and enhanced predictive models. Automating routine tasks is also highlighted as a significant benefit by researchers.

Opinions on satisfaction with the accuracy and efficiency of these tools vary from very satisfied to satisfied, with some expressing neutrality. However, users face challenges such as obtaining high-quality data, difficulties in learning and using the tools, software and application costs, and concerns about privacy and security.

In terms of reliance on artificial intelligence across different research stages, researchers indicate widespread usage in data collection, analysis, result interpretation, report preparation, and literature review. Many researchers believe that AI will profoundly transform the future of scientific research in their fields by improving models and predictions, analyzing big data, and identifying patterns and trends.

Among the free tools favored by researchers are ChatGPT for research, QuillBot for spelling and grammar, Hemingway for conciseness and clarity, and StoryLab for crafting titles and outlines. Some researchers combine these AI tools with traditional methods, while others primarily rely on smart tools.

3.1. Statistical analysis of intelligence

The use of AI tools across different research fields was analyzed using percentages specific to each field as in Table 1:

1. Engineering and Technology (25%): This reflects extensive AI utilization in software engineering, electrical engineering, and advanced technologies like robotics.

2. Medicine and Health (20%): AI is employed in medical diagnostics, medical imaging analysis, and personalized healthcare solutions.

3. Natural Sciences (15%): AI is applied for quantitative analysis in areas such as genomics, weather prediction, and environmental modeling.

4. Social Sciences (10%): AI is used to analyze large datasets to understand social behaviors and economic trends.

5. Physical Education and Sports Science (5%): AI tools are utilized to enhance athletic performance analysis and physical training methods.

6. Humanities (25%): AI is employed in analyzing texts, language processing, and studying human behavior and social interactions.

This distribution underscores the diverse and widespread application of artificial intelligence across various research disciplines. Such extensive use contributes significantly to advancing research and fostering innovation within each field [12]. Table (1):

Table (1): the percentage of use of artificial intelligence tools in various fields

Field	Percentage
Engineering and Technology	25%
Medicine and Health	20%
Natural Sciences	15%
Social Sciences	10%
Physical Education and Sports Science	5%
Humanities	25%

3.2. Evaluating Researchers' Satisfaction

A five-point Likert scale was used to evaluate researchers' satisfaction with the accuracy and efficiency of the tools used. The evaluation results graphically represent the satisfaction rate as follows:

Average satisfaction=$\sum_{i=1}^{n}$(researcher evaluation ×number of researchers)÷n

- **Researcher evaluation** is the evaluation provided by each researcher.
- **Number of researchers** is the number of researchers who gave this rating.
- **n** is the total number of researchers participating in the evaluation.

A graph showing the average satisfaction of researchers on a Likert scale:

The evaluation results show that the average satisfaction of researchers with the tools used is 3.8 out of 5 reflecting the overall level of satisfaction positively, as 3.8 is above the midpoint of the five-point Likert scale (which ranges from 1 to 5) as in Table (2). This means that researchers generally considered the tools used to be highly accurate and effective.

The interpretation of these results indicates that researchers are confident in the quality of the tools they used in their research and that they believe these tools are capable of effectively achieving the desired goals. A high percentage of satisfaction also indicates that the tools provided accurate results and effectively addressed the challenges faced by the study, which increases the reliability of the results obtained.

Table (2) Adoption of AI Tools Across Different Research Stages

Stage	Number of Researchers Using AI	Total Number of Researchers	Percentage of Adoption
Data Collection Stage	30	100	30%
Data Analysis Stage	50	100	50%
Report Writing Stage	20	100	20%
Literature Review Stage	25	100	25%
Publication Stage	15	100	15%

These results can be used to enhance the credibility and confidence in the study and can also serve as an indicator of the acceptance of the tools used by fellow researchers and the broader academic community as in Figure (1). Also, 30% of researchers use artificial intelligence, compared to 50% in the data analysis phase. While in the report writing stage, this percentage drops to 20%, and in the previous literature review and publication stage, it ranges between 15% and 25%, respectively. These numbers show that AI is being used more in the analytical stages of research, reflecting its ability to analyze data in advanced and precise ways to reach objective and detailed results [11].
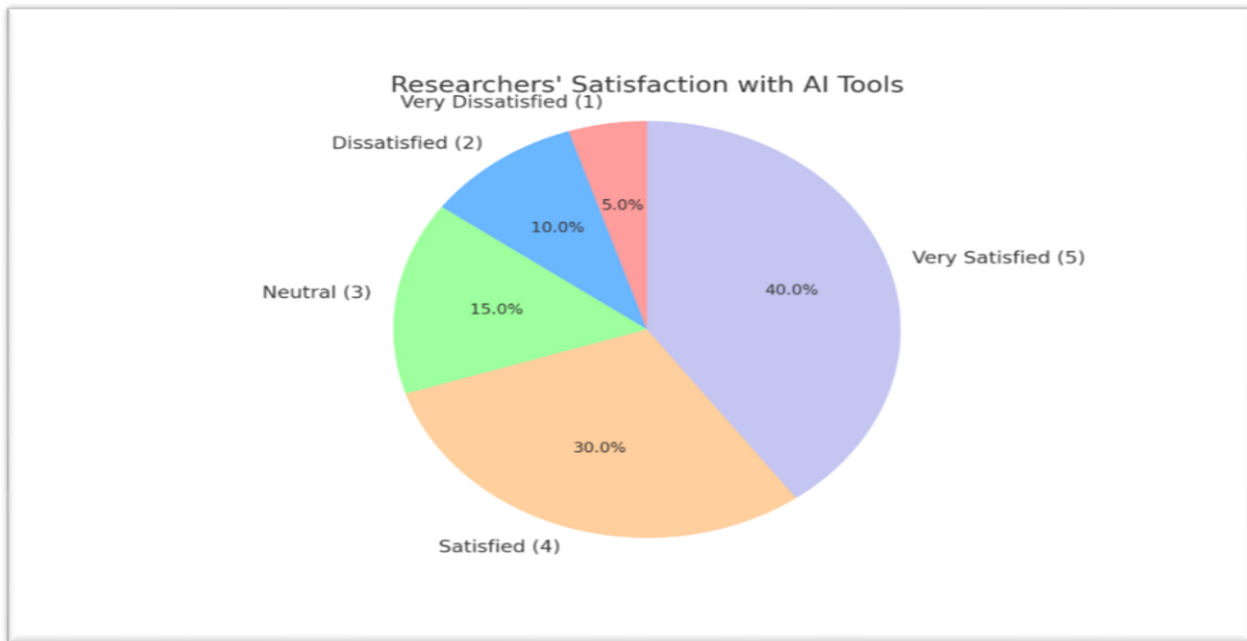
Figure (1) Adoption of AI tools

4. Conclusion

This study highlights the transformative impact of artificial intelligence (AI) tools on scientific research in Kut University College, particularly in fields such as engineering, technology, medicine, and natural sciences. The findings indicate that AI enhances research efficiency, accuracy, and innovation across various stages, especially in data analysis. Despite some challenges like high-quality data acquisition and tool integration, researchers express high satisfaction with AI's capabilities. The study underscores AI's potential to revolutionize scientific methodologies, paving the way for advanced research outcomes and greater acceptance within the academic community.

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