



Mahidol University

Faculty of Medicine Ramathibodi Hospital

Department of Clinical Epidemiology and Biostatistics

Can artificial intelligence (AI) help for scientific writing?



Teerapong Aramruang



- Background knowledge about ChatGPT and GPT-4
- How an AI help for scientific writing?
- Can an AI be the author of a scholarly article?
(Authorship, Copyright law, Research ethics)
- Concerns regarding the ChatGPT
- Use AI for scientific writing in a smart way
- Summary



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How an AI help for scientific writing

PERSPECTIVE

Open Access

Can artificial intelligence help for scientific writing?



Michele Salvagno^{1*}, Fabio Silvio Taccone¹ and Alberto Giovanni Gerli²

ACS NANO

www.acsnano.org

Best Practices for Using AI When Writing Scientific Manuscripts

Caution, Care, and Consideration: Creative Science Depends on It



Cite This: *ACS Nano* 2023, 17, 4091–4093



Read Online



ChatGPT language bot

- An artificial intelligence (AI) chatbot, called ChatGPT, known as large language models (LLMs).
- Which can generate human-like text, was released by Open AI in November 2022 in San Francisco, California, have made the chatbot free to use and easily accessible for people who don't have technical expertise and has since become a global issue.
- In education, concerns have arisen about students using this amazing chatbot to complete assignments. It was also reported that this chatbot was listed in academic papers as a co-author. Opinions were formulated about the need for guidelines for the use of AI chatbots in scientific writing.



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How an AI help for scientific writing



Strengths of the ChatGPT language bot

I. Help to break mental log jams when writing, or when struggling to write those first words.

- Having some text to start with can enable a writer to overcome an activation barrier to productivity.
- Be aware that this starting point might mentally pin you to a certain way of thinking and writing, so do not let this text limit your creativity and insights.
- A better approach might be to use ChatGPT after completing a draft of your manuscript to provide a complementary perspective to determine if key topics or points were missed, and to spark new ideas and directions.

k

I am writing an research article on Deep learning in prostate cancer classification. Can you write an introduction paragraph for me?



Certainly! Here's an introduction paragraph for your research article on deep learning in prostate cancer classification:



Prostate cancer remains one of the most prevalent malignancies affecting men worldwide, with a significant impact on public health. Accurate and timely diagnosis of prostate cancer plays a crucial role in determining appropriate treatment strategies and improving patient outcomes. In recent years, deep learning techniques have emerged as a powerful tool in medical image analysis, demonstrating remarkable success in various domains. Deep learning algorithms, driven by artificial neural networks, have the ability to automatically learn intricate patterns and features from large-scale datasets, thereby offering a promising avenue for enhanced prostate cancer classification. This research article aims to provide a comprehensive overview of the application of deep learning approaches in prostate cancer classification, highlighting their potential to revolutionize current diagnostic practices and pave the way for more personalized and precise treatment strategies. By exploring the current state-of-the-art methodologies, challenges, and future directions, this study aims to contribute to the growing body of knowledge in the field, ultimately fostering advancements in prostate cancer diagnosis and patient care.



Strengths of the ChatGPT

II. Make interesting analogies and generate seemingly creative links between disparate concepts and ideas.

- When properly prompted
- Require a reality check to ensure that they are reasonable or plausible.

III. Help in improving your manuscript

- Be used effectively to improve the title, abstract, and conclusion of your manuscript and to tailor it to match the journal parameters and better match its scope or readership.

k

Can you suggest some titles for this abstract?: "This paper discusses the use of Artificial Intelligence Chatbot in scientific writing. ChatGPT is a type of chatbot, developed by OpenAI, that uses the Generative Pre-trained Transformer (GPT) language model to understand and respond to natural language inputs. AI chatbot and ChatGPT in particular appear to be useful tools in scientific writing, assisting researchers and scientists in organizing material, generating an initial draft and/or in proofreading. There is no publication in the field of critical care medicine prepared using this approach; however, this will be a possibility in the next future. ChatGPT work should not be used as a replacement for human judgment and the output should always be reviewed by experts before being used in any critical decision-making or application. Moreover, several ethical issues arise about using these tools, such as the risk of plagiarism and inaccuracies, as well as a potential imbalance in its accessibility between high- and low-income countries, if the software becomes paying. For this reason, a consensus on the use of AI in scientific writing will soon be required"



PERSPECTIVE

Open Access

Can artificial intelligence help for scientific writing?



Michele Salvagno^{1*}, Fabio Silvio Taccone¹ and Alberto Giovanni Gerli²



1. "Artificial Intelligence Chatbots in Scientific Writing: Enhancing Research Efficiency and Collaboration"
2. "Exploring the Role of ChatGPT in Scientific Writing: Benefits and Challenges"
3. "Revolutionizing Scientific Writing: The Potential of AI Chatbots in Research"
4. "ChatGPT: Transforming Scientific Writing with Artificial Intelligence"
5. "Leveraging Chatbots for Scientific Writing: An Emerging Paradigm in Research Communication"



k

shorten to 300 characters:

This paper discusses the use of Artificial Intelligence Chatbot in scientific writing. ChatGPT is a type of chatbot, developed by OpenAI, that uses the Generative Pre-trained Transformer (GPT) language model to understand and respond to natural language inputs. AI chatbot and ChatGPT in particular appear to be useful tools in scientific writing, assisting researchers and scientists in organizing material, generating an initial draft and/or in proofreading. There is no publication in the field of critical care medicine prepared using this approach; however, this will be a possibility in the next future. ChatGPT work should not be used as a replacement for human judgment and the output should always be reviewed by experts before being used in any critical decision-making or application. Moreover, several ethical issues arise about using these tools, such as the risk of plagiarism and inaccuracies, as well as a potential imbalance in its accessibility between high- and low-income countries, if the software becomes paying. For this reason, a consensus on how to regulate the use of chatbots in scientific writing will soon be required.



This paper explores AI chatbots, specifically ChatGPT, in scientific writing. They assist researchers by organizing material, generating drafts, and proofreading. Critical care medicine lacks publications using this approach, but it may be possible in the future. Human review is necessary, as ethical concerns like plagiarism and accessibility imbalance arise. Regulation consensus for chatbot use in scientific writing is needed.





Strengths of the ChatGPT

IV. Identify relevant references

- Find references for a specific topic that might be missed by conventional literature searches.
- But they must be carefully read or scanned to ensure that they are correct and relevant.

V. Guide on writing structure

- Provide a guidance on writing structure by breaking up a difficult topic into smaller pieces.
- However, the bot might make poor suggestions, so caution is required when doing so.



can you summarize the literature about deep learning in prostate cancer



Deep learning has emerged as a promising approach in various medical applications, including prostate cancer. By leveraging large datasets and powerful computational models, deep learning algorithms have demonstrated potential in improving diagnosis, risk stratification, and treatment outcomes. Here's a summary of the literature on deep learning in prostate cancer:



1. Diagnosis and Detection:

Deep learning algorithms have been developed to aid in the detection and diagnosis of prostate cancer. Convolutional neural networks (CNNs) have been trained on histopathological images to accurately identify cancerous regions and assist pathologists in making more precise diagnoses.

2. Gleason Grading:

Gleason grading is crucial for assessing the aggressiveness of prostate cancer. Deep learning models have been trained to automatically grade prostate cancer based on histopathological images, achieving results comparable to expert pathologists. This can potentially improve consistency and reduce interobserver variability.

3. Risk Stratification:

Deep learning models have been employed to predict the risk stratification of prostate

k

Please provide sources for the previous answer



I apologize for the inconvenience, but as an AI language model, I don't have direct access to external sources or the ability to browse the internet. However, I can provide you with a list of key research papers and review articles on the topic of deep learning in prostate cancer. You can search for these papers in academic databases such as PubMed, Google Scholar, or IEEE Xplore to access the full texts:



1. Litjens, G., Kooi, T., Bejnordi, B. E., Setio, A. A. A., Ciompi, F., Ghafoorian, M., ... & Sánchez, C. I. (2017). A survey on deep learning in medical image analysis. *Medical image analysis*, 42, 60-88.
2. Arvaneh, S., Snead, D. R., & Epstein, D. M. (2020). Artificial intelligence in prostate cancer: from detection to diagnosis. *BJU international*, 125(6), 769-780.
3. Trivedi, H., & Turkbey, B. (2020). Artificial intelligence and machine learning in prostate cancer: a review. *Translational Andrology and Urology*, 9(Suppl 2), S135-S145.
4. Oberlin, D. T., Casalino, D. D., Miller, F. H., Meeks, J. J., Ryan, S. T., & Duszak Jr, R. (2018). Deep learning in radiology: does one size fit all?. *Journal of the American College of Radiology*, 15(3), 521-526.
5. Zhang, J., Shan, L., Luo, B., Qiu, X., Wang, G., Zhao, X., ... & Wang, X. (2020). Deep learning in prostate magnetic resonance imaging—clinical translation. *Translational Andrology and Urology*, 9(Suppl 1), S71-S82.

k

suggest an outline of the paper in terms of headlines



Title: Exploring [Topic]: A Comprehensive Analysis



Abstract:

- Briefly summarize the purpose, methodology, and findings of the paper.

1. Introduction

- Background information on the topic.
- Problem statement and research objectives.
- Significance of the study.

2. Literature Review

- Review of existing literature, theories, and studies related to the topic.
- Identification of gaps, controversies, or unresolved issues.

3. Methodology

- Explanation of the research design and approach.



Strengths of the ChatGPT

VI. Level the playing field by facilitating composition by non-native English speakers.

VII. Help a writer be more thorough when covering a topic by reminding them of aspects they had not considered.

VIII. Provide knowledge in an area in which one has little familiarity

- Provide in a structured, easy-to-digest manner.
- However, one must keep in mind that the output might be incomplete or lacking in creative insights.

IX. Develop code for Python and other computer languages

k

Improve this paragraph for flow and readability: This paper discusses the use of Artificial Intelligence Chatbot in scientific writing. ChatGPT is a type of chatbot, developed by OpenAI, that uses the Generative Pre-trained Transformer (GPT) language model to understand and respond to natural language inputs. AI chatbot and ChatGPT in particular appear to be useful tools in scientific writing, assisting researchers and scientists in organizing material, generating an initial draft and/or in proofreading. There is no publication in the field of critical care medicine prepared using this approach; however, this will be a possibility in the next future. ChatGPT work should not be used as a replacement for human judgment and the output should always be reviewed by experts before being used in any critical decision-making or application. Moreover, several ethical issues arise about using these tools, such as the risk of plagiarism and inaccuracies, as well as a potential imbalance in its accessibility between high- and low-income countries, if the software becomes paying. For this reason, a consensus on how to regulate the use of chatbots in scientific writing will soon be required.



This paper examines the application of Artificial Intelligence Chatbot in scientific writing, with a focus on ChatGPT. Developed by OpenAI, ChatGPT utilizes the powerful Generative Pre-trained Transformer (GPT) language model to comprehend and respond to natural language inputs. AI chatbots, including ChatGPT, offer valuable assistance to researchers and scientists in various aspects of scientific writing, such as organizing content, generating initial drafts, and proofreading. While there are currently no published works utilizing this approach in the field of critical care medicine, it holds significant potential for future



FA

Can you make a summary of the background, methodology, main results and conclusions of the study "Early Extracorporeal CPR for Refractory Out-of-Hospital Cardiac Arrest" by Sovereign et al. published in the New England Journal of Medicine in 2023 and compare it with two other studies "Effect of Intra-arrest Transport, Extracorporeal Cardiopulmonary Resuscitation, and Immediate Invasive Assessment and Treatment on Functional Neurologic Outcome in Refractory Out-of-Hospital Cardiac Arrest: A Randomized Clinical Trial" and "Advanced reperfusion strategies for patients with out-of-hospital cardiac arrest and refractory ventricular fibrillation (ARREST): a phase 2, single centre, open-label, randomised controlled trial" ?



The study "Early Extracorporeal CPR for Refractory Out-of-Hospital Cardiac Arrest" by Sovereign et al. published in the New England Journal of Medicine in 2023 evaluates the use of extracorporeal cardiopulmonary resuscitation (ECPR) in patients with refractory out-of-hospital cardiac arrest (OHCA). The study included patients with OHCA who failed to respond to traditional cardiac resuscitation measures and found that early initiation of ECPR was associated with higher rates of return of spontaneous circulation (ROSC) and improved survival to hospital discharge compared to conventional cardiac resuscitation alone.



In comparison, the study "Effect of Intra-arrest Transport, Extracorporeal Cardiopulmonary Resuscitation, and Immediate Invasive Assessment and Treatment on Functional Neurologic Outcome in Refractory Out-of-Hospital Cardiac Arrest: A Randomized Clinical Trial" found that ECPR was associated with improved functional neurologic outcomes in patients with refractory OHCA. The study "Advanced Reperfusion Strategies for Patients with Out-of-Hospital Cardiac Arrest and Refractory Ventricular Fibrillation (ARREST): a Phase 2, Single Centre, Open-Label, Randomized Controlled Trial" found that advanced reperfusion strategies, including ECPR, improved outcomes in patients with refractory OHCA.

Overall, these studies suggest that ECPR may be a useful treatment option for patients with refractory OHCA and that early initiation of ECPR may improve survival and neurologic outcomes. Further research is needed to fully understand the benefits and limitations of ECPR in this patient population.

k Write a Python script that implements a machine learning algorithm to classify iris flowers based on their sepal length, sepal width, petal length, and petal width. The script should be able to handle new data points and return the corresponding class.



Certainly! Here's a Python script that uses the scikit-learn library to implement a machine learning algorithm for classifying iris flowers based on their sepal and petal measurements:



```

# Importing the necessary libraries
from sklearn.datasets import load_iris
from sklearn.model_selection import train_test_split
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import accuracy_score

# Load the Iris dataset
iris = load_iris()

# Split the data into features (X) and target (y)
X = iris.data
y = iris.target

# Split the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, ran

# Create the KNN classifier
k = 3 # Set the value of K for KNN
knn = KNeighborsClassifier(n_neighbors=k)

# Train the classifier using the training data
knn.fit(X_train, y_train)

# Predict the classes for the testing set
y_pred = knn.predict(X_test)

# Calculate the accuracy of the classifier
accuracy = accuracy_score(y_test, y_pred)
print(f"Accuracy: {accuracy:.2f}")

# Example usage: Classify new data points
new_data = [[5.1, 3.5, 1.4, 0.2], [6.4, 3.2, 4.5, 1.5], [6.9, 3.1, 5.4, 2.1]]
new_pred = knn.predict(new_data)
print(f"Predicted classes for new data: {new_pred}")

```

In this script, we load the Iris dataset using `load_iris()` from the scikit-learn library. We split the data into training and testing sets using `train_test_split()`. Then, we create a K-nearest neighbors (KNN) classifier using `KNeighborsClassifier()` and fit it to the training data using `fit()`. We predict the classes for the testing set using `predict()` and calculate the accuracy of the classifier using `accuracy_score()`. Finally, we demonstrate the classification of new data points by providing their sepal and petal measurements to the trained model using `predict()`.

Please note that this script assumes you have scikit-learn installed. If not, you can install it by running `pip install scikit-learn` in your command prompt or terminal.



Process of reviewing

- Finding academic papers
- Summarizing their conclusion
- Highlighting areas of uncertainty (e.g., summarizing the recent randomized clinical trial on the use of extracorporeal membrane oxygenation for refractory cardiac arrest)
- Help physicians to quickly gain an understanding of the current state of knowledge on a particular topic.
- Identifying potential gaps that need to be addressed



Process of writing

- Generating an initial draft of paper and suggest titles by providing raw information.
- Assisting in composing the section on the methods used in the study, justify sample size, and describe data analysis techniques.
- Manuscript; editing process, formatting and language editing, rewriting a complex sentence in a clearer way, and summarizing the entire text to compose a suitable abstract.
- ChatGPT has been recently asked to prepare regular discharge summaries, but the quality of the content has not been specifically evaluated.

Example of medical record

case pt male 45 yr U/D HT DM DLP came to the emergency department on 23 Feb 2023 with dyspnea and leg swelling. the patient was admitted from the emergency department on 24 Feb 2023.

24 Feb 2023

S : still tired, decrease in leg swelling, no chest pain
O : CXR - decrease in pulmonary edema, I/O = 800/2000
A : case heart failure slightly improved
P : - continue lasix iv
- strict fluid

25 Feb 2023

S : decrease in leg swelling, no chest pain
O : Lungs - clear
A : case heart failure improved
P : - off lasix iv, start lasix oral

26 Feb 2023

S : no dyspnea, no chest pain
O : Lungs - clear
A : case heart failure improved
P : - plan D/C

27 Feb 2023

S : increased dyspnea, no leg swelling, no chest pain
O : Lungs - crepitation LL
A : case heart failure improved, LLL pneumonia
P : - start Levofloxacin iv

28 Feb 2023

S : decreased dyspnea, no leg swelling, no chest pain
O : Lungs - mild crepitation LL
A : case heart failure improved, LLL pneumonia
P : - continue Levofloxacin iv

2 Mar 2023

S : no dyspnea, no leg swelling, no chest pain
O : Lungs - no crepitation
A : case heart failure improved, LLL pneumonia
P : - continue Levofloxacin iv

4 Mar 2023

S : no dyspnea, no leg swelling, no chest pain
O : Lungs - no crepitation
A : case heart failure improved, LLL pneumonia improved
P : - switch to Levofloxacin oral

5 Mar 2023

S : no dyspnea, no leg swelling, no chest pain
O : Lungs - no crepitation
A : case heart failure improved, LLL pneumonia improved
P : - D/C tomorrow

6 Mar 2023

S : no dyspnea, no leg swelling, no chest pain
O : Lungs - no crepitation
A : case heart failure improved, LLL pneumonia improved
P : - D/C , F/U 1 wk OPD MED

k

Please summarize this patient's admission history to each problem list for the discharge summary (the active problem list should come first and combine the inactive problem list into inactive):

case pt male 45 yr U/D HT DM DLP came to the emergency department on 23 Feb 2023 with dyspnea and leg swelling.

the patient was admitted from the emergency department on 24 Feb 2023.

24 Feb 2023

S : still tired, decrease in leg swelling, no chest pain

O : CXR - decrease in pulmonary edema, I/O = 800/2000

A : case heart failure slightly improved

P : - continue lasix iv

- strict fluid

25 Feb 2023

S : decrease in leg swelling, no chest pain

O : Lungs - clear

A : case heart failure improved

P : - off lasix iv, start lasix oral

26 Feb 2023

S : no dyspnea, no chest pain

O : Lungs - clear

A : case heart failure improved

P : - plan D/C

27 Feb 2023



Active Problem List:



1. Heart failure

- 23 Feb 2023: Admitted with dyspnea and leg swelling. Diagnosis of heart failure.
- 24 Feb 2023: Heart failure slightly improved. Treatment with IV Lasix and strict fluid management.
- 25 Feb 2023: Heart failure improved. Transitioned to oral Lasix.
- 26 Feb 2023: Heart failure improved. Plan for discharge.
- 27 Feb 2023: Heart failure improved. Increased dyspnea noted.
- 28 Feb 2023: Heart failure improved. Mild crepitation in lower left lung (LLL). LLL pneumonia diagnosed. Treatment with IV Levofloxacin.
- 2 Mar 2023: Heart failure improved. LLL pneumonia ongoing. Continued treatment with IV Levofloxacin.
- 4 Mar 2023: Heart failure improved. LLL pneumonia improved. Switched to oral Levofloxacin.
- 5 Mar 2023: Heart failure improved. LLL pneumonia improved. Discharge planned for tomorrow.
- 6 Mar 2023: Heart failure improved. LLL pneumonia improved. Discharged with follow-up in 1 week at outpatient department (OPD) MED.

Inactive Problem List:

1. Hypertension (HT)
2. Diabetes mellitus (DM)
3. Dyslipidemia (DLP)
 - These conditions are not actively addressed during the admission and are considered inactive during this period.

Note: The summary is based on the provided information, and additional details from the patient's medical history may be required for a comprehensive assessment.



nature

News in focus



CHATGPT LISTED AS AUTHOR ON RESEARCH PAPERS

Many scientists disapprove of articles crediting the AI tool as a co-author.

The artificial-intelligence (AI) chatbot ChatGPT that has taken the world by storm has made its formal debut in the scientific literature – racking up at least four authorship credits on published papers and preprints.

Journal editors, researchers and publishers are now debating the place of such AI tools in the published literature, and whether it's appropriate to cite the bot as an author. Publishers are racing to create policies for the chatbot, which was released as a free-to-use tool last November by tech company OpenAI in San Francisco, California.

ChatGPT is a large language model (LLM), which generates convincing sentences by mimicking the statistical patterns of language in a huge database of text collated from the Internet. The bot is already disrupting sectors including academia: in particular, it is raising questions about the future of university essays and research production.



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eISSN: 1975-5937

Open Access

Review



J Educ Eval Health Prof 2023;20:6 • <https://doi.org/10.3352/jeehp.2023.20.6>

Jeehp
Journal of Educational Evaluation
for Health Professions

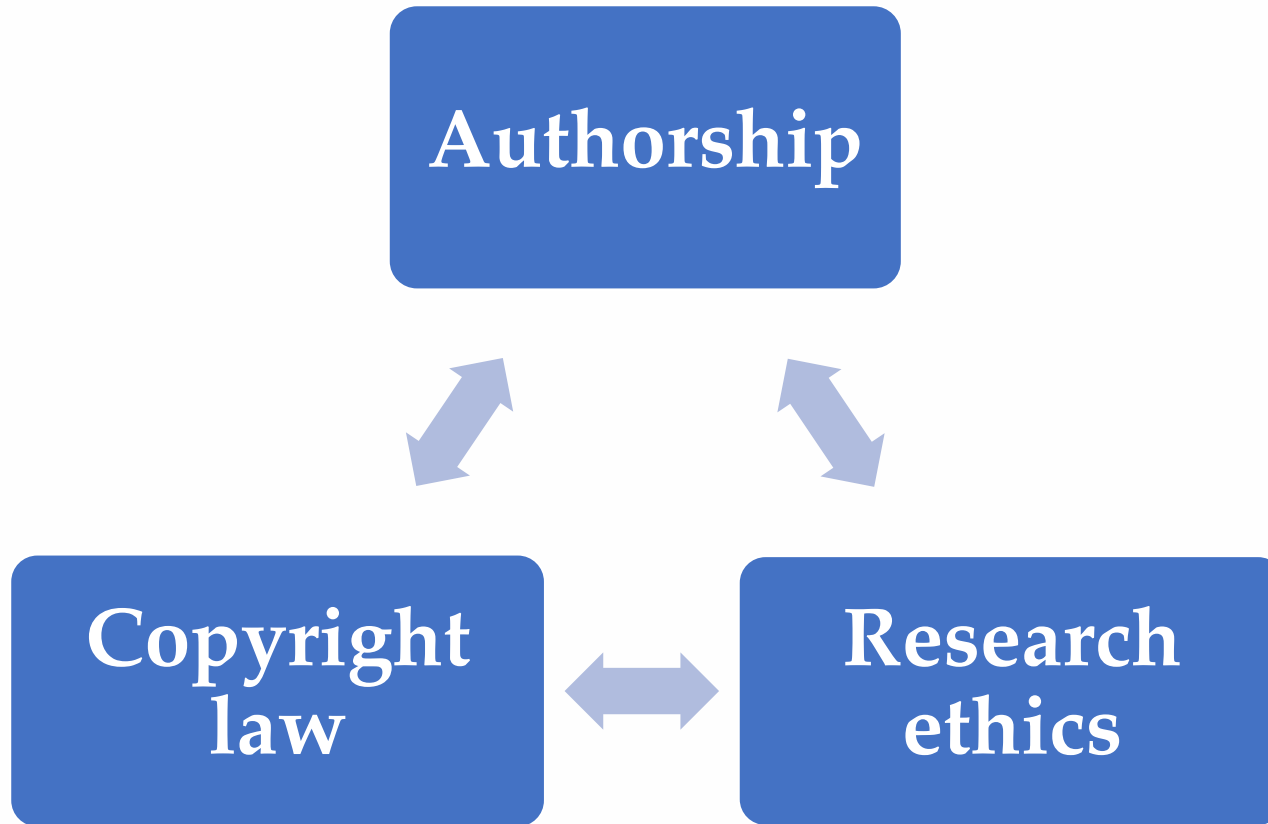
Can an artificial intelligence chatbot be the author of a scholarly article?

Ju Yoen Lee*

Hanyang University School of Law, Seoul, Korea

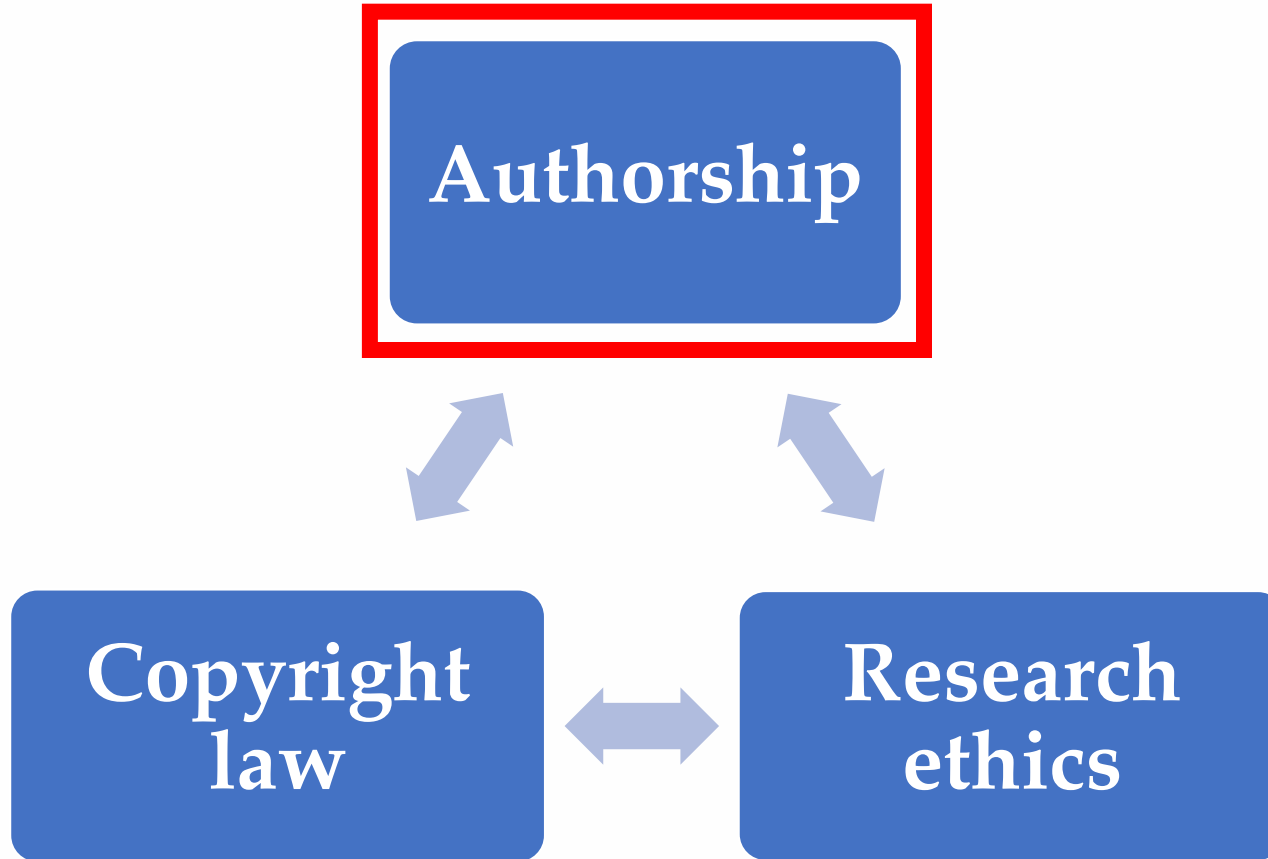
At the end of 2022, the appearance of ChatGPT, an artificial intelligence (AI) chatbot with amazing writing ability, caused a great sensation in academia. The chatbot turned out to be very capable, but also capable of deception, and the news broke that several researchers had listed the chatbot (including its earlier version) as co-authors of their academic papers. In response, Nature and Science expressed their position that this chatbot cannot be listed as an author in the papers they publish. Since an AI chatbot is not a human being, in the current legal system, the text automatically generated by an AI chatbot cannot be a copyrighted work; thus, an AI chatbot cannot be an author of a copyrighted work. Current AI chatbots such as ChatGPT are much more advanced than search engines in that they produce original text, but they still remain at the level of a search engine in that they cannot take responsibility for their writing. For this reason, they also cannot be authors from the perspective of research ethics.

Keywords: Authorship; Artificial intelligence; Chatbot; Copyright; Research ethics





Can an AI be the author of a scholarly article?





Editorials

nature

Tools such as ChatGPT threaten transparent science; here are our ground rules for their use

As researchers dive into the brave new world of advanced AI chatbots, publishers need to acknowledge the tools' legitimate uses and lay down clear guidelines to avoid abuse.

The big worry in the research community is that students and scientists could deceitfully pass off LLM-written text as their own, or use LLMs in a simplistic fashion (such as to conduct an incomplete literature review) and produce work that is unreliable. Several preprints and published articles have already credited ChatGPT with formal authorship.

That's why it is high time researchers and publishers laid down ground rules about using LLMs ethically. *Nature*, along with all Springer Nature journals, has formulated the following two principles, which have been added to our existing guide to authors (see go.nature.com/3jljxsw). As *Nature's* news team has reported, other scientific publishers are likely to adopt a similar stance (see page 620).

First, no LLM tool will be accepted as a credited author on a research paper. That is because any attribution of authorship carries with it accountability for the work, and AI tools cannot take such responsibility.

Second, researchers using LLM tools should document this use in the methods or acknowledgements sections. If a paper does not include these sections, the introduction or another appropriate section can be used to document the use of the LLM.



Authorship

provides credit for a researcher's contributions to a study and carries accountability. Authors are expected to fulfil the criteria below:

- Each author is expected to have made substantial **(I)** contributions to the **(I)** conception or design of the work; or **(II)** the acquisition, analysis, or interpretation of data; or **(III)** the creation of new software used in the work; or **(IV)** have drafted the work or substantively revised it.
- **AND** to have **(V)** approved the submitted version (and any substantially modified version that involves the author's contribution to the study);
- **AND** to have **(VI)** agreed both to be personally accountable for the author's own contributions and to ensure that questions related to the accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature.



Authorship

Author contribution statements

Nature Portfolio journals encourage transparency by publishing author contribution statements. Authors are required to include a statement of responsibility in the manuscript, including review-type articles, that specifies the contribution of every author. The level of detail varies; some disciplines produce manuscripts that comprise discrete efforts readily articulated in detail, whereas other fields operate as group efforts at all stages. Author contribution statements are included in the published paper. This [Nature Editorial](#) describes the policy in more detail.

Nature Portfolio journals also allow one set of co-authors to be specified as having contributed equally to the work and one set of co-authors to be specified as having jointly supervised the work. Other equal contributions are best described in author contribution statements. Corresponding authors have specific responsibilities (described above).

Editorials

nature



Authorship

Summary

Large Language Models (LLMs), such as **ChatGPT**, do not currently satisfy our authorship criteria. Notably an attribution of authorship carries with its accountability for the work, which cannot be effectively applied to LLMs.

Use of an LLM should be properly documented in the Methods section (and if a Methods section is not available, in a suitable alternative part) of the manuscript.



Can an artificial intelligence chatbot be the author of a scholarly article?

(กฎหมายลิขสิทธิ์)

Copyright law

ChatGPT



Research ethics

AI Chatbot and Copyright Law



Copyright offices and courts have a negative view.

AI Chatbot and Research Ethics



Currently?



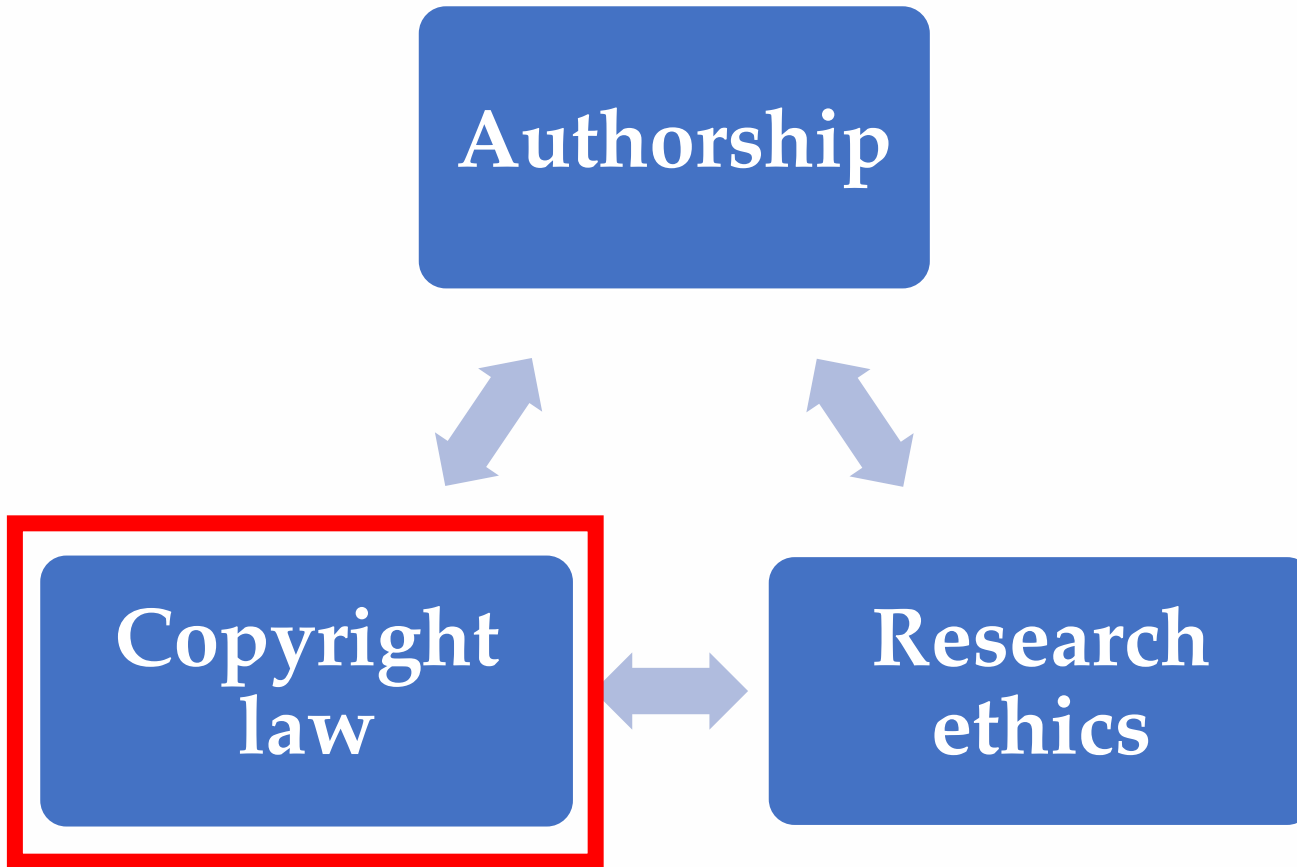
In the future?



It all depends.

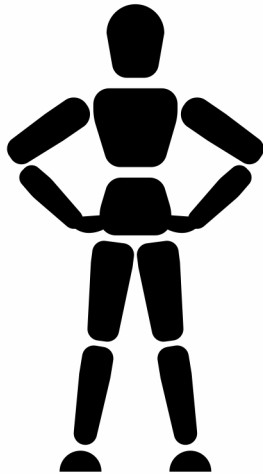
Conclusion

The current AI chatbot cannot be the author of an academic paper, not only from the perspective of copyright law but also from the perspective of research ethics.





Can the authorship of AI be acknowledged from the perspective of current copyright law?



Copyright offices and courts in many countries have generally expressed negative opinions on this issue, but depending on each country.



AI chatbot authorship from the perspective of “Copyright law”

Explicated statement

Korean; Copyright Act defines “a work” as “a creation that expresses the thoughts or feelings of a human being” and an “author” as “a person who creates a work?”

In the other word, anything created by a nonhuman being cannot be a copyrighted work, and a nonhuman being cannot be an author OR AI chatbot cannot be an author under Korean law.

In other countries (**USA, EU, UK, Australia, China, Japan**), copyright offices interpret their copyright statutes as endorsing the so-called “**human authorship principle**”, which means that for a work to be copyrightable, it must be created by a human.



AI chatbot authorship from the perspective of “Copyright law”

Explicated statement

China; copyrighted work was created by a “natural person”, but does not explicitly state that the creator of a work must be a human being

AI does not have the capacity to have a right, held that originality alone is not sufficient for a work to be protected and a copyrighted work must be created by a natural person

USA; have also protected only works created by “natural person”

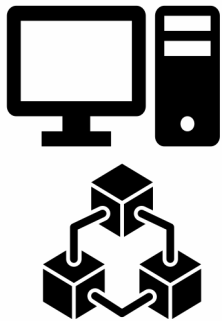
Reject copyright registration for artwork, which was allegedly automatically generated by an AI program named Creativity Machine

Reject photo painted by monkeys because they are not humans and therefore lack statutory standing under the Copyright Act

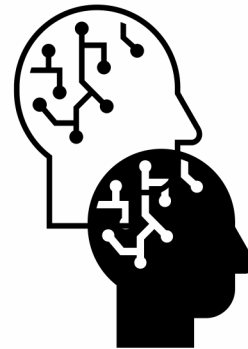


AI chatbot authorship from the perspective of “Copyright law”

It may be sometimes difficult to recognize whether a paper is written by a chatbot or a human being, because chatbots use advanced techniques



- fast comprehending information deeply
- connecting evidence to reach conclusions



- limitations in their ability to read a comprehensive range of literature
- limitations in distinguishing the connections between seemingly separate pieces of information.



AI chatbot authorship from the perspective of “Copyright law”

Characteristics that a paper was written by a chatbot: lack of nuance, style, or originality, which could allow the identification by AI output detectors and skeptical human reviewers.

Texts written in a language that is not an individual’s native tongue, it is possible that AI plagiarism detectors would identify non-native English language papers as AI-generated text.

Journal editors should use programs to detect written content using AI.



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GPT-4, ChatGPT & AI Detector by ZeroGPT: detect OpenAI text

ZeroGPT the most Advanced and Reliable Chat GPT, GPT4 & AI Content Detector

Link: <https://www.zerogpt.com>



Example of a tool helping to detect AI generating text

k

can you summarize the literature about deep learning in prostate cancer within 500 words



Certainly! Here's a summary of the literature on deep learning applications in prostate cancer within 500 words.



Deep learning has emerged as a powerful tool in prostate cancer research, enabling significant advancements in diagnosis, prognosis, and treatment. Prostate cancer is one of the most common cancers in men, and deep learning techniques have shown great potential in improving various aspects of its management.

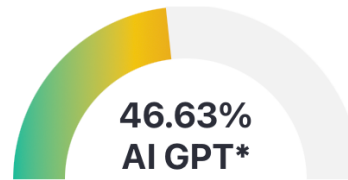
One area where deep learning has been extensively explored is the analysis of histopathological images. Deep learning algorithms, particularly convolutional neural networks (CNNs), have been employed for automated cancer detection and classification. These models are trained on large datasets of histopathological images and can accurately identify cancerous regions, helping pathologists in the diagnosis process. They have demonstrated high sensitivity and specificity, potentially improving diagnostic accuracy and reducing interobserver variability.





Example of a tool helping to detect AI generating text

Your Text is Likely generated by AI/GPT



Certainly! Here's a summary of the literature on deep learning applications in prostate cancer within 500 words.

Deep learning has emerged as a powerful tool in prostate cancer research, enabling significant advancements in diagnosis, prognosis, and treatment. Prostate cancer is one of the most common cancers in men, and deep learning techniques have shown great potential in improving various aspects of its management.

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AI chatbot authorship from the perspective of “Copyright law”

Accept registration

India and **Canada**; copyright office accepted a copyright registration application where an AI painting app named Raghav was listed as a co-author of a painting titled “Suryast”.

However, it is too early to determine that the copyright ability has been recognized for a work automatically generated by AI, or that the co-authorship of AI has been recognized



AI chatbot authorship from the perspective of “Copyright law”



Bangkok Post

AI art raises questions about copyright

PUBLISHED : 26 OCT 2022 AT 04:00

NEWSPAPER SECTION: OPED

WRITER: SALILTORN THONGMEENSUK

AI x Copyright เมื่อผลงานจาก AI
อาจได้รับลิขสิทธิ์ที่ถูกต้องได้ตาม
กฎหมาย





AI chatbot authorship from the perspective of “Copyright law”



Thailand

The Journal of Law, Public Administration and Social Science.

School of Law Chiang Rai Rajabhat University Vol.5 No.1 (January – June 2021)

Copyright Protection on AI-Generated Work : The Case Study of the US, UK, and Thailand Copyright Laws*

In Thailand, the provisions are quite clear to show that AI can likely never fulfil the requirement of copyrightability without personality. Even the work created by AI can easily fall under any one of the nine types of copyrighted work (Sec. 6), this research also found it difficult to prove that its work would meet the condition of originality and creativity. Can we say that AI device spends “effort, knowledge, and intellect” as stated by the Supreme Court which deserves reward of copyright protection in return? Reading together with Sec. 8 on the point of attachment, of the repeated terms “national and domicile”, it is moreover hard to believe that the Thai legislators ever expected to apply copyright with AI author.



AI chatbot authorship from the perspective of “Copyright law”



Thailand

The Journal of Law, Public Administration and Social Science.

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Copyright Protection on AI-Generated Work : The Case Study of the US, UK, and Thailand Copyright Laws*

This research found it unreasonable to include AI and its generated work under the Thai current regime as the copyright system is, at present, unable to holistically serve the new technology of artificial intelligence.

According to Prof. Thatchai Supphaphonsiri, to be copyrightable, apart from the fact that the work must be able to fulfill the conditions of copyrightability and is not protected under other laws (i.e. patent), the entire copyright system must be in support and facilitate its protection²⁰. Though the AI-generated work can likely be categorized under “any other work in the literary, scientific or artistic field...” subject to Sec. 6 par. 1, the work by nature is argued to be incompatible with the overall copyright system given that it does not fit with several provisions that are initially set to serve human author.

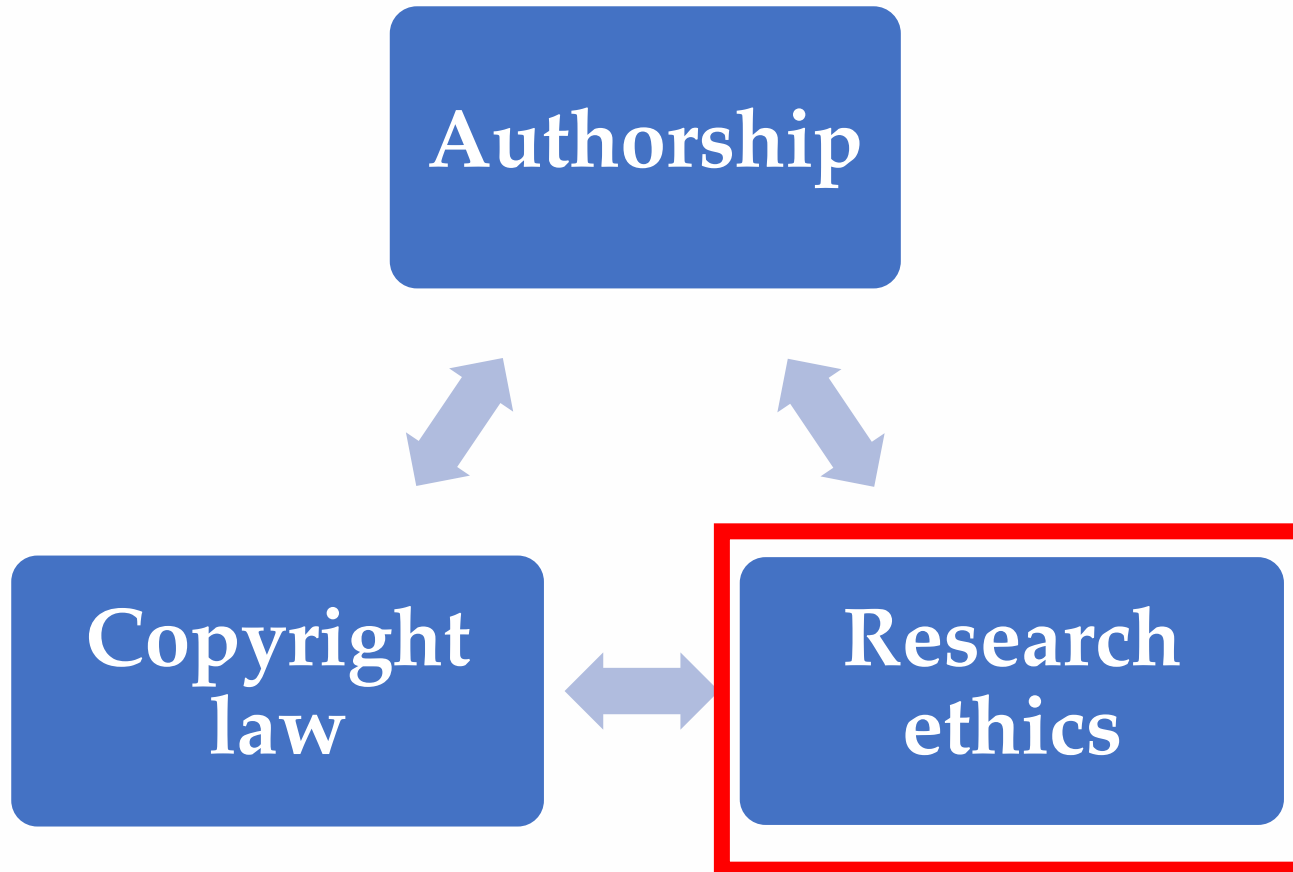


AI chatbot authorship from the perspective of “Copyright law”

Summary

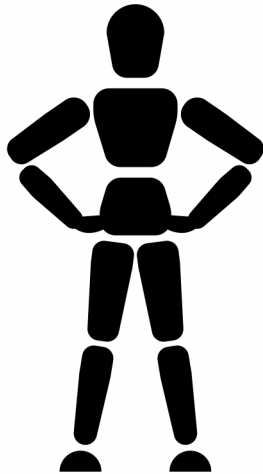
- Copyright offices and courts in many countries have generally expressed negative opinions on this issue.
- The fact that AI is denied a legal personality and cannot be a copyright holder serves as a strong argument that AI cannot be an author.
- Another argument is that AI cannot exercise rights by itself, AI cannot decide by itself whether to exercise moral rights, such as the right to make the work public, the right to claim authorship of the work, and the right to integrity of the work, which are inalienable and exclusive to the author.

In this respect, it is clear that AI cannot be an author under the current copyright regime.





From the perspective of research and publication ethics, the question remains of whether an AI chatbot can become an author of an academic paper



The answer to this question is, “it all depends.”

The fact is that if a writing is not the work of a human, it may not be appropriate to attribute it to a human as an author.

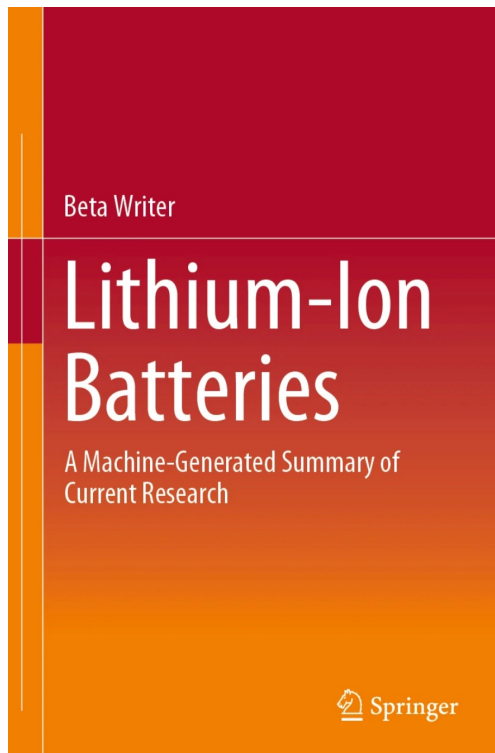


AI chatbot authorship from the perspective of “Research ethics”

China; as the Beijing Internet Court mentioned as dicta in the case of Feilin Law Firm v Baidu, AI-generated outputs must not have a human being indicated as the author, whether the human being is the developer (owner) of the AI program or its user (a person who has rights and interests in the AI creation as determined by the court), and it must be indicated that the outputs were automatically generated by AI.



AI chatbot authorship from the perspective of “Research ethics”



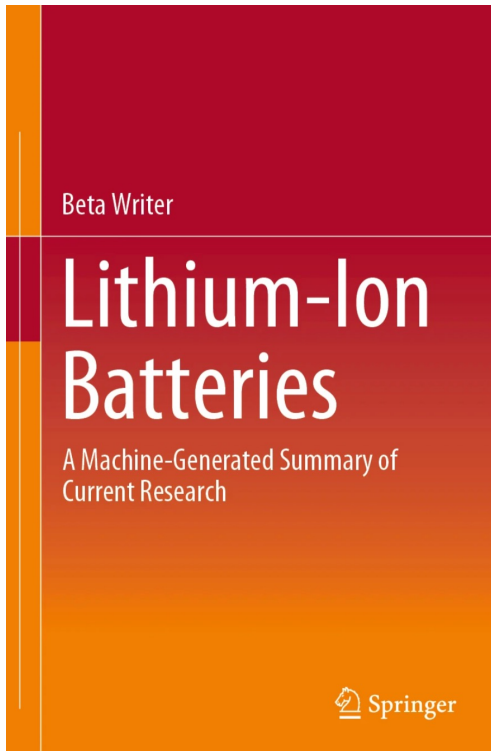
A book authored by AI was published in 2019. The author of Lithium-Ion Batteries, introduced as the first machine-generated research book, is Beta Writer, an algorithm developed through a collaboration between Springer Nature and researchers at Goethe University.

From a legal point of view, writings generated by Beta Writer are not copyrighted works, and Beta Writer cannot be considered authors.

Still, it was appropriate to publish the works under the names of “Beta Writer” because it would be against publishing ethics to publish such writings under the name of human beings.



AI chatbot authorship from the perspective of “Research ethics”



The reason why this book was published (i.e., the value of this book) did not lie in its content (i.e., the research results). In fact, the book contained many manifest flaws, such as grammatical errors. Rather, the real value of the book lay in the fact that “Beta Writer,” which is not a human being, wrote a book on scientific research, which was expected to promote related discussions and future research. Likewise, if an editor thinks that an academic paper that was generated by an AI chatbot has some academic value, he or she may allow the publication of the paper credited to ChatGPT.



Can an artificial intelligence chatbot be the author of a scholarly article?



ChatGPT



AI Chatbot and Copyright Law



Copyright offices and courts have a negative view.

AI Chatbot and Research Ethics

Currently?



In the future?



It all depends.

Conclusion

The current AI chatbot cannot be the author of an academic paper, not only from the perspective of copyright law but also from the perspective of research ethics.



Summary

Nature and Science declare that AI chatbots cannot be authors of articles published in their journals: do not currently satisfy our authorship criteria.

Author is not just because AI chatbots are not human, but because the currently available AI chatbots do not meet the required qualifications for accountability.

This also implies that an advanced AI chatbot in the future might meet the criteria for authorship of academic papers.

Perspective of copyright: AI chatbots do not have the capacity to consent to the distribution of the paper is another reason why they cannot be considered authors.

Perspective of research ethics: if an AI chatbot makes a significant contribution to research and can explain and prove the research results, it would be reasonable to recognize its authorship.



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Concerns regarding the ChatGPT



I. Be fast and easy to use, but perhaps too easy if one fails to use it responsibly and with care.

II. Be used to write and replace critical thinking and thorough literature reviews to the detriment of the user. In the case of students, the writing of their first manuscripts is a transformative training experience. Over-reliance on these language bots deprives them of this opportunity, limiting their intellectual growth and confidence.

III. Lead to banal, cookie-cutter and uninteresting science if not used as only a jumping-off point for creative science. AI tools are typically good at regurgitating conventional wisdom, but weak when it comes to identifying and generating unique outcomes. They can be even worse at judging whether a unique outcome is spurious, anomalous or groundbreaking.

IV. Fail to provide both sides of controversial topics, particularly without user input. ChatGPT cannot express disruptive concepts.



V. Be used without reading the actual papers that support claims made by the author. As mentioned earlier, ChatGPT can invent references or spurious correlations. The output of the AI model cannot be taken at face value; all outputs need to be subjected to critical review to prevent errors, missing key information, or making unrelated claims. ChatGPT might be more likely to generate incorrect information if the available data is incomplete or outdated.

VI. Inherit the built-in biases and falsehoods intrinsic to the scientific enterprise. It can suppress minority views that question or oppose a well-established concept or explanation of a scientific phenomenon, or overlook works with fewer citations arising from intrinsic biases.

VII. Generate text that is not forward-looking, as it might summarize the consensus without user intervention. Introductions and review papers that are based solely upon the output of ChatGPT will lack thoughtful insights on where a field is headed.



VIII. Lead to an increase of submissions of perspectives, accounts, and reviews that lack nuance in the storyline and forward-looking discussion since these manuscript types can be easily generated by ChatGPT with the existing information.

IX. Generate output that is incorrect or recently shown to be false. Outputs can also be manipulated to support arguments with tailored prompts.

X. Present major challenges with regards to the reporting of clinically relevant findings that require transparency in outcomes reporting, clear communication of trial designs, and other information. Given the important role that publications can play in reporting clinically actionable findings that can drive practice change, the use of ChatGPT in these circumstances might require substantial oversight and disclosure.



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Use AI for scientific writing in a smart way



Recommendations for the use of AI language bots for scientific communication:

I. Acknowledge, in the Acknowledgments and Experimental Sections, your use of an AI bot/ChatGPT to prepare your manuscript. Clearly indicate which parts of the manuscript used the output of the language bot, and provide the prompts and questions, and/or transcript in the Supporting Information.

II. Remind your coauthors, and yourself, that the output of the ChatGPT model is merely a very early draft, at best. The output is incomplete, might contain incorrect information, and every sentence and statement must be considered critically. Check, check, and check again. And then check again.

III. Do not use text verbatim from ChatGPT. These are not your words. The bot might have also reused text from other sources, leading to inadvertent plagiarism.



Recommendations for the use of AI language bots for scientific communication:

IV. Any citations recommended by an AI bot/ChatGPT need to be verified with the original literature since the bot is known to generate erroneous citations.

V. Do not include ChatGPT or any other AI-based bot as a co-author. It cannot generate new ideas or compose a discussion based on new results, as that is our domain as humans. It is merely a tool, like many other programs, for helping with the formulation and writing of manuscripts.

VI. ChatGPT cannot be held accountable for any statement or ethical breach. As it stands, all authors of a manuscript share this responsibility.

VII. And most importantly, do not allow ChatGPT to squelch your creativity and deep thinking. Use it to expand your horizons and spark new ideas!



10 ข้อควรรู้ก่อนใช้ ChatGPT

แบบปฏิบัติเบื้องต้นในการใช้ ChatGPT สำหรับองค์กร



- คำตอบจาก ChatGPT อาจไม่ถูกต้อง 100% แม้ว่าโดยส่วนใหญ่แล้วข้อมูลและข้อเท็จจริงที่ ChatGPT ตอบกลับมาจากชุดเหตุผลผลได้อย่างน่าทึ่งก็ตาม ประเด็นหลักที่ควรคำนึงคือการที่ ChatGPT ให้คำตอบเหมือนกับเป็นมนุษย์ที่มีคลังข้อมูลความรู้เทียบเท่ากับสารานุกรมโลก อาจทำให้ผู้ใช้หลงคิดว่าข้อมูลที่ได้นั้นน่าจะถูกต้องเชื่อถือได้ ดังนั้น ผู้ใช้ควรตรวจสอบข้อมูลที่ได้อีกครั้งจากแหล่งอ้างอิงอื่นด้วย [จากข้อมูลของ Australian National University ได้ทำการประเมินว่า ChatGPT ตอบคำถามแบบคาดเดากว่า 15 - 21 %]
- เวอร์ชันปัจจุบันของ ChatGPT ยังไม่สามารถระบุแหล่งที่มาของข้อมูลได้ จึงไม่ควรนำคำตอบที่ได้ไปอ้างอิง โดยเฉพาะในงานที่ต้องการความถูกต้องของข้อมูลอย่างสูง เช่น งานทางด้านวิชาการ เป็นต้น
- จากข้อมูลของผู้พัฒนา ChatGPT คือ บริษัท OpenAI แจ้งไว้ว่า ข้อมูลที่นำมาใช้พัฒนา ChatGPT ถึงปี 2021 ดังนั้น ควรระมัดระวังคำตอบจะไม่ครอบคลุมข้อมูลที่เกิดขึ้นหลังปี 2021
- การพัฒนา ChatGPT เป็นการนำข้อมูลจากแหล่งต่าง ๆ เช่น บทความ หนังสือ วิกิพีเดีย ไปจนถึงเว็บไซต์ต่าง ๆ มาสอนระบบ AI ของ ChatGPT จึงไม่สามารถการันตีได้ว่าคำตอบที่ได้จะไม่มีความเอนเอียง (Bias) และนำไปสู่การเลือกปฏิบัติ หรือสร้างความไม่ยุติธรรม ผู้ใช้จึงควรตรวจสอบคำตอบว่ามีประเด็นที่เป็น Bias หรือไม่
- การให้บริการ ChatGPT มีทั้งแบบเสียเงินและใช้ฟรี ซึ่งแน่นอนว่าการใช้แบบเสียเงินจะได้รับคำตอบที่รวดเร็วกว่าในเวลาที่ผู้ใช้พร้อม ๆ กัน และสามารถใช้งานฟังก์ชันใหม่ ๆ ได้ ผู้ใช้ควรคำนึงถึงเงื่อนไขการใช้งานด้วยว่า ควรจะใช้บริการ ChatGPT แบบใดที่เหมาะสมกับงานและความคุ้มค่าที่จ่ายไป
- การตั้งคำถาม (Prompts) เพื่อให้ ChatGPT ตอบ ถ้าไม่กำหนดกรอบคำถามให้ชัดเจนแล้ว ผู้ใช้อาจจะได้คำตอบที่กว้างมากจนไม่สามารถนำไปใช้งานต่อได้ ผู้ใช้ควรตั้งคำถามที่เหมาะสมเพื่อให้ได้คำตอบที่ตรงกับความต้องการ เช่น เลือกใช้คำที่เข้าใจง่าย ให้รายละเอียดที่ชัดเจน ใช้ตัวอย่างช่วยถาม เลี่ยงคำกำกวม ใช้คำเดียวกันเหมือนกับทุกข้อความ เป็นต้น
- เนื่องจาก ChatGPT เป็นการนำ Language model ดังนั้น สิ่งที่ ChatGPT สร้างขึ้นมาเป็น response เกิดจากการใช้ Language model ซึ่งควรระมัดระวังว่าจะไม่มีส่วนที่สะท้อนความถูกต้องของข้อมูล โดยเฉพาะข้อมูลบุคคล
- จากที่ผู้พัฒนา ChatGPT แจ้งว่ามีการใช้ข้อมูลภาษาไทยในการพัฒนา ChatGPT ในอัตราส่วนที่น้อยมากเมื่อเทียบกับภาษาอังกฤษ จึงทำให้การตั้งคำถามโดยใช้ภาษาไทยอาจจะได้คำตอบที่ไม่ครบถ้วน จึงแนะนำให้ใช้ภาษาอังกฤษในการตั้งคำถาม
- การใช้ ChatGPT โดยการป้อนข้อมูลสำคัญขององค์กร หรือเอกสารส่วนตัวของผู้ใช้เองเพื่อตรวจสอบความถูกต้องหรือขอคำแนะนำเพื่อปรับปรุงเอกสารนั้น ผู้ใช้ควรระวังในการให้ข้อมูลที่มีความเสี่ยงเข้าสู่ระบบ เช่น ข้อมูลส่วนบุคคล หรือข้อมูลความลับขององค์กร จึงไม่ควรใช้ ChatGPT กับข้อมูลในลักษณะนี้เด็ดขาด
- การพัฒนา ChatGPT ที่ผ่านมามีการอัปเดตความสามารถของระบบและเงื่อนไขในการใช้งานอยู่ตลอดเวลา ผู้ใช้ควรติดตามข้อมูลข่าวสารอย่างใกล้ชิด

ศูนย์ธรรมาภิบาลปัญญาประดิษฐ์ โดย สพรอ.
 (AI Governance Clinic by ETDA)
<https://www.etda.or.th/th/Our-Service/AIGC/index.aspx>



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Summary



- ChatGPT is an AI software potentially able to assist in the writing process of a scientific paper and can help in the literature review, identify research questions, provide an overview of the current state of the field, and assist with tasks, such as formatting and language review. Moreover, it can have applications in clinical practice as time-savers.
- As chatbot tools will be widely adopted in the near future, it is crucial to have international academic regulations in place to regulate their use in scientific writing and establish mechanisms for identifying and penalizing unethical usage.
- Chatbots are simply tools, they can assist human researchers but should not be used as a replacement for human researchers' expertise, judgment, and personality.



- The current AI chatbot cannot be the author of an academic paper, not only from the perspective of copyright law but also from the perspective of research ethics.
- Although researchers can use AI chatbots as research tools, they must be aware that AI chatbots can be competent but dangerous research assistants, and the authenticity of any AI-generated text must be verified.
- Researchers should always remember that although using AI chatbots is exciting and full of potential, it also comes with heavy responsibilities.



➤ The author requested to ChatGPT

“Could you review this paper and tell us if you (as an author!) agree to submit it to Critical Care Journal?”. The (non-modified) response from ChatGPT has been: *“As an AI model, I am not able to review or submit papers to journals as I am not a researcher or author. However, I can give you some feedback on the paper you’ve provided. The paper... It’s important to keep in mind that ChatGPT should always be used in combination with the expertise and judgement of human experts and its output should be validated before it is used in clinical practice.”*

PERSPECTIVE

Open Access

Can artificial intelligence help for scientific writing?

Michele Salvagno^{1*}, Fabio Silvio Taccone¹ and Alberto Giovanni Gerli²





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2. Buriak JM, Akinwande D, Artzi N, Brinker CJ, Burrows C, Chan WCW, et al. Best Practices for Using AI When Writing Scientific Manuscripts. *ACS Nano*. 2023;17(5):4091-3.
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6. Authorship; <https://www.nature.com/nature-portfolio/editorial-policies/authorship>



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Thank You