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AI and Teaching Writing

AI in Writing Class: Editor, Co-Author, Ghostwriter, or Muse?

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While computers have always been accomplished at mathematics, able to perform complex calculations at lightning speed with unerring accuracy, their language processing abilities have, until recently, been limited to a few simple uses with far from perfect reliability. However, during the past five years, technological advances in artificial intelligence (AI) have resulted in a quantum leap in how digital devices can understand and generate written and spoken language. You may have witnessed this progress in the increased ability of your phone, digital assistant, or car navigation system to use spoken language to communicate with you, or in the increased accuracy and fluency of Google Translate, but that is just the tip of the AI language processing iceberg.

The advances in AI language processing will have implications for the teaching and learning of reading, writing, languages, and other content areas. In this working paper, we focus on the development of students' writing skills and frame the discussion around four different roles AI tools can play for writers: editor, co-author, ghostwriter, and muse.

The potential uses of AI raise complex issues for writing teachers to consider. How can these systems be used to guide and scaffold learning for students at different levels of writing ability? Do these AI systems impact what students need to learn and be able to do? What constitutes appropriate use by students, and what crosses the line into cheating on their assignments? How can teachers partner with these AI systems to provide quality teaching, with the AI tools enabling teachers to focus their time on the most critical aspects of teaching students to write well? This working paper provides some background to inform educators, researchers, and AI developers as they consider questions such as these.

The Revolution in AI Language Processing

The startling progress in AI language processing systems stems from a combination of advances. These systems use electronic neural networks to build representations of knowledge, modeled in some ways after the neurons and synapses of the human brain. They take advantage of the power and speed of current computers and the ability to harness many computers working in parallel to accomplish large tasks rapidly. Most remarkably, they use processes of self-directed learning from enormous data sets so that the AI system builds its knowledge without human intervention.

The most powerful current system, GPT-3 (Generative Pre-trained Transformer-3) from OpenAI, became available for beta-testing in July 2020. GPT-3 created its neural network by processing about 500 billion words of text from the Web. That information, containing the full array of what one can find online and in digitized books, is estimated to be more than three times the information in the Library

of Congress, the world's most extensive library. It processed that data by playing a simple trial-and-error language game – guess the words that have been randomly removed from the text – to improve its knowledge base continuously, using 1,024 powerful computers operating 24 hours per day over an estimated 34 days. The result is a neural network with 175 billion parameters, the electronic analog to synapses in the human brain. As GPT-3 masters the guess-the-word task over billions of trials within the enormous corpus of text, the system acquires knowledge of vocabulary, sentence structure, word connotations, facts about the world, writing styles, and so much more. It can then use this knowledge to respond to a wide variety of requests. Of course, it does not have the understanding of the world that every person acquires through experience and interactions, so it can be said to have a depth of knowledge but lack breadth.

GPT-3 is a foundation technology that can perform a wide array of tasks, unlike prior technologies that are programmed or trained to perform specific tasks (Stanford Institute for Human-Centered Artificial Intelligence, 2021; Manning, 2022). It can engage in interactive dialogs; answer questions; suggest text for a writer to consider; generate articles, reports, and stories; mimic the style of known writers; summarize text; and perform many of the writing tasks that students are assigned. Many people are exploring what GPT-3 can do, experimenting by providing it with different prompts and requests to find new ways it can be used, often with surprising results. GPT-3's performance has surpassed every expectation, even of the AI experts involved in developing the underlying technologies.

GPT-3 as a Co-Author

In order to demonstrate the capabilities of current AI language processing systems, I (the human co-author) wrote the introductory materials above and selected the four roles to frame discussions about how teachers and students might use AI. I then asked GPT-3 to write an essay of at least 250 words about each of the four roles. Finally, I prompted GPT-3 to generate a summary section for this paper. Here are the specific prompts I gave to my AI co-author:

1. Write an essay about how AI can serve as an editor for a writer. Discuss both copy editing and content editing.
2. Write an essay about how AI can serve as a co-author for a writer. Include specific examples of how AI could contribute to authoring a research paper.
3. Write an essay about how AI can serve as a ghostwriter for an author. Include specifics about what AI can do well and what it cannot do well as a ghostwriter.
4. Write an essay about how AI can serve as a muse to inspire and motivate a writer.
5. Write a summary of the following article about how AI can help students learn to write. (I then pasted the GPT-3 written sections for all four roles into the prompt).

GPT-3 then wrote the content of each section below. In two cases, the roles of editor and muse, the first GPT-3 essay wasn't as good as I had hoped, so I had GPT-3 produce a second essay and selected paragraphs from the two to create the text shown in those sections below. I also inserted the subheadings and removed an extraneous sentence and the names of specific products that GPT-3 used as examples but did no further editing of GPT-3's writing. I added a brief final note at the very end.

While GPT-3's text could undoubtedly be improved, consider how it compares to what high school or college students might write and what the capacity of AI systems to generate this type of text might mean in teaching and learning writing. GPT-3 could also be given beginning and ending text and asked to fill in the middle, be given a set of keywords and asked to write a text that includes them, create an outline on a topic, summarize papers, and provide other support for writers. What it can do and how it can productively interact with writers is just beginning to be explored, and we should expect the capacity of these systems to develop rapidly in the next few years.

And now, GPT-3 takes over, with its writing shown in italics.

AI as an Editor

One area where AI is beginning to have a significant impact is in the field of writing. In particular, AI can be used as an editor for writers, providing both copy editing and content editing services.

Copy editing is the process of correcting errors in grammar, spelling, punctuation, and style. It also involves ensuring that the text flows smoothly and makes sense. AI can be used to help with this process by using natural language processing (NLP) algorithms to identify errors and suggest corrections. NLP algorithms can also be used to suggest alternative words or phrases that might improve the clarity or flow of the text.

Content editing is concerned with making sure that the ideas in a piece of writing are well-organized and clearly expressed. It also involves making sure that the overall tone and style of the writing are appropriate for the audience and purpose. AI can again be used to help with this process through the use of NLP algorithms. In particular, algorithms can be used to analyze a piece of writing and offer suggestions for how it could be improved. For example, they might suggest ways to make the argument more clear or ways to add supporting evidence.

AI can also be used as a tool for improving one's writing skills. There are now numerous software programs that use machine learning algorithms to provide feedback on writing style and grammar usage. These programs are becoming increasingly sophisticated and are able to provide detailed suggestions for improving one's writing. By using these programs regularly, writers can hone their skills and produce high-quality work more easily than ever before.

Overall, AI can be a valuable tool for writers who want to improve their work. By using AI-powered editors, writers can get help with both copy editing and content editing tasks, allowing them to produce better-quality work more efficiently.

AI as a Co-Author

In recent years, artificial intelligence (AI) has made significant advances in its ability to generate text. For example, OpenAI's GPT-3 algorithm is capable of generating realistic-sounding news articles and fiction stories. AI can also be used to help authors write research papers.

There are a number of ways that AI can contribute to the authoring of a research paper. First, AI can help with the task of data collection and analysis. For instance, if an author is writing a paper on the effect of climate change on crop yields, AI can be used to collect data on historical weather patterns and agricultural production. This data can then be analyzed by AI algorithms to identify trends and relationships that might otherwise be difficult to discern.

Second, AI can be used to generate drafts of sections or even entire papers. This is especially useful for tasks such as literature reviews, where it can be difficult to keep track of all the relevant literature. By inputting a few keywords or phrases, an AI system can search through millions of documents to find relevant papers and then generate a draft summary of each one.

Third, AI can serve as a sounding board for ideas during the brainstorming and writing process. For example, AI tools can provide feedback on written texts; it can suggest alternative phrasings, offer constructive criticism on grammar and style choices, and check texts for errors and make suggestions for improvement.

Overall, there are many ways in which AI can contribute to the authoring of a research paper. By automating tedious tasks such as data collection and analysis, freeing up time for more creative endeavors such as brainstorming and drafting, and offering valuable feedback throughout the process, AI has the potential to greatly improve the efficiency and quality of scientific writing.

AI as a Ghostwriter

A ghostwriter is someone who writes a book or other work for another person who will be credited as the author. In some cases, the ghostwriter may be acknowledged by the author or publisher for their contribution. In other cases, the ghostwriter remains anonymous.

AI can serve as a ghostwriter in two ways: through automated writing and through human-assisted writing. Automated writing is where AI takes over the entire writing process from start to finish. This could involve using natural language processing (NLP) to understand an author's style and ideas, and then generate text that imitates that style. Or it could involve taking a set of data points and turning them into a narrative (as some AI systems are already doing).

Human-assisted writing is where AI helps an author with specific tasks related to writing, but does not take over the entire process. For example, an AI system could help an author brainstorm ideas, do research, or edit their work. Currently, there are many software programs that claim to do these things, but they are not true AI systems; they only use simple rules to find errors or suggest corrections. True AI systems would be able to understand context and offer more nuanced suggestions.

There are several advantages of using AI as a ghostwriter. First, it can save an author time on tasks like research and editing. Second, it can help authors improve their work by offering suggestions that they might not have thought of themselves. Finally, it can allow authors to produce work at a higher volume or faster pace than they could on their own.

However, there are also some disadvantages to using AI as a ghostwriter. First, it is still early days for this technology, so the quality of automated writing is not yet up to par with that of human writers (though this will likely change in time). Second, even if the quality is good enough, readers may be able to tell that the work was written by a machine – which could make them less likely to engage with it. Finally, there is always the risk that something could go wrong during the automated writing process – e.g., the AI system could produce gibberish, or it could plagiarize someone else's work.

Overall, AI can be a helpful tool for authors – but it is not yet good enough to replace human ghostwriters entirely. In the future, as the technology continues to develop, we may see more and more works that are either written entirely by AI or heavily assisted by AI.

AI as a Muse

In the past, writers have often relied on muses for inspiration. A muse can be a person, place, thing, or even an idea that inspires a writer to create their work. Today, muses come in all shapes and sizes, and some of them are powered by artificial intelligence (AI). While AI is often associated with automation and efficiency, it can also be a powerful tool for creativity. In fact, AI is being used more and more to help people generate new ideas and solve creative problems. For writers, AI can serve as a virtual muse, providing motivation and inspiration when they need it most.

There are many ways in which artificial intelligence (AI) can serve as a muse to inspire and motivate a writer. For example, AI can help a writer generate ideas for new stories or characters, or help them develop plotlines and backstories. In addition, AI can also provide feedback on a writer's work, helping them to improve their craft.

One of the most exciting things about AI is its potential to help writers create completely original works of fiction. By analyzing large data sets, AI can identify patterns and trends that humans may not be able to see. This information can then be used to generate new ideas for stories or characters. For example, if a writer was struggling to come up with an idea for a new romance novel, an AI could analyze data from popular romance novels and identify common themes and plot elements. The writer could then use this information to create a new story that appeals to readers of romance novels.

Another way that AI can help writers is by generating ideas based on input from the writer themselves. This approach is known as computational creativity or artificial imagination. Here, AI systems are used to generate new ideas based on what they've been told about the project so far. This can be useful for brainstorming sessions or when a writer hits a wall and needs some fresh ideas to get the project moving again.

In addition to generating new ideas, AI can also help writers develop existing ones. For instance, many writers use character creation tools that allow them to input information about their characters and receive feedback about how realistic or believable those characters are. These tools often utilize AI algorithms that compare the characteristics of the character being created with those of real people in order to provide accurate feedback. By using these tools, writers can ensure that their characters are well-rounded and believable, which is essential for creating compelling stories.

Ultimately, whether or not AI will replace human muses remains to be seen. What is certain though is that AI can serve as a valuable tool for any writer looking for inspiration and motivation during the creative process.

Summary

The article discusses how artificial intelligence is being used in various ways to help writers. AI can help with tasks such as generating ideas, doing research, and editing work. Additionally, AI can serve as a tool for improving one's writing skills. There are advantages and disadvantages to using AI as a writer. Some advantages include that AI can save time on tasks like research and editing, and can help authors produce work at a higher volume or faster pace than they could on their own. Some disadvantages include that the quality of automated writing is not yet up to par with that of human writers, and there is always the risk that something could go wrong during the automated writing process.

Final Note from the Human Co-Author

This paper aims to provide information about advances in AI language processing and to pose a framework and questions to inform considerations of how these advances might impact the teaching and learning of writing. It is the first working paper of the Stanford AI and Education Challenges project, and we will be working with teachers, researchers, and AI developers to continue exploring the possibilities and providing additional resources for educators.