



Artificial Intelligence in Academic Research: Exploring Potential and Ethical Considerations in Algerian Universities

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Received: 06/11/2024

Accepted: 02/04/2025

Abstract:

This study explores the integration of Artificial Intelligence (AI) in Algerian academic research, exploring how Algerian researchers employ artificial intelligence in their academic work and examining the instances where they should be careful in their AI integration to ensure adherence to research principles. AI's potential to revolutionize research methods and perspectives across disciplines motivates this investigation. The study utilizes a qualitative research design, interviewing thirty PhD scholars from various Algerian institutions. Data analysis reveals a shared understanding among participants regarding AI's significant contributions to research tasks. However, the participants also highlight the importance of vigilance and carefulness in AI integration to uphold research principles and ethics. The study recommends familiarizing Algerian researchers with AI integration regulations and promoting training initiatives that equip researchers with the skills for responsible and effective AI utilization in their academic pursuits.

Keywords: academic research, AI technologies, AI usefulness, cautious use, concerns.

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I. INTRODUCTION

Artificial intelligence (AI) has significantly changed the ever-evolving field of academic study, permanently shifting the academic landscape. Its ability to assist researchers with a wide range of research tasks has made it an indispensable collaborator for researchers in a variety of fields (Burger et al., 2023). Even though it is still in its early stages, AI has the potential to change how academics conduct research, especially for no-code applications (Calo, 2017). However, as AI becomes an increasingly important tool in academia, it also opens up a rich discussion about ethical considerations, concerns, and responsible use. The use of AI in the academic research journey particularly where researchers are allowed to use it and where they are not allowed to do so is still largely unexplored and clarified, the Algerian context is no exception. This study therefore aims to investigate the research tasks that Algerian doctoral researchers employ artificial intelligence in their research process. Additionally, it explores instances where such use should be avoided. This study then seeks to answer this question:

In what research tasks do Algerian doctoral researchers use AI technologies? And to what extent are they granted unrestricted autonomy in using AI?

By conducting this research, the findings contribute to highlighting the transformative potential of AI while addressing ethical issues, promoting responsible AI integration, and influencing future scholarly research in a variety of fields as well as adding to the existing body of research on the multifaceted relation between AI and academic research.

1. Literature Review

This section is devoted to giving the theoretical framework of the research. It gives information about the AI, its history, its key technologies, and its significant tools used by researchers. Additionally, it offers details about AI application in academic research.

1.1. Definition of Artificial Intelligence

To gain a deeper understanding of AI, it is helpful to examine its scientific definitions as articulated by experts in the field. The Cambridge Handbook of Artificial Intelligence by Frankish & Ramsey (2014) defines AI as an interdisciplinary methodology that aims to understand, simulate, and produce a variety of manifestations of intelligence. AI plays a crucial role in the cognitive science and is increasingly having an impact in various domains. The impact of AI is changing how people interact with one another and their environment (Frankish & Ramsay, 2014). From this definition, it can be observed clearly that AI is an interdisciplinary approach to developing a variety of intelligence modalities. As a result, AI represents a technology that integrates knowledge from several fields, including engineering and neuroscience. The diverse fields in which AI operates produce applications that are practically incorporated into people's daily lives, changing the dynamics of how people interact with both their immediate surroundings and one another. By virtue of its primary intelligence, as indicated by the provided definition, AI belongs to the broad field of cognitive science and has given rise to separate branches within it. It can be also deduced that research into AI will undoubtedly reveal the various forms that intelligence can take and will illuminate the intricacies of the human psyche.

Another definition is provided by Encyclopedia Britannica stating "...artificial intelligence is the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings". Moreover, from the perspective of the Meriam-Webster Dictionary, AI is "1. A branch of computer science dealing with the simulation of intelligent behaviour in computers. 2. The capability of a machine to imitate human behaviour". The aforementioned definitions, which provided by Encyclopedia Britannica and Meriam-Webster Dictionary respectively underscored the methods and modalities through AI is actualized, denoting either a computer or a robot as the primary apparatus. In the first case, the Encyclopedia Britannica described tasks involving AI as being associated with intelligent entities, implicitly including not just humans. Meriam-Webster Dictionary emphasized the mimetic quality that AI aspires to adopt in order to achieve intelligence by using human behaviour as a foundation. Together, these points of view portray machine intelligence that is essentially an imitation, a replication, or a simple correlation with the characteristics of human intelligence (or behaviour).

To put it simple, AI constitutes a multidisciplinary realm of scientific inquiry focused on developing intelligence that is similar to human cognition in various machine types, including robots, computers, and other non-biological devices. The overarching objective is to engineer systems and applications that hold utility for humans. Healey (2020) contended “artificial intelligence is a broad term used to describe a collection of technologies that can solve problems and perform tasks to achieve defined objectives without explicit human guidance” (p.3).

1.2. A Brief History of AI

1.2.1. The Past

The idea of creating machines with cognition was first presented in a scholarly article written by Alan Turing, who is widely regarded as a pioneer in modern computer science, in 1950 (Turing, 2006). This was the first steps into the world of AI. Nevertheless, the term ‘artificial intelligence’ was not coined until 1956, during the Dartmouth Conference, with John McCarthy being the originator (Xu et al., 2021). Since inception, AI has seen both notable advancements and significant setbacks, which added to its contentious status as a research field. For many years, these vicissitudes frequently obscured its progress, in large parts because of the formidable obstacles it encountered in achieving its envisioned goal, giving machine intelligence life (Xu et al., 2021).

Researchers showed enthusiasm, especially during the early stages, for projects that seemed to be progressing and holding promise for immediate real world application. However, due to the unbeatable technological limitations for that time, these endeavours were ultimately abandoned (Xu et al., 2021). After two decades of research, AI came under heavy criticism from nearly the entire scientific community in the middle of the 1970s. The expected results promised by researchers working on various AI projects did not happen, prompting scepticism. Therefore, financial support began to dwindle, which caused an increase in the number of researchers and investors to lose faith in the feasibility of developing an artificial entity endowed with some sort of intelligence (Boström, 2014).

This unfavourable outlook and general pessimism were significantly influenced by the lack of computational power required to handle extremely complex computations (Xu et al., 2021). This constraint made it difficult for researchers to apply their theoretical ideas to make advancements in this emerging field. Due to lack a lack of computational power, tasks requiring large datasets and complex algorithms could not be completed because of insufficient memory and processing speed. A secondary contributing factor was the lack of what is commonly referred to as ‘Big Data’, which is acknowledged as being essential to the concept known as Machine Learning (ML). Information or data, like human intelligence, is an undeniable prerequisite for endowing intelligence upon an entity, in this case, a machine. Xu et al., (2021) contended that the artificial neural network training required to give machinery intelligence is hampered by the lack of input data. Thus, until 1993, interest in researching and funding AI all but died down as a result of these underlying factors and this period was called as ‘the AI Winter’ (Frankish & Ramsay, 2014).

1.2.2. The Present

After fifty years that were characterized by constant failures and setbacks, AI started a new chapter in the 1990s. Significant improvement in computer processing speed and memory, along with the vast amounts of data collected during that era and made possible by the internet, revived the same upbeat optimism reminiscent of the 1960s. The advancement of AI during this time was remarkable, showing a resurgence. This upsurge, which is characterized by an exponential growth that consistently break previous records and completes feats that were once thought to be unattainable, appears to be unstoppable (Bringsjord et al., 2017).

It is worthy to mention that Geoffery Hinton and his team achieved a pivotal moment in AI in 2006 by introducing the idea of deeper neural networks and overcoming a significant training problem (Xu et al., 2021). This renewed the focus on AI research and prompted the rise of Deep Learning (DL) algorithms (Xu et al., 2021). DL is a subset of Machine Learning (ML), which, in turn, is a component of AI. ML empowers computers to learn and become intelligent without

direct human interventions encapsulating the essence of this era: learning. Currently, DL algorithms are outperforming humans in specialized fields like natural language processing and computer vision. AI achievements support both scholarly research and real world applications in a variety of domains.

1.3. Key Technologies

A wide range of approaches, strategies, and instruments are incorporated into AI technologies to simulate human intelligence and behaviour in machines. Computers and systems can now perform tasks that would typically require human intelligence thanks to these technologies:

- a. Natural Language Processing (NLP) is a domain that blends artificial intelligence and linguistics with its primary focus being the automated handling of human language. Although speech processing is frequently regarded as a separated subfield, its scope includes tasks related to both spoken and written language. NLP can be viewed as the practical application of computational linguistics (Meurers, 2012).
- b. Machine Learning (ML) constitutes a branch of AI, specializing in systems that learn from experience. Khan (2004) emphasized the critical role that machine learning plays in addressing a wide range of problems in fields like visual perception, speech recognition, and robotics.
- c. Deep Learning (DL) is a specialized domain within the realm of AI that harnesses the power of AI neural networks, which are computational systems designed to emulate the intricate neural networks found in the human brain (Schmidt & Strasser, 2022). According to Schmidhuber (2015), DL thrives on the ability to draw conclusions from sizable and comprehensive datasets. While DL primarily focuses on visual perception tasks like identifying different types of images, it also proves its utility in the realm of NLP (Schmidt & Strasser, 2022).
- d. Computer Vision: computer vision technologies allow machines to analyse and comprehend visual data from the outside world, such as pictures and videos. It is utilized in autonomous vehicles, object detection, and facial recognition (Schmidt & Strasser, 2022).

1.4. AI and Academic Research

1.4.1. Reasons of Adding AI to the Research Process

There are compelling reasons to contemplate the integration of AI into research endeavours. One of its most evident advantages is AI ability to handle the burdens of monotonous tasks and routine responsibilities.

The use of AI in the research workflow results in numerous positive contributions. One of the most important of these is the considerable decrease in human error. Burger et al. (2023) highlighted that, in contrast to humans, artificial intelligence (AI) is immune to data skimming caused by fatigue or other distractions, guaranteeing consistent and repeatable outcomes when provided with comprehensive and precise input. Another significant advantage is that AI can produce outcomes that are consistently reproducible, just like most computer systems can (Burger et al., 2023). AI consistently generates the same outcomes when given the correct settings, input, and historical data. This consistency is especially valuable because it eliminates the possibility of human variability in research interpretation. Furthermore, AI can also act as an extra set of discerning eyes, bringing a level of precision to the research process without requiring more time, money, or resources (Burger et al., 2023).

1.4.2. Application of AI in Academic Research

Researchers claim that the most obvious uses of AI may be found in a wide range of contexts. AI can identify underlying themes and patterns in interview data classification that human researchers often miss (Cui & Zhang, 2021). AI-powered computer vision technologies are very good at breaking down different kinds of images, such as sophisticated microscope pictures, and exposing minute details and valuable information (Davenport & Kalakota, 2019). Furthermore, AI's analytical prowess is seen in pattern recognition, where it scans massive datasets, such as medical records, to uncover hidden patterns and useful data (Kong et al., 2020). Additionally, data input and annotation activities can be automated by AI-driven systems, freeing up academics to concentrate on other important projects. It is important to note that AI expedites the process of analysis and synthesis for researchers in systematic literature reviews by rapidly locating relevant research papers and articles (Burger et al., 2023).

1.5. AI Tools in Employed by Researchers in their Academic Research

Kakarash (2023) listed the following as the most beneficial free artificial intelligence technologies that researchers can utilize at any point in their study process:

1.5.1. Search Engine

Search Smart is a search engine designed to help researchers find the best database for their investigations. Consensus offers responses to researchers' queries with citations from reliable and authenticated published sources, unlike ChatGpt, which might provide spurious references.

1.5.2. For Taking Notes

Lateral is an excellent tool for quickly finding common themes among numerous research papers. Glasp captures and annotates researchers' findings from research papers, then effortlessly collaborates and exchanges insights with individuals who share their interests on a global scale. Audiopen transforms researchers' spoken notes into well-structured and coherent written text.

1.5.3. For Writing

SciSpace is one of the most potent and effective tools for reading academic journal articles. Researchers have the option to ask their reading co-pilot to elucidate challenging passages. ChatPDF is used for research papers. It permits researchers to upload their papers and ask it questions for clarification. Casper, a chrome browser extension, condenses research papers while also aiding in brainstorming ideas. Grammarly assesses English texts for clarity, spelling, grammar, and punctuation. It suggests alternative solutions for the identified errors. Users also have the freedom to modify their writing's tone, style, and language according to the situation. Quillbot and Paperpal are sophisticated AI-driven paraphrasing and summarizing tools that assist countless students and professionals in significantly reducing and reformulating their writing time. It can efficiently rewrite sentences or paragraphs, cutting down on the time needed for such tasks. Turnitin is an online plagiarism detection service offered by Turnitin, LLC, which is a subsidiary of Advance Publication, an American company.

1.6. Ethical Considerations and Biases Associated with AI Utilization

The use of AI technologies in academic research raises a number of ethical considerations and the possibility of inherent biases that warrant meticulous scrutiny. Alshater (2022) stated few of them, which are:

Algorithmic bias: This represents a critical concern when it comes to AI technologies. These systems are trained on large datasets, and it is possible that these datasets contain biases or inaccuracies that could be seen in the results of the model (Alshater, 2022). For example, ChatGpt, an AI technology, may generate biased material or perpetuate pre-existing stereotypes if it is predominantly trained on data from a demographic within a particular cultural context. Therefore, it is necessary to thoroughly assess any potential biases in the data and take appropriate remedial action in order to maintain the fairness and objectivity of the model.

Data privacy security: According to Alshater (2022), integrating AI technology into academic research typically involves gathering and modifying personal user data, which presents significant privacy and security issues. To protect people's privacy rights and prevent illegal access or potential misuse of their data, clear guidelines must be established.

Accuracy and reliability: AI technologies are powerful, yet they are not perfect; sometimes they produce incorrect or erroneous results. As a result, it is crucial to carefully evaluate their dependability and accuracy while accounting for any biases or constraints that might have an impact on their conclusions.

Ethical guidelines: Ensuring that the use of AI technologies in academic research conforms to proper ethical standards and guidelines is crucial, as is making sure that its application follows these well-established principles (Alshater, 2022).

II. Methods and Materials:

This section elucidates the methodology utilized by the researchers to obtain the research findings. It provides details on the participants, data collection tool, data analysis process, the findings and discussion.

This study adopts a qualitative approach basing on an online structured interview. Data were analysed qualitatively.

1. The Participants

The participants of the research are thirty doctoral researchers with diverse specializations, including fields such as French, Social Sciences, Humanities, English, and Arabic Literature in different Algerian universities. The study took place during the academic year 2023/2024. Fifteen participants were male and fifteen of them were female doctoral researchers. Participants have ensured their use of AI technologies in their academic research journey.

2. Data Gathering Tool

A structured interview (Appendix I) was employed to elicit the study's data. It encompasses six questions that concentrates on the two main elements: the research tasks in which doctoral researchers use AI tools and situations in which they have to be cautious in their use of AI. All the questions posed necessitated extensive and clear responses, as they were formatted as WH-questions to elicit thorough insights. The interviews with participants were conducted through online means, spanning a duration of ten days. Subsequently, the responses offered by participants were recorded, followed by a qualitative descriptive and analytical analysis.

III. Results and discussion :

In response to the questions regarding the research tasks of using AI technologies in their academic research, the participants were unanimous on several points.

They asserted that AI technologies are very significant in helping them to navigate knowledge and clarify different complex concepts of their research areas as well as answering questions, providing comprehensive answers in fraction of seconds. Participants also referred to

the fact that using AI technologies in research has the potential to liberate time, permitting researchers to simultaneously engage in primary research while also dedicating time to other tasks.

The participants underscored the utility of AI tools in reviewing the existing literature. They stated that doing a literature review is considered a critical component and a keystone that enables researchers to synthesize existing knowledge, identify knowledge gaps, and situate their work within the larger context of their domains. Nevertheless, with so many academic articles and research papers being published in so many different fields, this task has grown more difficult and time-consuming. This is where AI transforms the way researchers interact with the body of existing literature by acting as a game-changer. They highlighted that with AI-powered automated literature review tools that ingest and analyse a sizable corpus of textual data, a synthetic overview of the literature that demonstrate core findings, debates, and spotting recurrent themes in a summarized content will be produced. Hence, speeding up the research process.

Moreover, most of the participants stressed the privilege of using AI technologies as tools for translating languages of published academic works. They declared that in the global spheres of scholarly research, removing language barriers is crucial for promoting collaboration, gaining access to different viewpoints and broadening the boundaries of knowledge. However, the diversity of languages in which research is published poses a significant problem, frequently preventing researchers from engaging with literature beyond their linguistic proficiency. The field of language translation provides an example of how AI technologies might act as catalysts for revolutionary change. Its capacity to translate text smoothly and accurately opens up new directions for cross-cultural study. This usefulness was demonstrated by a participant, specializing in social sciences, who highlighted how academic literature on family dynamics can be easily compared by researchers examining cultural norms in various nations, even when it is published in languages other than English. Researchers can expeditiously translate pertinent papers into their choice language with the aid of AI-powered translation tools, facilitating an extensive comparative examination.

Additionally, participants expressed optimism concerning the use of AI technologies in research, especially in the area of image and video analysis. They emphasized how visual data, such as historical photos, artwork, and multimedia, has the enormous potential to offer insightful information about societies, cultures, and historical eras. They highlighted the significance of artificial intelligence in bridging the gap in visual data interpretation, acknowledging the intricacies involved that frequently call for specialized knowledge and a sophisticated awareness of cultural and historical contexts. As illustrated by the instance of analysing old photographs, AI algorithms are able to efficiently extract relevant information from visual sources, such as ancient images. This allows for the discovery of hidden narratives and a deeper understanding of past societies. In order to uncover information about the economic and cultural practices of a certain era, artificial intelligence (AI) algorithms, for instance, can examine a collection of images showing everyday life in that era and look for patterns in the clothes, architecture, and other visual components. This enhances the understanding of the past that researchers have by allowing them to supplement conventional historical research approaches.

The respondent expressed optimism about artificial intelligence's potential in data visualization, pointing out that conventional techniques, such as tabular formats, frequently fall short of accurately capturing the intricacy of big datasets. On the other hand, AI-enhanced visualization tools are able to interpret data dynamically and provide interactive visualizations like animated graphs, interactive maps, and 3D models that help users interact with and comprehend complicated data connections more successfully.

Participants, also, indicated the importance of AI in enhancing the precision and lucidity of scholarly writing. By examining grammar, spelling, and syntax, AI-powered proofreading systems can efficiently detect and fix possible flaws, improving the overall quality of research results.

Despite the fact that AI technologies open up new possibilities and make the tedious process of research easier, the participants expressed their concerns about several crucial points in AI utilization.

They expressed worries about the use of AI technologies in data analysis and interpretation, arguing that doing so reduces the creativity and productivity of researchers when interpreting their findings. Furthermore, some of the participants expressed skepticism regarding AI's capacity for paraphrasing and summarizing lengthy passages, stating that these abilities are the cornerstones of research papers and that academics should work hard to develop them. They also shed light on the possibility that AI can provide repetitive or inaccurate material since it lacks adequate understanding of the academic developments and research

background. Furthermore, the participants insisted on adhering to research principles and guidelines that might be distorted or not respected by AI technologies. Consequently, they advised that using technology is absolutely, but it should not solely rely on it.

Discussion

Participants' answers are in line with Chubb et al. (2022) view in that AI technologies are pivotal tools that facilitate the process of investigation for researchers by elucidating and clarifying hard concepts of their research, keeping them with a quick moving research landscape. Additionally, the findings support these scholars' view in that AI contributes to speeding the procedures by automating tasks that take much time for human researchers to accomplish. Furthermore, participants support Saygın & Kabakçı (2023), Mijwil (2023), and Chubb et al. (2022) findings which hold that AI technologies speed up the literature review process, allowing researchers to quickly recognize important works, monitor changing trends slashing the long time required for that, and detecting knowledge gaps. This expedites the research phase and makes it easier to produce research outputs that are more significant. Moreover, the findings of the current research conform to Agrawal et al. (2017) claim which stated that AI tools expand the capabilities of researchers by simplifying language translation, fostering a lively interchange of knowledge and insights across linguistic boundaries. Therefore, scholarly endeavours enlarge in scope and foster collaboration. In the light of this study's results, it is evident that AI technologies enable researchers to derive information that surpass the surface, providing a deep comprehension of cultures, histories, and societies across time and space by revealing implicit meanings within visual data (Chubb et al., 2022). Besides, the interview findings corroborate existing research about the topic, particularly in relation to the usefulness of AI tools in well visualizing data. Conner et al. (2022) contended that AI tools improve researchers' capacity to skilfully communicate their findings by converting complex datasets into aesthetically pleasing and interactive presentations. These representations enable a profound comprehension of complex connections, opening up research results to more audiences. Lastly, the participants' responses align with Alshater's (2022) findings of that AI has the potential to increase research accuracy by identifying and fixing mistakes in academic writings.

The study's findings on the cautious utilization of AI in academic research validate some existing research. The participants' responses do confirm that using AI tools in some crucial research phrases such as in analysing and giving meaning to obtained data could reduce the quality of the output because they prevent researchers from being creative and making adequate judgements to come up with original and novel interpretations of the data (Chubb et al., 2022). Most importantly, AI does not have the right to offer any justification for any research data. It is always the researcher's duty and responsibility to explain, analyse, and give causes to all obtained findings Mijwil (2023). In addition, participants' view concerning the writing skills go in line with Chubb's et al. (2022) standpoint that hold that summarizing and paraphrasing are skills that define researchers and shape their academic works. They insisted on the fact that researchers should work hard to improve these essential skills since it is not merely a matter of reducing skill levels but it involves a deeper comprehension of those skills before considering their removal and be reliant on

AI tools. Thus, these tools should not obscure researchers' performance and their unique touch in their academic works. Finally, the interviewees do affirm Burger's et al. (2023) and Alshater's (2022) research results concerning adhering to research principles using AI technologies in the following crucial aspects. Researchers have to ensure truthfulness because AI systems occasionally produce false responses. This hallucination is particularly noticeable when asking for a literature reference, for instance ChatGpt 3/4 can produce accurate and convincing titles and authors that are entirely made up. Furthermore, AI models are always, and by definition, trained on existing data, hence it is not appropriate to depend on it to make new research connections and conclusions. Due to its insufficient background about the research context, AI can provide data that are irrelevant or generic.

IV. Conclusions and Recommendations :

This research was conducted to explore the research tasks in which Algerian researchers use AI and to examine instances where they should be cautious in employing AI technologies in academic research. The findings of this study proved that Algerian doctoral researchers of different disciplines utilize AI in their academic investigations, highlighting a significant utility in helping researchers to fulfil various academic tasks. Additionally, the findings demonstrated that researchers should be careful in using AI tools in research by ensuring their adherence and consideration of the research principles and ethics. Therefore, the findings come to answer the research question.

This research ended by suggesting some recommendations that could leverage the use of AI among researchers and guide its integration in the Algerian academic landscape. It is recommended that detailed policies and guidelines that display best practices of AI utilization in the academic journey should be developed. Moreover, promoting training programs that arm researchers with the needed competencies to navigate AI skilfully and ethically are of paramount importance.

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– **Appendices**

The Interview

- 1) How well versed are you in the use of AI in academic research?
- 2) What do you think concerning the influence of AI technologies on the research process within your discipline?
- 3) What are the research tasks in which you see that the use of AI technologies is helpful and beneficial to the researcher?
- 4) From your experience, what are some of the primary concerns associated with the utilization of AI in academic research?
- 5) Can you share instances where you believe AI should not be used in academic research?
- 6) What considerations and principles of academic research that researchers should keep in mind when employing AI in their research?