Integration of generative artificial intelligence in scientific research at Algerian universities

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Abstract:

Today we are witnessing a race toward unprecedented discoveries and innovations in the field of generative artificial intelligence despite the dissension between those who approve of its use in theses and dissertations, and those who fight against its use. The rapid progress of generative AI can neither wait for laggards nor do those who refuse to watch it come at full speed. Algerian universities are already suffering from the "Evil of Plagiarism" and which has not been eradicated to this day; here are the innovative generative languages of "ChatGpt" from Open IA and "Gemini" from Google. This major problem can only be solved by integration controlled by the university in order to benefit from all the advantages of this generative Artificial Intelligence of this century.

Keywords: *A I, scientific research; Scientific theft, Algerian University, scientific integration*

الملخص:

نشهد اليوم سباقًا نحو اكتشافات وابتكارات غير مسبوقة في مجال الذكاء الاصطناعي التوليدي، رغم الخلاف بين الموافقين على استخدامه في الأطروحات والرسائل العلمية، وبين المعارضين لاستخدامه. إن التقدم السريع للذكاء الاصطناعي التوليدي لا يمكنه انتظار المتقاعسين ولا أولئك الذين يرفضون مشاهدته و هو يأتي بأقصى سرعة يقتحم مجالات البحث العلمي. إن الجامعات الجزائرية تعاني بالفعل من "شر الانتحال" الذي لم يتم القضاء عليه إلى يومنا هذا؛ و إذا بالبرامج للغات التوليدية المبتكرة "ChatGpt" التابع Open IA و"Gemini" التابع Google تكتسح الفضاءات الجامعية، و عليه، لا يمكن حل هذه المشكلة الكبرى إلا من خلال إدماج رسميا هذه البرامج من طرف الجامعة و تحت رقابتها، من أجل الاستفادة من جميع مزايا هذا الذكاء الاصطناعي التوليدي لهذا القرن.

الكلمات المفتاحية: الذكاء الاصطناعي، البحث علمي; السرقة العلمية، الجامعة الجزائرية، التكامل العلمي

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Introduction:

The rapid progress of generative artificial intelligence at the beginning of the 21st century which is only the consequence of the extraordinary competition between the giants of AI has upset the global academic community. Should the use of generative software be authorized in schools and universities by assuming the negative consequences of this use, or should it be prohibited without being able to present an adequate substitute to users, especially for those preparing final dissertations or theses.

Despite the dissension between those who endorse its use in theses and dissertations, and those who fight against its use, the rapid progress of generative AI can neither wait for latecomers nor those who refuse to watch it arrive at full speed. Already Algerian universities are suffering from the "Plagiarism Sickness" which has not been eradicated until now due to the lack of appropriate software at the level of universities that are presenting the innovative generative languages of "ChatGpt" of Open AI and "Gemini" of Google. In addition to the vulgarity of this generative software, accessibility is free to innovations, which aggravates the problem of use at all levels, so we find ourselves faced with the following problem:

How to integrate the generative language of AI at the level of Algerian universities, and how to facilitate its use in a thesis or research thesis?

It is important to emphasize that scientific research is the key to the development of each country, also, it makes it possible to improve human life through technological and scientific advances that are the basis of all innovations, therefore, of any progress in the various areas of life. However, the rapid progress of innovations requires a lot of time for researchers in the field, and for this, AI as an “assistant tool” to any research team can be beneficial for the valuable time it represents to any researcher. Also, without the generative software of AI, scientific researchers will never be able to reach an advanced stage of scientific progress.

Note that each scientific research project consists of a theoretical part and another practical part. For this, the objective of this research is first to present two examples of technological progress in the medical field, then the technical field, to enhance the role of AI in scientific research to improve human life and facilitate the task of researchers, then it is a question of presenting the disadvantages and advantages of generative software in the field of social sciences to integrate them or not at the level of Algerian universities.

1. The concept of artificial intelligence and its various applications

1.1. Definition and typology of artificial intelligence

Artificial intelligence (AI) is a process of imitating human intelligence that relies on the creation and application of algorithms executed in a dynamic computing environment. Its purpose is to enable computers to think and act like human beings.

For this, there are standard disputes of Artificial Intelligence such as:

A - Rules-based AI: This is the simplest form of artificial intelligence.

It relies on pre-established rules and instructions to solve specific problems. These rules are usually created by human experts in the relevant field.

B - Weak (or narrow) AI: Refers to AI systems that specialize in a specific task.

These systems are designed to perform a single task very well, but they lack the learning ability and general understanding of context that humans do.

C - Strong (or general) AI: It represents a higher level of artificial intelligence.

Unlike weak AI, strong AI has the ability to learn on its own, understand context, and adapt to new situations.

This level of AI is still largely theoretical and has not yet been fully achieved. although significant progress has been made in the field of machine learning and neural networks.

D - Supervised learning: This is a machine learning technique where an AI model is trained on a set of labeled data.

Each training data is associated with a known tag or response.

E - Unsupervised learning: Unlike supervised learning, unsupervised learning does not require labeled data for training.

The AI model seeks to uncover hidden patterns or structures in the data without receiving prior answers.

F - Reinforcement learning: This is an approach where an AI agent learns to make decisions by interacting with an environment.

The agent takes a series of actions and receives rewards or penalties based on the quality of their decisions.

The agent's goal is to maximize accumulated rewards over time.

G - Deep Learning: This is a subcategory of machine learning that uses deep neural networks to model and solve complex problems.

These networks are inspired by the functioning of the human brain and are able to learn hierarchical representations of data.

2. Application of artificial intelligence in the medical field:

Technological progress in the medical field is very successful in various fields that it is impossible to list them all. But, as an example, the choice was made to the smart prosthesis "The Bionic Arm" in order to demonstrate the extraordinary advantages of AI in the field. The researchers came up with a thought-controlled Bionic Arm. This revolutionary feat of the 21st century was achieved, thanks to several research teams in the field and where time was the major challenge for these researchers under the pressure of fierce competition from other companies in the field.

"The thought-controlled bionic arm " was created by acompany that combines wearable robotics with an amazing (and recently award-winning) design.Esper Bionics, a New York startup that develops smart prosthetics, recently received the°Red Dot Award, an international award that recognizes the best designs, forsetting new standards in the design industry. The company manufactures a prosthesis powered by highly agile AI, remarkably lightweight and incomparably elegant.

The Esper Hand offers a complete functionality that is surprisingly close to the natural movement of the hand," wrote the Red Dot jurors. Its self-learning technology goes a long way in enabling users to perform everyday tasks autonomously. Its technically elegant appearance makes the prosthesis a "lifestyle" product that the user wears with confidence. In addition, the design ensures gender-specific shaping by sensitively considering anatomical differences.

"The Esper hand can pick up signals from each muscle, allowing it to be controlled three times faster than other similar products. It is also lighter (380°g) than many other prosthetic hands. The controls, as with the latest generation of controllable prostheses, are via a non-invasive brain-portable computer interface. A cloud-based software solution makes it possible to individualize the control of the hand. Artificial intelligence and machine learning have been assets for the development of prostheses. It can detect the user's most repeated patterns of behavior and thus predict their intentions and movements. This makes it possible to train it to move intuitively, without any effort on the part of the user. It can also be controlled and driven via a mobile app.

In Algerian universities, scientific research in the medical field requires extraordinary means, and among these means AI and especially time for research teams to catch up with scientific progress that separates the major universities of developed countries from ours.

3 - Application of artificial intelligence in the technical field:

With regard to the technical field, the choice of an example was focused on the progress of remote sensing and satellite image recognition in the field of satellite mapping and image analysis based on satellite imaging technology.

3.1. Remote sensing and object recognition from satellite images:

AI algorithms have become indispensable° in different technical fields. These include image processing and remote sensing. Remote sensing is the set of AI techniques and algorithms used to detect and extract shapes remotely from aerial or satellite imagery.

By the phenomenal development of AI algorithms in the field of image processing and remote sensing, we can mention the exploitation of road extraction from satellite images.

Applications of AI road extraction include applications dedicated to urban planning such as road network maps and building footprints. Other examples of applications using AI road extraction are emergency rescue systems using instant maps, traffic monitoring in intelligent transport, autonomous driving systems and real-time updating of road networks, other technical applications that use AI include; satellite data modeling for weather forecasting and seismic prediction.

3.2. The field of mapping:

"This field is undergoing a real revolution because of the low cost in building the geographical database thanks to satellites, for this, the operation to be implemented is a semantic segmentation operation. This type of processing consists of identifying and trimming the elements of an image by associating each pixel with a given category in mapping, this can for example be the following categories: buildings, roads, vegetation, etc. Objects or areas of interest can then be easily reconstructed by vectoring the result. Supervised learning, and more particularly deep-learning models, allows us to perform semantic segmentation operations efficiently and automatically. They are based on convolutional neural networks that will search the images for the characteristic elements of the expected categories.

3.3. The Benefits of AI-Based Image Analysis for Satellite Imaging Technology:

"AI-based image analysis technology works by using deep learning algorithms to 'teach' computers how to analyze satellite images. By training the computer to recognize patterns, shapes, and colors, AI-based image analysis technology can quickly and accurately identify objects, features, and terrain on the Earth's surface. This technology can be used to monitor changes in land use, urban development, and agricultural production. In addition, AI-based image analysis can help detect changes in Earth's oceans, such as coral reef bleaching and the presence of oil spills."

It can also serve researchers in the field of the environment and its change over time, and allows them to better monitor and assess the impacts of climate change and many other environmental issues. It also allows researchers to monitor and analyze data in near real-time, rather than waiting for the analysis to be performed manually. This gives researchers much faster access to data and allows them to respond more quickly to environmental changes.

"The use of AI-based image analysis for satellite imaging technology provides researchers with an invaluable tool for monitoring the Earth's surface. This technology allows researchers to gain a more detailed understanding of the environment, monitor changes in land and ocean use, and respond more quickly to environmental changes."

Like that of the medical field, any researcher needs more time to devote to the "Application" side of their research project. For this, the AI generative software cannot replace the researcher in the application of practice; on the other hand, it can do it for the theoretical side. This cooperation between generative software and scientific researchers is among the solutions proposed to the challenge of «time " that researchers around the world and in particular those in our universities face.

2. Use of generative artificial intelligence in the social sciences:

The remarkable advances of AI in various fields have aroused great interest from researchers. Today, a language model developed by Open AI "ChatGpt" attracts the attention especially of the general public, Thanks to its ability to generate natural language texts that can be difficult to distinguish from those written by humans, ChatGpt has become a versatile and powerful tool for AI applications such as automatic response to customers, text generation and machine translation. Since it was made available in November 2022, not a day has passed without ChatGpt inviting itself into conversations and the media, arousing its share of curiosities, questions and fears. AI, which kept at

its evocation a part of science-fiction and promises for a still distant future, has suddenly become a tangible reality that everyone can be convinced of its formidable effectiveness.

2.1. ChatGpt, the innovative software in scientific research:

ChatGPT is a free and fast conversational robot, which produces well-constructed texts from a simple question (Prompt). It uses “Deep Learning” to generate responses to user queries. It understands the context of the questions and generates consistent answers. It is a tool used in various applications; it is often improved and updated.

As soon as it appeared, the discourse of AI specialists affirmed that it already existed, for the Media it is a revolution. But what is new is access to the general public since December 2022. This is the first public availability of a “conversational robot", it has learned to "speak well" in different styles, and languages... Its learning base is essentially English-speaking and limited to 2021. This said it has a database that is autonomous from that of other databases for the moment. Its essential mission is to produce text in a personalized way, responding to a "prompt". It should be noted that this generative software is not a search engine, nor a knowledge base. Also, it is not connected to the Internet and does not cite the sources mobilized. On the other hand, ChatGpt 4 can provide the references of the bibliography to which it has referred in its texts.

Faced with this extraordinary feat, two distinct attitudes have manifested themselves in generative language software, especially in schools and universities. Those who present its use in the preparation of a thesis or dissertation as cheating, and those who see it as a very beneficial working tool for students and researchers.

2.2. Criticisms of the use of the software in schools and universities:

Since the launch of ChatGPT last November by the Californian start-up Open AI, universities and schools have been concerned about the widespread use of generative software by students. Because from a simple question and in a few minutes, this conversational robot can synthesize a book, formulate a dissertation plan, translate a text, and produce an effective text.

A -1st reflection of commentators: "Cheating»:

An innovation widely used by students in exams, consequences, better grades acquired unfairly. The risk is that if the software always thinks in the place of the students it ends up diminishing their ability to think. For this, it is necessary to monitor and detect its use in schools and universities. However, the problem of detection with the tools provided by several AIs is that it only covers 26% of the texts produced by generative languages.

The effectiveness of this content-generating artificial intelligence has not escaped students. “As early as January 2023, for example, 95% of students in France were aware of ChatGPT and the majority of them had already used it. Especially when responding to remote MCQs or homework, the risk is the impossibility of detection even if we use detection software provided by Open AI, the problem with this software is that it is not 100% reliable.

For some professors at universities in France, who refuse its use, "The risk is that if the software always thinks in the place of students, it will end up reducing their ability to think". Not to mention their writing skills, which would make it difficult to integrate them into the workforce. For this, it is necessary to redouble vigilance in the correction of exams.

Faced with this phenomenon, many establishments have organized working groups. However, they are still groping and struggling to issue instructions for their teaching teams. But the entourage of the Minister of Higher Education in France indicates that "the position of the latter is not to prohibit this type of software, but to support its uses".

Several start-ups have already designed ChatGPT content detectors, but few higher education institutions have already equipped themselves in France. Spelling mistakes, too flat answers, particular punctuation, the lack of depth of certain approaches, contradictions... Clues that may lead them to believe the robot was used. "AI doesn't necessarily give a fair, but plausible answer. The texts she provides require the proofreading of an expert to be corrected, when we submit a request in science, the form is bluffing, but some statements are nonsense.

But it is in master's theses that teachers are most concerned because while some address subjects that have never been cleared, this is not the case for all. And if ChatGPT is not yet able to produce a 100-page memoir, it can provide some parts of it. "A greater place must be given to the dissertation defense which makes it possible to ask the student specific questions, to ask him to justify his research choices... If he is unable to argue, we will quickly understand where the problem comes from ".

Also, there is the Evidence of Plagiarism, when a writing job is assigned, it is essential that the student can express their ideas and reflections. Assessments are usually based on the student's ability to develop their thinking. Unfortunately, no AI tool can provide this personal reflection, and teachers can quickly spot plagiarism. In the context of a final dissertation, taking shortcuts using ChatGPT can result in the loss of an entire year of study.

For the reliability of the Information, although ChatGPT can generate fluent text, errors can creep into the generated content. It is possible to find incorrect or contradictory information in the documents produced by this tool, which can compromise the credibility of the work.

Finally, there is a violation of University Ethics; the use of ChatGPT to produce academic content is considered cheating in many institutions. Plagiarism detection software is becoming increasingly sophisticated, and the consequences of improper use of this tool can be severe, ranging from course failure to expulsion from university.

3. Benefits of ChatGPT in scientific research:

ChatGPT represents a real revolution in the production of content and the help it can provide to scientific research, in particular to researchers and apprentice researchers who have to write academic writings.

If ChatGPT is used wisely, with ethics and scientific integrity, it can become a real assistant to the apprentice researcher but also to (teachers-) researchers.

3.1. The benefits of using ChatGPT according to the AI generative software:

- Automatic text generation: Automatic language processing models such as GPT can automatically generate texts from training data. This can be useful for researchers looking to generate data summaries, hypotheses, experiment protocols, etc.

- Automatic data annotation: Automatic language processing models can also be used to automatically annotate textual data, which can help researchers quickly identify trends and patterns in their data.
- Sentiment analysis: Automatic language processing models can be used to detect feelings expressed in a text, which can be useful for social media studies, satisfaction surveys, etc.
- Question-answer generation: GPT can generate automatic answers to questions, which can facilitate interactions with users in applications.
- Improved efficiency: This can help researchers and trainee researchers complete certain tasks faster and more accurately, allowing them to devote more time and energy to more complex and creative tasks.

3.2. Benefits of ChatGpt according to researchers and users of the software:

- Inform the researcher on a specific subject.
- Writing/Writing: can refine your writing (reformulation...), can also rewrite passages, and can make summaries (also summaries in French or English articles).
- Make suggestions for research topics, (starting) research questions, titles, and future directions...
- Sentiment analysis (detecting feelings expressed in a text, e.g. on social networks).
- Improved efficiency (completing certain tasks faster and more accurately) by using it as an assistant.
- Make tables (by asking him how we want them and what we put in them), and generate items and questionnaires from these items... (update on 20/01/23).

Finally, the future will tell how the academic (and research) world has appropriated these tools of which ChatGPT is only the beginning of the era of "accessible" artificial intelligence.

3.3. Encourage and train in academia:

I think that the use of ChatGPT with an explicit mention in the content produced by the software presents credibility to the work of research whatever it is. For this, an integration of AI courses into the curricula in °2024 and teacher training on the subject is necessary. Training is beneficial both technically and ethically.

Students should be taught to critique texts produced by AI to improve their “Becoming smarter than a robot” skill (as cited below) to mobilize and encourage users. ChatGpt can generate summaries of specific texts and introduce the researcher to new areas of which they are unaware. Moreover, the Model can generate research ideas and also hypotheses that can inspire new research avenues previously ignored. Not to mention the «Time " factor for researchers, because the time that they can benefit from doing their investigations in the field and that this robot cannot do it for them is important in the development of scientific research.

Many institutions in France, for example, have understood that it is more effective to tame the tool, rather than demonize it. The School of Sciences Po has therefore prohibited the use of ChatGPT without explicit mention in the content produced by its students. The school also decided to integrate an AI course in all these M1s in the spring of 2024 and to train teachers on the subject. "Students must be trained in the use of the software, both from a technical and ethical point of view. And make them work on texts produced by AI by asking them to take a critical look at them to improve them. To this extent, AI could even become an interesting component of teaching, pushing students to excel. As long as we ask our students to be smarter than a robot, there will be no problem. After all, isn't the purpose of Higher Education to train individuals to solve complex problems?

4. Conclusion and recommendations:

The rapid competition between the big generative artificial intelligence firms has resulted in the birth of a new language more advanced than ChatGPT, Google's "Gemini" which is enjoying incomparable success. It is illogical to refuse to acknowledge its widespread use in dissertations and research theses by a large number of students, and in return, the total inability of supervisors and examiners to detect the work performed by the generative language of AI and the technical inability to detect its use.

For this, recommendations are needed to face this new challenge at the level of our universities.

- Control of the use of the generative software by teachers trained in the field.
- It is imperative to integrate the generative languages of AI at the level of Algerian universities officially and under the control of the Ministry of Higher Education.
- Organizing learning workshops for teachers and students to maximize the benefits of AI generative languages.

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