Kuidas võib tehisaru muuta teadlase elu?

Marek Tamm
kultuuriajaloo professor

KOOS ÕPPE JÕUD

TALLINNA ÜLIKOOL

Ettekande lähtekohad

- **Autoetnograafia** (ehk minu elu ChatGPT-ga)
- **Erialakirjanduse süntees** (ehk mida me teame uuringutepõhiselt)
- **Tulevikuprognoosid** (ehk kuhu see kõik välja võib viia)

KOOS ÕPPE JÕUD

TALLINNA ÜLIKOOL

Ettekande ülesehitus

1. Tehisaru kui teadlase assistent
2. Tehisaru kui teadlase asemik
3. Mida sellest kõigest järeldada?

KOOS ÕPPE JÕUD

TALLINNA ÜLIKOOL

1. Tehisaru kui teadlase assistent ehk kuidas ChatGPT on muutnud minu ja teiste teadlaste elu (kümnes punktis)

KOOS ÕPPE JÕUD

TALLINNA ÜLIKOOL

“Our research indicates that scholars’ knowledge about what may or may not classify as AI is still limited. More than half of the respondents (57%) described themselves as “somewhat familiar” with AI technology and how it works. A higher percentage of STEM scholars (28%) said they were “very familiar” with AI, compared to HSS scholars (19%).
A similar picture emerges when looking specifically at ChatGPT/GPT-4: 52% of respondents described themselves as being “quite familiar” with the tool, while 29% said they were not familiar with it at all. Several HSS scholars commented that the use of ChatGPT/GPT-4 could be problematic in their field. There was less opposition among STEM scholars.”

KOOS OPPE JOUD

https://blog.degruyter.com/chatgpt-in-academia-how-scholars-integrate-artificial-intelligence-into-their-daily-work/

preprints.org > social sciences > education > doi: 10.20944/preprints202406.0011.v1

Preprint **Review** *Version 1* **Preserved in Portico** **This version is not peer-reviewed**

Generative Artificial Intelligence, AI for Scientific Writing: A Literature Review

Jovan Shopovski *

Version 1 : Received: 31 May 2024 / Approved: 31 May 2024 / Online: 3 June 2024 (12:01:18 CEST)

How to cite: Shopovski, J. Generative Artificial Intelligence, AI for Scientific Writing: A Literature Review. *Preprints* **2024**, 2024060011. https://doi.org/10.20944/preprints202406.0011.v1 Copy

Abstract

The growing usage of Generative AI tools in scientific writing requires a critical examination of their benefits and challenges. This literature review is aimed at comprehensively analyzing current empirical research articles focused on the application of Generative AI in scientific writing. The Google Scholar database was used to search for the literature. The following keywords were used: "Generative AI" and "academic writing", "LLM" (Large Language Models) and "academic writing", "Generative AI" and "Scientific writing", and "ChatGPT" and "Scientific Writing". The search was restricted to articles published between January 1, 2023, and April 30, 2024. 15 articles were selected as appropriate for the study and analyzed. It was found that, thus far, ChatGPT is the most exploited tool in the studies. AI tools such as Bard (Gemini), Bing, Claude2, and Elicit were also tested. The benefits of Generative AI usage in scientific writing were found to be omnipresent. It can aid in the generation of structured abstracts, titles, introductions, literature reviews, and conclusions of a scientific article. Generative AI also makes writing more efficient and time-saving. Its capabilities in improving language and proofreading are well-established. However, the generation of inaccurate content and references by current commercially available LLMs poses a serious problem. The lack of critical thinking and tendency to produce non-original content are significant drawbacks. Generative AI should be employed with human oversight, serving as an assistant rather than a replacement. Transparency in AI usage in scientific writing is essential, along with the necessity for proper legal regulation.

Keywords

Artificial Intelligence; AI; Generative AI; Large Language Models (LLMs); Scientific Writing; ChatGPT

Subject

Social Sciences, Education

https://www.preprints.org/manuscript/202406.0011/v1

Computer Science > Computation and Language

[Submitted on 3 Nov 2023]

An Interdisciplinary Outlook on Large Language Models for Scientific Research

James Boyko, Joseph Cohen, Nathan Fox, Maria Han Veiga, Jennifer I-Hsiu Li, Jing Liu, Bernardo Modenesi, Andreas H. Rauch, Kenneth N. Reid, Soumi Tribedi, Anastasia Visheratina, Xin Xie

In this paper, we describe the capabilities and constraints of Large Language Models (LLMs) within disparate academic disciplines, aiming to delineate their strengths and limitations with precision. We examine how LLMs augment scientific inquiry, offering concrete examples such as accelerating literature review by summarizing vast numbers of publications, enhancing code development through automated syntax correction, and refining the scientific writing process. Simultaneously, we articulate the challenges LLMs face, including their reliance on extensive and sometimes biased datasets, and the potential ethical dilemmas stemming from their use. Our critical discussion extends to the varying impacts of LLMs across fields, from the natural sciences, where they help model complex biological sequences, to the social sciences, where they can parse large-scale qualitative data. We conclude by offering a nuanced perspective on how LLMs can be both a boon and a boundary to scientific progress.

Subjects: **Computation and Language (cs.CL)**; Artificial Intelligence (cs.AI); Digital Libraries (cs.DL); Machine Learning (cs.LG)
Cite as: arXiv:2311.04929 **[cs.CL]**
(or arXiv:2311.04929v1 **[cs.CL]** for this version)
https://doi.org/10.48550/arXiv.2311.04929

Submission history
From: Kenneth Reid [view email]
[v1] Fri, 3 Nov 2023 19:41:09 UTC (167 KB)

"Our evaluative commentary aims to foster further discussion and clear considerations of the integration of LLMs in scientific research, promoting a balanced view that capitalizes on their potential while conscientiously navigating their constraints. We conclude with a cautiously optimistic outlook, positing that LLMs, when employed judiciously, will indeed serve as a catalyst for more dynamic and introspective scientific inquiry."

https://arxiv.org/abs/2311.04929

KOOS OPPE JÕUD

TALLINNA ÜLIKOOL

Computer Science > Computation and Language

[Submitted on 1 Apr 2024]

Mapping the Increasing Use of LLMs in Scientific Papers

Weixin Liang, Yaohui Zhang, Zhengxuan Wu, Haley Lepp, Wenlong Ji, Xuandong Zhao, Hancheng Cao, Sheng Liu, Siyu He, Zhi Huang, Diyi Yang, Christopher Potts, Christopher D Manning, James Y. Zou

Scientific publishing lays the foundation of science by disseminating research findings, fostering collaboration, encouraging reproducibility, and ensuring that scientific knowledge is accessible, verifiable, and built upon over time. Recently, there has been immense speculation about how many people are using large language models (LLMs) like ChatGPT in their academic writing, and to what extent this tool might have an effect on global scientific practices. However, we lack a precise measure of the proportion of academic writing substantially modified or produced by LLMs. To address this gap, we conduct the first systematic, large-scale analysis across 950,965 papers published between January 2020 and February 2024 on the arXiv, bioRxiv, and Nature portfolio journals, using a population-level statistical framework to measure the prevalence of LLM-modified content over time. Our statistical estimation operates on the corpus level and is more robust than inference on individual instances. Our findings reveal a steady increase in LLM usage, with the largest and fastest growth observed in Computer Science papers (up to 17.5%). In comparison, Mathematics papers and the Nature portfolio showed the least LLM modification (up to 6.3%). Moreover, at an aggregate level, our analysis reveals that higher levels of LLM-modification are associated with papers whose first authors post preprints more frequently, papers in more crowded research areas, and papers of shorter lengths. Our findings suggests that LLMs are being broadly used in scientific writings.

Subjects: **Computation and Language (cs.CL)**; Artificial Intelligence (cs.AI); Digital Libraries (cs.DL); Machine Learning (cs.LG); Social and Information Networks (cs.SI)

Cite as: arXiv:2404.01268 [cs.CL]

(or arXiv:2404.01268v1 [cs.CL] for this version)

https://doi.org/10.48550/arXiv.2404.01268

Submission history

From: Weixin Liang [view email]

[v1] Mon, 1 Apr 2024 17:45:15 UTC (3,875 KB)

KOOS OPPE JÕUD

"Our findings reveal a steady increase in LLM usage, with the largest and fastest growth observed in Computer Science papers (up to 17.5%). (...) Moreover, at an aggregate level, our analysis reveals that higher levels of LLM-modification are associated with papers whose first authors post preprints more frequently, papers in more crowded research areas, and papers of shorter lengths. Our findings suggests that LLMs are being broadly used in scientific writings."

https://arxiv.org/abs/2404.01268

TALLINNA ÜLIKOOL

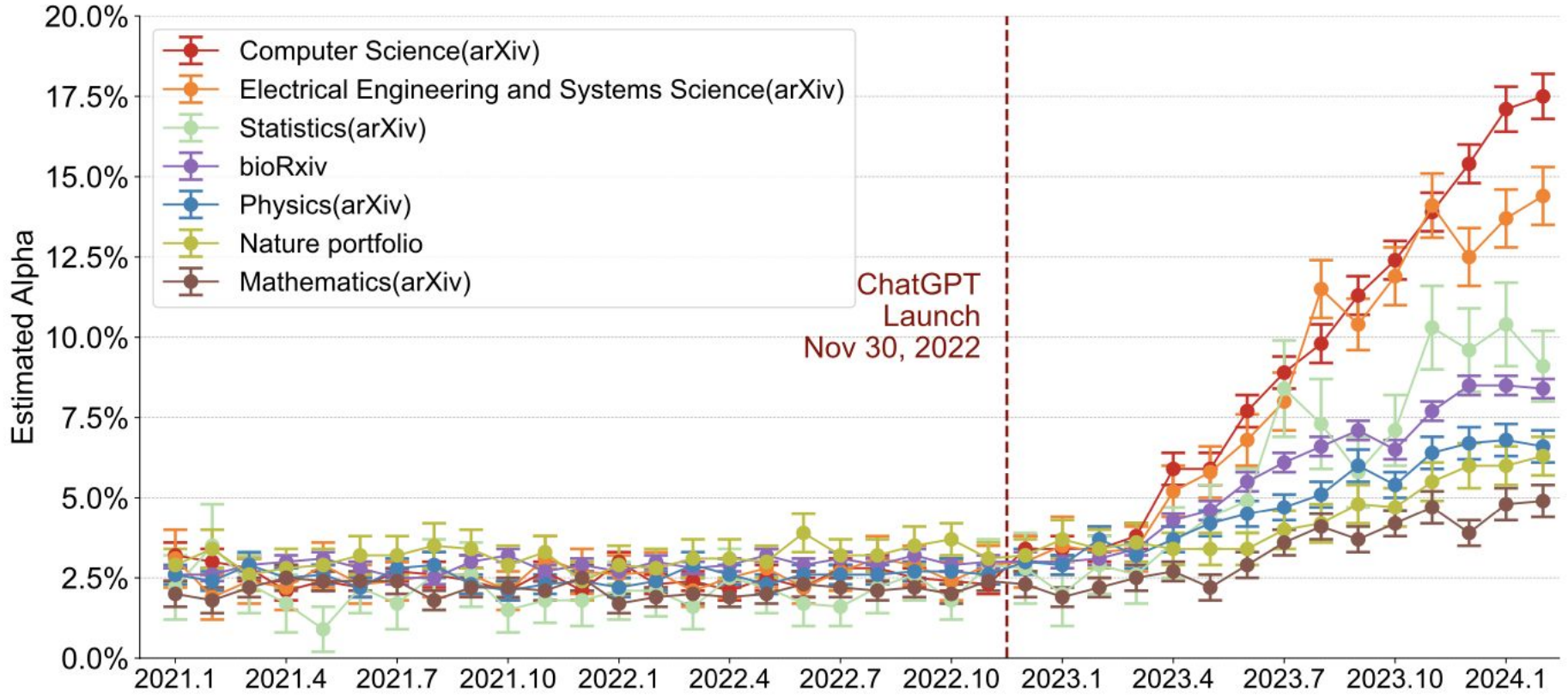


Figure 1: **Estimated Fraction of LLM-Modified Sentences across Academic Writing Venues over Time.** This figure displays the fraction (α) of sentences estimated to have been substantially modified by LLM in abstracts from various academic writing venues. The analysis includes five areas within *arXiv* (Computer Science, Electrical Engineering and Systems Science, Mathematics, Physics, Statistics), articles from *bioRxiv*, and a combined dataset from 15 journals within the *Nature* portfolio. Estimates are based on the *distributional GPT quantification* framework, which provides population-level estimates rather than individual document analysis. Each point in time is independently estimated, with no temporal smoothing or continuity assumptions applied. Error bars indicate 95% confidence intervals by bootstrap. Further analysis of paper introductions is presented in Figure 7.

Weixin Liang et al., "Mapping the Increasing Use of LLMs in Scientific Papers", arXiv:2404.01268, 1 April 2024

Computer Science > Computation and Language

[Submitted on 20 Sep 2024 (v1), last revised 22 Oct 2024 (this version, v2)]

The Impact of Large Language Models in Academia: from Writing to Speaking

Mingmeng Geng, Caixi Chen, Yanru Wu, Dongping Chen, Yao Wan, Pan Zhou

Large language models (LLMs) are increasingly impacting human society, particularly in textual information. Based on more than 30,000 papers and 1,000 presentations from machine learning conferences, we examined and compared the words used in writing and speaking, representing the first large-scale study of how LLMs influence the two main modes of verbal communication and expression within the same group of people. Our empirical results show that LLM-style words such as "significant" have been used more frequently in abstracts and oral presentations. The impact on speaking is beginning to emerge and is likely to grow in the future, calling attention to the implicit influence and ripple effect of LLMs on human society.

Comments: 23 pages
Subjects: **Computation and Language (cs.CL)**; Artificial Intelligence (cs.AI); Computers and Society (cs.CY); Digital Libraries (cs.DL); Machine Learning (cs.LG)
Cite as: arXiv:2409.13686 **[cs.CL]**
(or arXiv:2409.13686v2 **[cs.CL]** for this version)
https://doi.org/10.48550/arXiv.2409.13686

Submission history

From: Mingmeng Geng [view email]
[v1] Fri, 20 Sep 2024 17:54:16 UTC (3,993 KB)
[v2] Tue, 22 Oct 2024 17:06:17 UTC (8,235 KB)

KOOS OPPE JÕUD

"Our findings demonstrate the impact of LLMs in the abstracts of papers at top machine learning conferences. We also found that the words used in the talks were also influenced by LLMs, although this effect was less than in the abstracts."

https://arxiv.org/abs/2409.13686

TALLINNA ÜLIKOOL

“On taxonomic labeling tasks (classification), LLMs fail to outperform the best fine-tuned models but still achieve fair levels of agreement with humans. On free-form coding tasks (generation), LLMs produce explanations that often exceed the quality of crowdworkers’ gold references. [...] In summary, LLMs are posed to meaningfully participate in social science analysis in partnership with humans.”

KOOS OPPE JOUD

Can Large Language Models Transform Computational Social Science?

Caleb Ziems, William Held, Omar Shaikh, Jiaao Chen, Zhehao Zhang, Diyi Yang

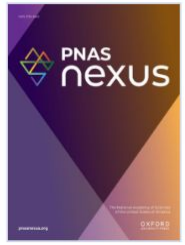
Abstract

Large language models (LLMs) are capable of successfully performing many language processing tasks zero-shot (without training data). If zero-shot LLMs can also reliably classify and explain social phenomena like persuasiveness and political ideology, then LLMs could augment the computational social science (CSS) pipeline in important ways. This work provides a road map for using LLMs as CSS tools. Towards this end, we contribute a set of prompting best practices and an extensive evaluation pipeline to measure the zero-shot performance of 13 language models on 25 representative English CSS benchmarks. On taxonomic labeling tasks (classification), LLMs fail to outperform the best fine-tuned models but still achieve fair levels of agreement with humans. On free-form coding tasks (generation), LLMs produce explanations that often exceed the quality of crowdworkers’ gold references. We conclude that the performance of today’s LLMs can augment the CSS research pipeline in two ways: (1) serving as zero-shot data annotators on human annotation teams, and (2) bootstrapping challenging creative generation tasks (e.g., explaining the underlying attributes of a text). In summary, LLMs are posed to meaningfully participate in social science analysis in partnership with humans.

Anthology ID: 2024.cl-1.8
Volume: Computational Linguistics, Volume 50, Issue 1 - March 2024
Month: March
Year: 2024
Address: Cambridge, MA
Venue: CL
SIG: –
Publisher: MIT Press
Note: –
Pages: 237–291
Language: –
URL: https://aclanthology.org/2024.cl-1.8
DOI: 10.1162/coli_a_00502

https://aclanthology.org/2024.cl-1.8

“GPTology—which we define as the hurried and unjustified application of LLMs either as “replacements” for human participants, or as an off-the-shelf “one-size-fits-all” method in psychological text analysis—can lead to a proliferation of low-quality research [...]. While LLMs, especially fine-tuned ones, can achieve impressive performances on many tasks, the presence of a WEIRD bias, along with the opaque and often irreproducible nature of these models, particularly the proprietary ones, makes them a double-edged sword for psychological research.”



Volume 3, Issue 7
July 2024

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LLMs should not replace human participants
LLMs are not a panacea for text analysis
Reproducibility matters
Conclusion
Supplementary Material
Funding
Preprint

JOURNAL ARTICLE

Perils and opportunities in using large language models in psychological research

Suhaib Abdurahman, Mohammad Atari ✉, Farzan Karimi-Malekabadi, Mona J Xue, Jackson Trager, Peter S Park, Preni Golazizian, Ali Omrani, Morteza Dehghani
Author Notes

PNAS Nexus, Volume 3, Issue 7, July 2024, pgae245,
https://doi.org/10.1093/pnasnexus/pgae245
Published: 16 July 2024 **Article history**

Abstract

The emergence of large language models (LLMs) has sparked considerable interest in their potential application in psychological research, mainly as a model of the human psyche or as a general text-analysis tool. However, the trend of using LLMs without sufficient attention to their limitations and risks, which we rhetorically refer to as “GPTology”, can be detrimental given the easy access to models such as ChatGPT. Beyond existing general guidelines, we investigate the current limitations, ethical implications, and potential of LLMs specifically for psychological research, and show their concrete impact in various empirical studies. Our results highlight the importance of recognizing global psychological diversity, cautioning against treating LLMs (especially in

https://doi.org/10.1093/pnasnexus/pgae245

“Overall, GPT may be superior to many existing methods of automated text analysis, since it achieves relatively high accuracy across many languages, requires no training data, and is easy to use with simple prompts and little coding experience. [...] We argue that GPT and other LLMs help democratize automated text analysis by making advanced natural language processing capabilities more accessible, and may help facilitate more cross-linguistic research with understudied languages.”

KOOS OPPE JOUD

RESEARCH ARTICLE | PSYCHOLOGICAL AND COGNITIVE SCIENCES

GPT is an effective tool for multilingual psychological text analysis

Steve Rathje, Dan-Mircea Mirea, Ilia Sucholutsky, +2, and Jay J. Van Bavel Authors Info & Affiliations

Edited by Terrence Sejnowski, Salk Institute for Biological Studies, La Jolla, CA; received May 30, 2023; accepted June 18, 2024

August 12, 2024 | 121 (34) e2308950121 | https://doi.org/10.1073/pnas.2308950121

Vol. 121 | No. 34

Significance
Abstract
Overview
Results
Discussion
Conclusions
Methods
Data, Materials, and Software Availability
Acknowledgments
Supporting Information
References

Significance

Many fields—including psychology, sociology, communications, political science, and computer science—use computational methods to analyze text data. However, existing text analysis methods have a number of shortcomings. Dictionary methods, while easy to use, are often not very accurate when compared to recent methods. Machine learning models, while more accurate, can be difficult to train and use. We demonstrate that the large-language model GPT is capable of accurately detecting various psychological constructs (as judged by manual annotators) in text across 12 languages, using simple prompts and no additional training data. GPT thus overcomes the limitations present in existing methods. GPT is also effective in several lesser-spoken languages, which could facilitate text analysis research from understudied contexts

https://www.pnas.org/doi/10.1073/pnas.2308950121

“We argue that generative Artificial Intelligence and specifically Large Language Models (LLMs) can be immensely helpful for management researchers focused on theory building. LLMs are already widely diffusing as research tools in the social sciences, primarily to aid with data cleaning, data analysis, and writing (...) Yet, the value of LLMs goes beyond harnessing generative AI to support the research process or replicate known results. Our central contention is that LLMs can become a simulation tool that is particularly well-suited to generate novel theory in management.”

KOOS OPPE JOUD

Theorizing with Large Language Models

Matteo Tranchero, Cecil-Francis Brenninkmeijer, Arul Murugan & Abhishek Nagaraj

WORKING PAPER 33033 DOI 10.3386/w33033 ISSUE DATE October 2024

Large Language Models (LLMs) are proving to be a powerful toolkit for management and organizational research. While early work has largely focused on the value of these tools for data processing and replicating survey-based research, the potential of LLMs for theory building is yet to be recognized. We argue that LLMs can accelerate the pace at which researchers can develop, validate, and extend strategic management theory. We propose a novel framework called Generative AI-Based Experimentation (GABE) that enables researchers to conduct exploratory in silico experiments that can mirror the complexities of real-world organizational settings, featuring multiple agents and strategic interdependencies. This approach is unique because it allows researchers to unpack the mechanisms behind results by directly modifying agents' roles,

https://www.nber.org/papers/w33033

Kuidas mina olen ChatGPTd kasutanud?

KOOS ÕPPE JÕUD

TALLINNA ÜLIKOOL

1. Info kogumine ja sünteesimine

- Teaduskirjanduse bibliograafilised ülevaated (sh eraldi AI-rakendused selleks)
- Teadusartiklite ja raamatute kokkuvõtted (sh konkreetse nurga alt)
- Uurimisseisu kaardistamine (praegu veel mitte tingimata usaldusväärne)

KOOS ÕPPE JÕUD

TALLINNA ÜLIKOOL

2. Materjali tõlkimine ja selgitamine

- Võõras keeles erialakirjanduse tõlkimine (inglise keelde)
- Erialase allikmaterjali tõlkimine ja mõistete seletamine (nt ladina või alamsaksa keelest)
- Ajaloolise allikmaterjali analüüsimine ja kommenteerimine
- Värsstekstide vormiline analüüs

KOOS ÕPPE JÕUD

TALLINNA ÜLIKOOL

3. Tekstide toimetamine

- Ingliskeelsete kirjade, taotluste, soovituskirjade, abstraktide, artiklite jne keeleline toimetamine (sh lähtudes etteantud stiiliregistritest, eraldi briti või ameerika inglise keelest jne)
- Teistes suurematest keeltes tekstide toimetamine (prantsuse, saksa jt)

KOOS ÕPPE JÕUD

TALLINNA ÜLIKOOL

4. Teadusprojektide kirjutamistugi

- Teadusprojekti ideede arendamine
- Teadusprojekti teksti tihendamine etteantud tähemärkidesse
- Teadusprojekti kriitiline tagasisidestamine (eri distsiplinaarsetest jm vaatenurkadest)
- Teadusprojekti stiililine ja keeleline toimetamine (etteantud registris)

KOOS ÕPPE JÕUD

TALLINNA ÜLIKOOL

5. Teadusprojektide hindamistugi

- Teadusprojekti hindamine, lähtudes minu poolt etteantud märkustest ja suunistest (NB! projekti üles laadimisel tuleks piirduda katkenditega ja selliste osadega, mis on selgelt anonüümsed)
- Teadusprojekti retsensiooni stiililine ja keeleline toimetamine, etteantud formaati sobitamine.

KOOS ÕPPE JÕUD

TALLINNA ÜLIKOOL

6. Raamaturetsensioonide kirjutamistugi

- Etteantud märkuste ja suuniste põhjal ettepanekute tegemine retsensiooni kirjutamiseks (abiks nt raamatu sisukord ja sissejuhatus vm abimaterjalid)
- Retsensiooni sisuline, stiililine ja keeleline toimetamine

KOOS ÕPPE JÕUD

TALLINNA ÜLIKOOL

7. Teadustöö kirjutamistugi

- Teadustöö ideede testimine ja esmane tagasiside
- Konkreetsete ideede arendamine
- Uurimisküsimuste arendamine ja toimetamine
- Artikli struktureerimine ja vormistamine
- Artikli keeleline ja sisuline toimetamine

KOOS ÕPPE JÕUD

TALLINNA ÜLIKOOL

Signe Altmäe et al. 2023: “Our experiment of using ChatGPT for scientific writing demonstrates that ChatGPT has a high potential for becoming a great help to researchers in designing their study, performing analyses and drafting the study results into a scientific article. This would definitely help in overcoming the ‘blank-sheet syndrome’ that all authors face from time to time.”

KOOS OPPE JÕUD

https://doi.org/10.1016/j.rbmo.2023.04.009

RBMO

ELSEVIER

Artificial intelligence in scientific writing: a friend or a foe?

Signe Altmäe[1,2,3,*], Alberto Sola-Leyva[1,2], Andres Salumets[3,4,5]

ABSTRACT

The generative pre-trained transformer, ChatGPT, is a chatbot that could serve as a powerful tool in scientific writing. ChatGPT is a so-called large language model (LLM) that is trained to mimic the statistical patterns of language in an enormous database of human-generated text combined from text in books, articles and websites across a wide range of domains. ChatGPT can assist scientists with material organization, draft creation and proofreading, making it a valuable tool in research and publishing. This paper discusses the use of this artificial intelligence (AI) chatbot in academic writing by presenting one simplified example. Specifically, it reflects our experience of using ChatGPT to draft a scientific article for *Reproductive BioMedicine Online* and highlights the pros, cons and concerns associated with using LLM-based AI for generating a manuscript.

INTRODUCTION

The introduction of the generative pre-trained transformer ChatGPT in November 2022 by OpenAI shook the scientific world. It was instantly acknowledged as a new level of tool that artificial intelligence (AI) can provide for seeking online for information, answers and solutions (*Macdonald et al., 2023*). ChatGPT is a type of chatbot designed to provide natural language-processing capabilities for a wide range of applications. It is a large language model (LLM) that generates sentences based on mimicking the statistical patterns of language in an enormous database of human-generated text combined from text from books, articles and websites across a wide range of domains (*Stokel-Walker, 2023*). In addition to ChatGPT, there are other free LLM platforms such as cohere.com, writesonic.com (100 free generations per month), you.com (10 free extracts of writing per day) and anthropic.com.

Language-based AI has already entered the academic community. Many researchers are believed to use chatbots as research assistants to help in organizing their thoughts, provide feedback on their work, help with code writing and summarize the research literature (*Hutson, 2022*). Regardless of the lack of guidelines for its use in scientific writing, and the debate over whether ChatGPT should be listed as a co-author or how/whether to acknowledge its use, four manuscripts have been reported in preprint where ChatGPT has been credited as an author (*Stokel-Walker, 2023*), and one article has documented the use of AI for generating a scientific paper (*Getahun, 2022*). These LLMs offer a powerful tool for a wide range of applications and demonstrate the potential of these models to transform the way we interact with language, scientific writing and science, which may lead to another revolutionary stage of progress in science.

This paper reflects on the experience of using ChatGPT to draft a research article for *Reproductive BioMedicine Online*. We highlight the pros and cons of AI for manuscript generation and discuss potential concerns regarding the use of the LLM platform alongside our writing. For this test, it was decided to generate a simulated study comprising of 10,000 women undergoing IVF cycles who had been tested for endometrial receptivity; the main focus of the study was to be whether the state of the endometrium (receptive/non-receptive) influences the outcome of treatment (successful pregnancy/no pregnancy). The data were wholly fabricated. ChatGPT was then used to guide us in deciding how to proceed with the data and to help to draft the manuscript. Using ChatGPT it took the authors a total of 15 min to create the initial chat and the inputs, and to obtain the output texts for the manuscript.

DESCRIBING THE STUDY DATA

First, the simulated dataset was described. The conversation with ChatGPT was as follows (all conversations are unmodified text):

SA: *We have a dataset consisting of a cohort of 10000 women, some have receptive endometrium and some have not. We also have data if the embryo transfer resulted in a successful pregnancy or not.*

ChatGPT: *Great! Having this data set on women and the success of their embryo transfer can be useful for analyzing factors that contribute to successful pregnancy outcomes.*

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Declaration: The authors report no financial or commercial conflicts of interest.

KEY WORDS

Artificial intelligence
Chatbot
ChatGPT
Large language model
Scientific writing

Kacena et al. 2024:
“AI is likely here to stay, thus exploring its utility in scientific writing is timely. As with every new technology, there are pros and cons. Figuring out how to expand the pros while limiting the cons is critical to successful implementation and adoption of the technology.”

https://link.springer.com/article/10.1007/s11914-023-00852-0

Current Osteoporosis Reports (2024) 22:115–121
https://doi.org/10.1007/s11914-023-00852-0

The Use of Artificial Intelligence in Writing Scientific Review Articles

Melissa A. Kacena[1,2,3,4] · Lilian I. Plotkin[2,3,4] · Jill C. Fehrenbacher[3,5,6]

Accepted: 21 December 2023 / Published online: 16 January 2024

Abstract

Purpose of Review With the recent explosion in the use of artificial intelligence (AI) and specifically ChatGPT, we sought to determine whether ChatGPT could be used to assist in writing credible, peer-reviewed, scientific review articles. We also sought to assess, in a scientific study, the advantages and limitations of using ChatGPT for this purpose. To accomplish this, 3 topics of importance in musculoskeletal research were selected: (1) the intersection of Alzheimer’s disease and bone; (2) the neural regulation of fracture healing; and (3) COVID-19 and musculoskeletal health. For each of these topics, 3 approaches to write manuscript drafts were undertaken: (1) human only; (2) ChatGPT only (AI-only); and (3) combination approach of #1 and #2 (AI-assisted). Articles were extensively fact checked and edited to ensure scientific quality, resulting in final manuscripts that were significantly different from the original drafts. Numerous parameters were measured throughout the process to quantitate advantages and disadvantages of approaches.

Recent Findings Overall, use of AI decreased the time spent to write the review article, but required more extensive fact checking. With the AI-only approach, up to 70% of the references cited were found to be inaccurate. Interestingly, the AI-assisted approach resulted in the highest similarity indices suggesting a higher likelihood of plagiarism. Finally, although the technology is rapidly changing, at the time of study, ChatGPT 4.0 had a cutoff date of September 2021 rendering identification of recent articles impossible. Therefore, all literature published past the cutoff date was manually provided to ChatGPT, rendering approaches #2 and #3 identical for contemporary citations. As a result, for the COVID-19 and musculoskeletal health topic, approach #2 was abandoned midstream due to the extensive overlap with approach #3.

Summary The main objective of this scientific study was to see whether AI could be used in a scientifically appropriate manner to improve the scientific writing process. Indeed, AI reduced the time for writing but had significant inaccuracies. The latter necessitates that AI cannot currently be used alone but could be used with careful oversight by humans to assist in writing scientific review articles.

Keywords Artificial intelligence (AI) · ChatGPT · Scientific writing · Osteoporosis · Musculoskeletal system · Fracture healing · Neural regulation · Alzheimer's disease · COVID-19 · SARS-CoV-2

8. Andmete puhastamine ja sorteerimine

- Tekstidest või muust allikmaterjalidest andmete tuletamine
- Vigaste andmete parandamine
- Andmete puhastamine
- Andmete sorteerimine
- Andmete annoteerimine

KOOS ÕPPE JÕUD

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9. Andmete analüüs

Suuresti piiramatud võimalused:

- Nimeolemite tuvastamine (Named Entity Recognition)
- Sõnade sagedusanalüüs ja sõnapilved (Word Frequency Analysis and Word Clouds)
- Teemaanalüüs (Topic Modeling)
- Sõnavektorid (Word Embeddings)
- Meelestatuse analüüs (Sentiment Analysis)
- Võrgustikuanalüüs (Network Analysis)

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“It is clear that AI models will soon provide access to the collective text-based cognition of humanity at a qualitatively new level, potentially including (it already does it well) the ability to interpret text using spatiotemporal and social contexts, which has been considered a specialised skill of historians.”

MUNI ARTS Dissident Networks Project

News Project Publications Team Contacts

Can artificial intelligence read medieval inquisition records?

ChatGPT, a state-of-the-art language model developed by OpenAI, has taken the Internet by storm and has generated a variety of reactions: excitement about a breakthrough in AI technology, fear of losing creative jobs, and even concern about our supposedly unique human creative abilities. As unexpectedly as it arrived for the general public, our DISSINET team improvised an experiment to test ChatGPT's capabilities in understanding medieval Latin texts during a hackathon that took place from December 5th to 9th, 2022, in Brno.

20 DEC 2022 | Kaarel Sikk | David Zbíral

Image generated by AI on prompt "Ai explaining inquisitorial records to historians".

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https://dissinet.cz/news/articles/can-artificial-intelligence-read-medieval-inquisition-records

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10. Masinvõimestatud metoodika

Computer Science > Computation and Language

[Submitted on 24 Sep 2023 (v1), last revised 20 Oct 2024 (this version, v2)]

Machine-assisted quantitizing designs: augmenting humanities and social sciences with artificial intelligence

Andres Karjus

The increasing capacities of large language models (LLMs) have been shown to present an unprecedented opportunity to scale up data analytics in the humanities and social sciences, by automating complex qualitative tasks otherwise typically carried out by human researchers. While numerous benchmarking studies have assessed the analytic prowess of LLMs, there is less focus on operationalizing this capacity for inference and hypothesis testing. Addressing this challenge, a systematic framework is argued for here, building on mixed methods quantitizing and converting design principles, and feature analysis from linguistics, to transparently integrate human expertise and machine scalability. Replicability and statistical robustness are discussed, including how to incorporate machine annotator error rates in subsequent inference. The approach is discussed and demonstrated in over a dozen LLM-assisted case studies, covering 9 diverse languages, multiple disciplines and tasks, including analysis of themes, stances, ideas, and genre compositions; linguistic and semantic annotation, interviews, text mining and event cause inference in noisy historical data, literary social network construction, metadata imputation, and multimodal visual cultural analytics. Using hypothesis-driven topic classification instead of "distant reading" is discussed. The replications among the experiments also illustrate how tasks previously requiring protracted team effort or complex computational pipelines can now be accomplished by an LLM-assisted scholar in a fraction of the time. Importantly, the approach is not intended to replace, but to augment and scale researcher expertise and analytic practices. With these opportunities in sight, qualitative skills and the ability to pose insightful questions have arguably never been more critical.

Subjects: **Computation and Language (cs.CL)**; Artificial Intelligence (cs.AI); Computers and Society (cs.CY)
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(or arXiv:2309.14379v2 **[cs.CL]** for this version)
https://doi.org/10.48550/arXiv.2309.14379

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https://arxiv.org/abs/2309.14379

Machine-assisted (quantitizing) mixed methods (MAMM)

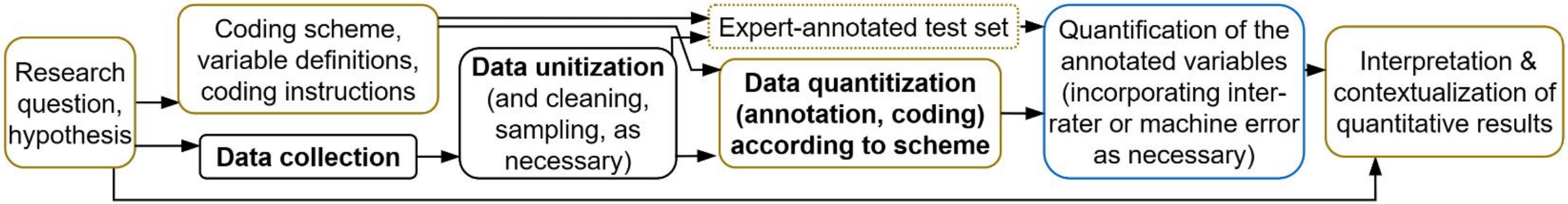


Figure 1: A typical QD pipeline. Qualitative elements are outlined in yellow, quantitative in blue. Steps where machine assistance (ML, LLMs, or otherwise) may be applied are in bold, including the quantitization step. Annotating a smaller additional test set is optional but strongly recommended if using either multiple human annotators or a machine.

- Machine-assisted (quantitizing) mixed methods (MAMM)
  - \+ All the benefits of qualitative analysis
  - \+ All the benefits of mixed methods, rigorous quantification, replicability
  - \+ Yet applicable to big data and scalable

"Importantly, the approach is not intended to replace, but to augment and scale researcher expertise and analytic practices. With these opportunities in sight, qualitative skills and the ability to pose insightful questions have arguably never been more critical."

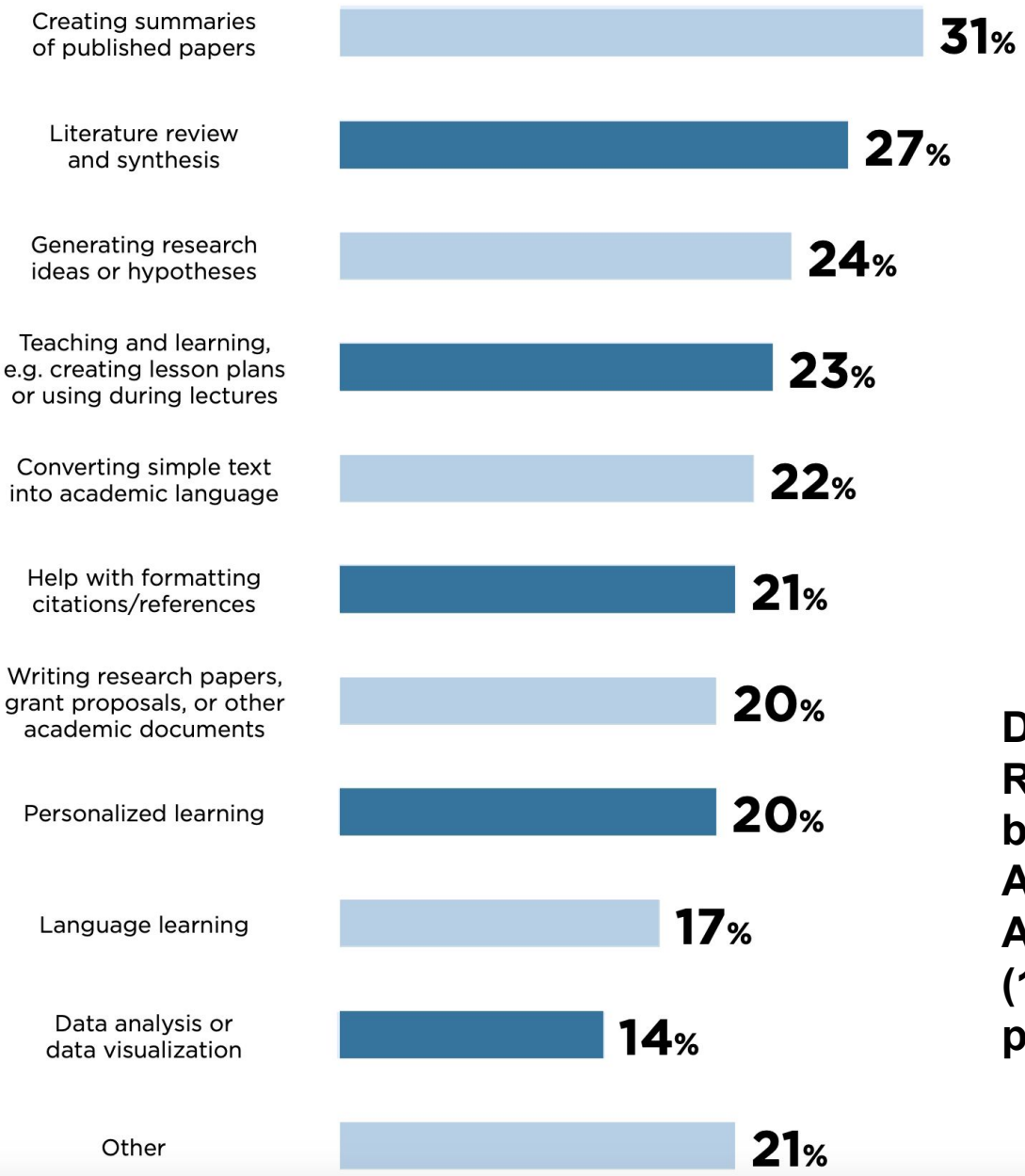
KOOS ÕPPEJÕUD

Andres Karjus, "Machine-assisted quantitizing designs: augmenting humanities and social sciences with artificial intelligence", https://arxiv.org/abs/2309.14379, [v1] 24 Sep 2023, [v2] Sun, 20 Oct 2024.

TALLINNA ÜLIKOOL

Most common research tasks using ChatGPT.

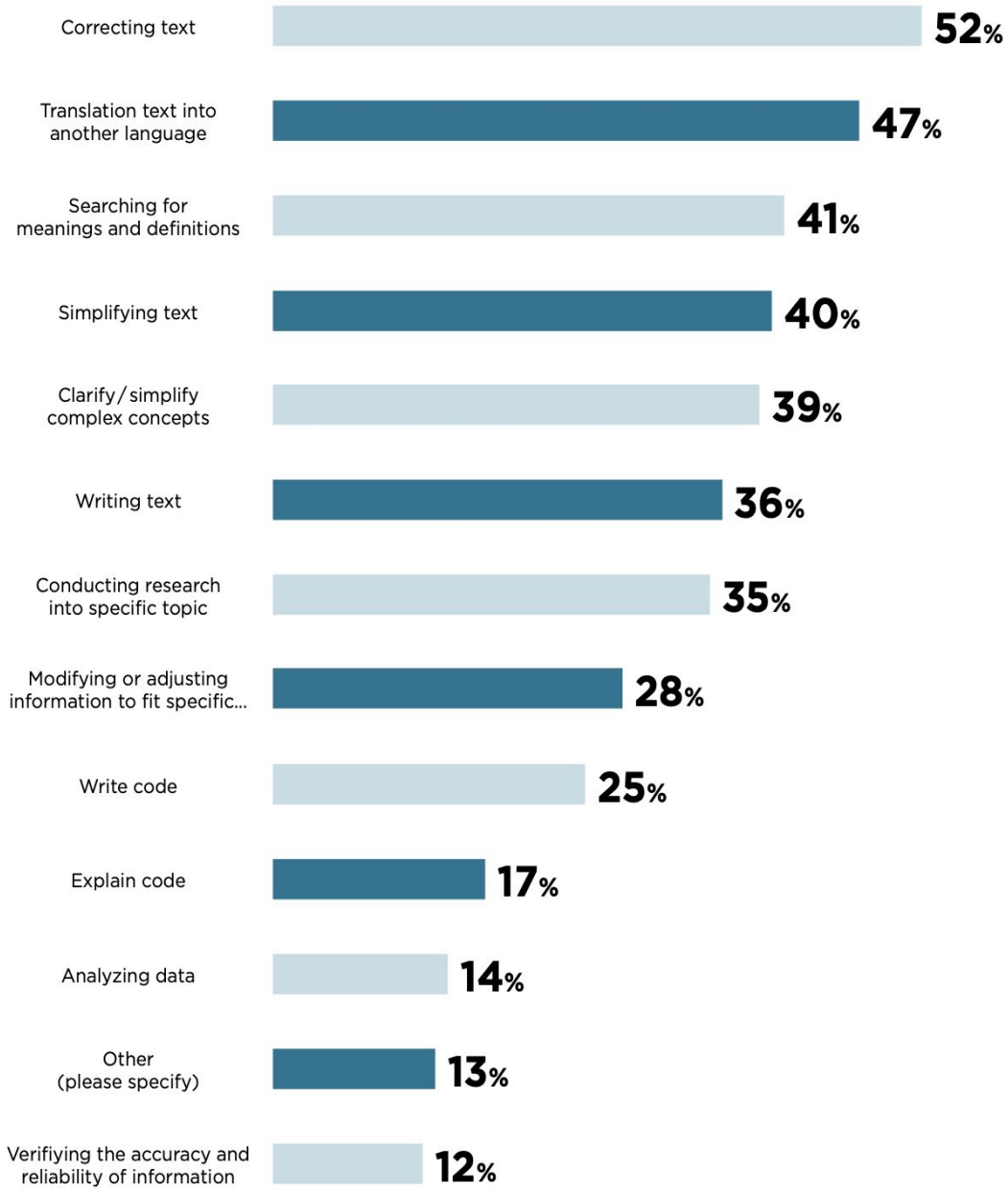
(N=294)



DE GRUYTER REPORT: Cautious but Curious: AI Adoption Trends Among Scholars (11 October 2023), pp. 11–12

Most common tasks using ChatGPT.

(N=289)



2. Tehisaru kui teadlase asemik ehk kuidas tehisaru võib muuta kõigi teadlaste elu

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AI teadlase sünd

arXiv > cs > arXiv:2408.06292

Search... All fields Search

Help | Advanced Search

Computer Science > Artificial Intelligence

[Submitted on 12 Aug 2024 (v1), last revised 1 Sep 2024 (this version, v3)]

The AI Scientist: Towards Fully Automated Open-Ended Scientific Discovery

Chris Lu, Cong Lu, Robert Tjarko Lange, Jakob Foerster, Jeff Clune, David Ha

One of the grand challenges of artificial general intelligence is developing agents capable of conducting scientific research and discovering new knowledge. While frontier models have already been used as aides to human scientists, e.g. for brainstorming ideas, writing code, or prediction tasks, they still conduct only a small part of the scientific process. This paper presents the first comprehensive framework for fully automatic scientific discovery, enabling frontier large language models to perform research independently and communicate their findings. We introduce The AI Scientist, which generates novel research ideas, writes code, executes experiments, visualizes results, describes its findings by writing a full scientific paper, and then runs a simulated review process for evaluation. In principle, this process can be repeated to iteratively develop ideas in an open-ended fashion, acting like the human scientific community. We demonstrate its versatility by applying it to three distinct subfields of machine learning: diffusion modeling, transformer-based language modeling, and learning dynamics. Each idea is implemented and developed into a full paper at a cost of less than $15 per paper. To evaluate the generated papers, we design and validate an automated reviewer, which we show achieves near-human performance in evaluating paper scores. The AI Scientist can produce papers that exceed the acceptance threshold at a top machine learning conference as judged by our automated reviewer. This approach signifies the beginning of a new era in scientific discovery in machine learning: bringing the transformative benefits of AI agents to the entire research process of AI itself, and taking us closer to a world where endless affordable creativity and innovation can be unleashed on the world's most challenging problems. Our code is open-sourced at this https URL

Subjects: **Artificial Intelligence (cs.AI)**; Computation and Language (cs.CL); Machine Learning (cs.LG)
Cite as: arXiv:2408.06292 **[cs.AI]**
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1 blog link (what is this?)

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"We introduce The AI Scientist, which generates novel research ideas, writes code, executes experiments, visualizes results, describes its findings by writing a full scientific paper, and then runs a simulated review process for evaluation. In principle, this process can be repeated to iteratively develop ideas in an open-ended fashion and add them to a growing archive of knowledge, acting like the human scientific community."

https://sakana.ai/ai-scientist/

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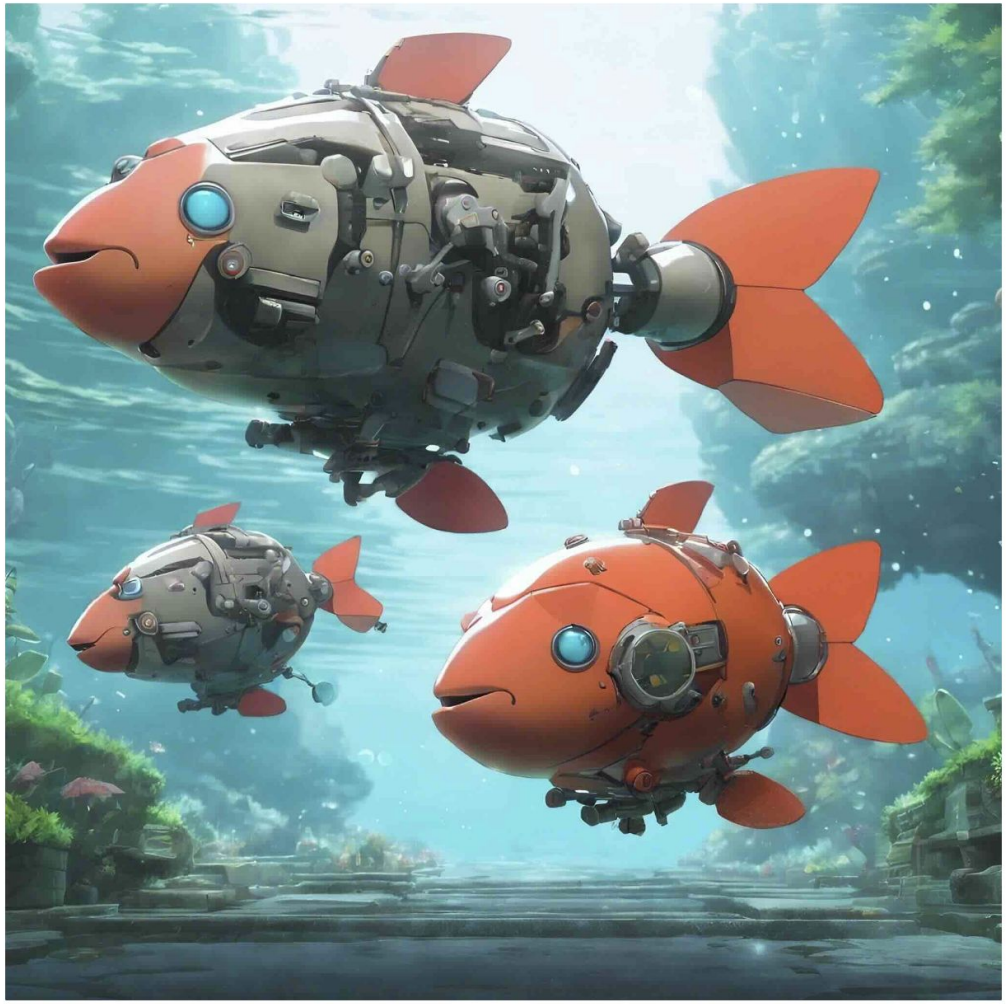
sakana.ai

The AI Scientist: Towards Fully Automated Open-Ended Scientific Discovery

August 13, 2024



At Sakana AI, we have pioneered the use of nature-inspired methods to advance cutting-edge foundation models. Earlier this year, we developed methods to automatically merge the knowledge of multiple LLMs. In more recent work, we harnessed LLMs to *discover* new objective functions for tuning other LLMs. Throughout these projects, we have been continuously surprised by the creative capabilities of current frontier models. This led us to dream even bigger: Can we use foundation models to automate the entire process of research itself?

Introduction

One of the grand challenges of artificial intelligence is developing agents capable of conducting scientific research and discovering new knowledge. While frontier models have already been used to aid human scientists, e.g. for brainstorming ideas or writing code, they still require extensive manual supervision or are heavily constrained to a specific task.

AI Scientisti töömudel

Chris Lu, Cong Lu, Robert Tjarko Lange, Jakob Foerster, Jeff Clune, David Ha, “The AI Scientist: Towards Fully Automated Open-Ended Scientific Discovery”, arXiv:2408.06292, submitted on 12 Aug 2024 (v1), last revised 1 Sep 2024 (this version, v3)]

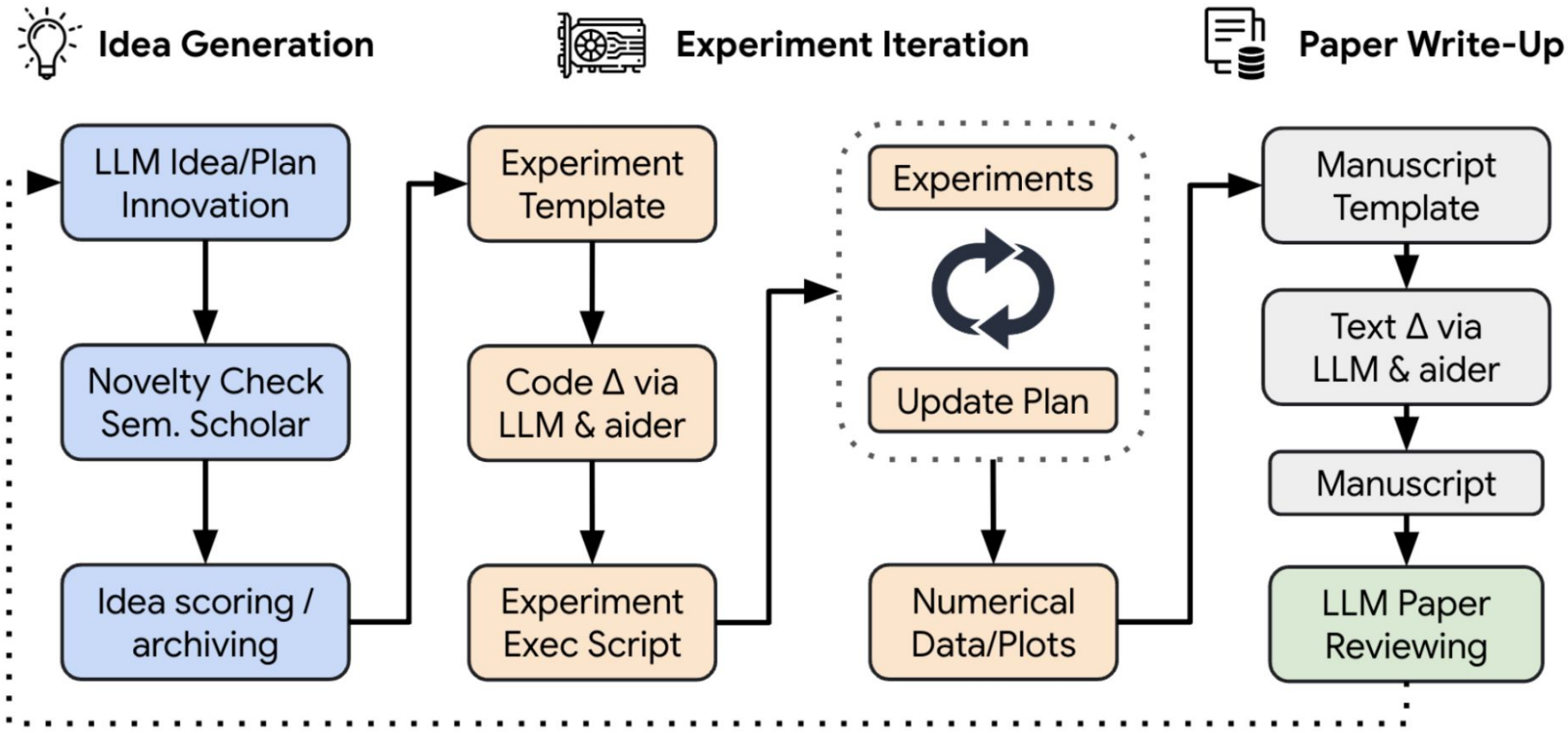


Figure 1 | Conceptual illustration of THE AI SCIENTIST, an end-to-end LLM-driven scientific discovery process. THE AI SCIENTIST first invents and assesses the novelty of a set of ideas. It then determines how to test the hypotheses, including writing the necessary code by editing a codebase powered by recent advances in automated code generation. Afterward, the experiments are automatically executed to collect a set of results consisting of both numerical scores and visual summaries (e.g. plots or tables). The results are motivated, explained, and summarized in a LaTeX report. Finally, THE AI SCIENTIST generates an automated review, according to current practice at standard machine learning conferences. The review can be used to either improve the project or as feedback to future generations for open-ended scientific discovery.

KOOS OPPE JÕUD

AI Scientisti toodetud teadusartiklid

StyleFusion: Adaptive Multi-Style Generation in Character-Level Language Models

Anonymous authors
Paper under double-blind review

Abstract

This paper introduces the Multi-Style Adapter, a novel approach to enhance style awareness and consistency in character-level language models. As language models advance, the ability to generate text in diverse and consistent styles becomes crucial for applications ranging from creative writing assistance to personalized content generation. However, maintaining style consistency while preserving language generation capabilities presents a significant challenge. Our Multi-Style Adapter addresses this by introducing learnable style embeddings and a style classification head, working in tandem with a StyleAdapter module to modulate the hidden states of a transformer-based language model. We implement this approach by modifying the GPT architecture, incorporating style adaptation after every transformer layer to create stronger style-specific representations. Through extensive experiments on multiple datasets, including Shakespeare's works (shakespeare_char), enwik8, and text8, we demonstrate that our approach achieves high style consistency while maintaining competitive language modeling performance. Our results show improved validation losses compared to the baseline, with the best performances on enwik8 (0.9488) and text8 (0.9145). Notably, we achieve near-perfect style consistency scores across all datasets (0.9667 for shakespeare_char, 1.0 for enwik8 and text8). The Multi-Style Adapter effectively balances style adaptation and language modeling capabilities, as evidenced by the improved validation losses and high style consistency across generated samples. However, this comes at a cost of increased computational complexity, resulting in slower inference speeds (approximately 400 tokens per second compared to 670 in the baseline). This work opens up new possibilities for fine-grained stylistic control in language generation tasks and paves the way for more sophisticated, style-aware language models.

1 Introduction

As language models continue to advance, demonstrating remarkable capabilities in generating coherent and contextually appropriate text OpenAI (2024), there is a growing need for fine-grained control over the style and tone of the generated content. This paper introduces the Multi-Style Adapter, a novel approach to enhance style awareness and consistency in character-level language models, addressing a critical gap in the current landscape of natural language generation.

The ability to generate text in diverse and consistent styles is crucial for a wide range of applications, from creative writing assistance to personalized content generation. Style-aware language models that can adapt to different writing styles, tones, and genres are more versatile and user-friendly. However, implementing style awareness in language models presents several challenges:

- Capturing and representing diverse styles within a single model architecture.
- Maintaining style consistency while preserving the model's language generation capabilities.
- Ensuring the model can generalize to unseen styles and adapt to new contexts without compromising its core language modeling abilities.

Our Multi-Style Adapter addresses these challenges by introducing:

- Learnable style embeddings that capture diverse writing styles.

DualDiff: Enhancing Mode Capture in Low-Dimensional Diffusion Models via Dual-Expert Denoising

Anonymous authors
Paper under double-blind review

Abstract

Diffusion models have demonstrated remarkable success in generating high-dimensional data, but their performance on low-dimensional datasets remains challenging, particularly in accurately capturing multiple modes. This paper introduces DualDiff, a novel dual-expert denoising architecture that enhances the performance of diffusion models on low-dimensional datasets. Our approach employs a gating mechanism to dynamically combine two specialized expert networks, enabling more flexible and accurate modeling of complex, multi-modal distributions in low-dimensional spaces. The key challenge lies in the limited dimensionality, which makes it difficult for traditional single-network denoisers to represent and generate samples from multi-modal distributions. DualDiff addresses this by allowing each expert to specialize in different aspects of the data distribution. We conduct extensive experiments on various 2D datasets, including 'circle', 'dino', 'line', and 'moons', demonstrating significant improvements in mode capture and sample diversity. Our method achieves a 38.7% reduction in KL divergence on the complex 'dino' dataset, from 1.060 to 0.650. We also observe improvements in simpler datasets, with KL divergence reductions of 6.2% for 'circle' and 3.1% for 'moons'. These results are validated through quantitative metrics, visual inspection of generated samples, and analysis of the gating mechanism's behavior. Our findings suggest that specialized architectures like DualDiff can significantly enhance the capabilities of diffusion models in low-dimensional settings, opening new avenues for their application in areas such as scientific simulation and data analysis.

1 Introduction

Diffusion models have emerged as a powerful class of generative models, achieving remarkable success in generating high-dimensional data such as images and audio Ho et al. (2020); Yang et al. (2023). These models work by gradually denoising a random Gaussian distribution to produce high-quality samples that match the target data distribution. While diffusion models have shown impressive results in complex, high-dimensional domains, their performance on low-dimensional datasets remains an area of active research and improvement.

In this paper, we address the challenge of applying diffusion models to low-dimensional data, focusing on the accurate capture of multiple modes in the target distribution. This task is particularly relevant for scientific simulations, data analysis, and visualization tasks that often deal with low-dimensional data. Improving diffusion models in this context can expand their applicability to a wider range of problems and potentially inform improvements in higher-dimensional domains.

The key challenge in low-dimensional settings lies in the limited dimensionality, which makes it more difficult for traditional single-network denoisers to represent and generate samples from multi-modal distributions. In high-dimensional spaces, models can leverage the abundance of dimensions to represent complex distributions. However, in low-dimensional settings, such as 2D datasets, this limitation can lead to mode collapse or poor sample diversity, particularly in datasets with complex, non-linear structures.

GAN-Enhanced Diffusion: Boosting Sample Quality and Diversity

Anonymous authors
Paper under double-blind review

Abstract

Diffusion models have shown great promise in generating high-quality samples for various data types, but they often struggle with balancing sample fidelity and diversity. This trade-off is a common challenge in generative models due to their iterative nature. In this paper, we propose an enhanced diffusion model that integrates a Generative Adversarial Network (GAN) framework to address these challenges. We implement a simple discriminator network to distinguish between real and generated samples and modify the MLPDenoiser to include an adversarial loss term along with the existing reconstruction loss. Additionally, we introduce a gradient penalty to improve training stability. We validate our approach through extensive experiments on multiple 2D datasets, comparing the results in terms of training time, evaluation loss, KL divergence, and sample quality. Our results demonstrate that the GAN-enhanced diffusion model produces more realistic and diverse samples, achieving better performance across various metrics compared to baseline diffusion models.

1 Introduction

Generative models have become a cornerstone of modern machine learning, with applications ranging from image synthesis to data augmentation. Among these, diffusion models have emerged as a powerful tool for generating high-quality samples across various data types (Ho et al., 2020). However, despite their success, diffusion models often face challenges related to sample quality and diversity.

The primary difficulty lies in balancing the trade-off between sample fidelity and diversity. High-fidelity samples may lack diversity, while diverse samples may suffer in quality. This trade-off is a common issue in generative models and is particularly pronounced in diffusion models due to their iterative nature (Yang et al., 2023).

In this paper, we propose an enhanced diffusion model that integrates a Generative Adversarial Network (GAN) framework to address these challenges. Our contributions are as follows:

- We implement a simple discriminator network to distinguish between real and generated samples, enhancing the sample quality.
- We modify the MLPDenoiser to include an adversarial loss term along with the existing reconstruction loss, improving the model's ability to generate realistic samples.
- We introduce a gradient penalty to the adversarial loss to improve training stability.
- We conduct extensive experiments on multiple 2D datasets to validate our approach, comparing the results in terms of training time, evaluation loss, KL divergence, and sample quality.

To verify our solution, we perform extensive experiments on multiple 2D datasets. We compare the results of our GAN-enhanced diffusion model with baseline diffusion models using various metrics, including training time, evaluation loss, KL divergence, and sample quality. Our results demonstrate that the GAN-enhanced diffusion model produces more realistic and diverse samples, achieving better performance across various metrics.

“Sünteetiline minevik” ehk kas tehisaru suudab kirjutada ajalugu?

Synthetic Pasts

About Work Packages Team Outputs

About

Synthetic Pasts explores automated and algorithmic processes designed to change the structure and behaviour of media fragments from the past, in-so-doing, offering them new kinds of ‘afterlife’. These developments - for example, creating ‘holographic’ resurrections of celebrities, deepfake historical figures, animated photos from archives, or voice assistants powered with our deceased relatives’ voice data - connect viscerally with urgent discussions about what futures AI heralds.

While there have always been myriad and competing narratives about the past produced from personal and institutional archives, recent advances in deep learning technologies that change, manipulate, or create new media objects present unprecedented challenges.

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https://www.syntheticpasts.com/

“Sünteetiline minevik” ehk kas tehisaru suudab kirjutada ajalugu?

The project aims at answering the following research questions:

RQ1 How is history written and employed by generative AI models? In what manner (if at all) can synthetic pasts produced by AI provide and compete with existing historical knowledge and evidence?

RQ2 How can generative AI be situated in a broader and longer history of media technology? In turn, how has this history shaped AI in its current form?

RQ3 What are the implications for knowledge, culture and creativity in the age of generative AI? How does integration of generative AI impact knowledge production, whether it is scholarly or involves creative and artistic expressions (e.g. fiction, literature, comics)?

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3. Mida sellest kõigest järeldada ehk mõned soovitused edaspidiseks

KOOS ÕPPE JÕUD

TALLINNA ÜLIKOOL

Tulevikuvajadused

1. Tehisaru kasutamisreeglite kokku leppimine teadustöös ja läbipaistvuse põhimõtte kehtestamine.*
2. Tehisaru-eetika väljatöötamine
3. Tehisaru ökoloogilise jalajälje arvestamine
4. Tehisaru kultuuriline joondamine
5. Tehisaru keeleline joondamine

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*Siinne ettekanne on sündinud ChatGPT 4o ja o1-preview' abil

TALLINNA ÜLIKOOL