Applications of Generative AI Tools in Computer Education

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Abstract

Generative AI (GenAI) is a specialized subfield of Artificial Intelligence (AI) that uses machine learning's abilities including self-learning from an immense volume of data, neural networks, and complex algorithms to predict outcomes based on user's prompt and generate text, image, and media. Generative pre-trained transformers (GPT) are trained in supervised, unsupervised, reinforcement, and semi-supervised learning modes to generate human-like responses. Open AI's ChatGPT chatbot is a GenAI tool that has opened new possibilities in computer education.

The role of GenAI in education has taken on new importance as educators grapple with gradual emergence of GenAI tools in academia. The fact remains that the impact of GenAI in every facet of education has startled educators where many educators are skeptical on potential of applications of GenAI in curriculum and many more are unsure how to effectively utilize Gen AI tools to develop computer course contents.

Despite computer educators' concerns regarding GenAI tools' weaknesses including plagiarism and copyright, the potential application of GenAI tools in computer education and research is increasingly promising. In July 2023, the White House announced that the major GenAI developers have voluntarily devoted to take significant steps toward developing responsible AI. Meanwhile, higher education institutions have devoted resources to revise academic integrity policies. Lately, computer instructors recognizing fusion of GenAI tools in the real world are incorporating GenAI tools in computer courses to better prepare students for the workplace.

This article discusses approaches to apply the power of GenAI tools to empower computer educators. Examples of ways ChatGPT can be used to assist instructors develop computer courses, generate course content, produce detailed assignment statements, discussion topics, rubrics, tests, and assessments are provided. In addition, examples of how students can use ChatGPT to generate program algorithm and code, develop ideas, and conduct research are illustrated.

Keywords: Artificial Intelligence (AI), ChatGPT, Computer Education, Generative AI(GenAI), GPT, Machine Learning (ML)

Addressing the computer and education-related issues of ChatGPT

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ChatGPT stands for "Chat Generative Pre-trained Transformer." The name "Transformer" refers to the architecture of the deep learning model that powers ChatGPT, which is based on the Transformer model originally proposed in a research paper by Vaswani et al. in 2017. The "Generative" part of the name refers to the fact that the model is capable of generating text in response to prompts, while "Pre-trained" indicates that the model was trained on a large amount of text data before being fine-tuned for specific tasks like text generation. Finally, "Chat" refers to ChatGPT primarily used for conversational purposes, such as chatbots and virtual assistants.

ChatGPT (https://chat.openai.com/chat) is still free for now subject to users' evaluation. ChatGPT is a language model that uses a combination of deep learning and natural language processing techniques to understand and generate text based on patterns and associations it has learned from vast amounts of text data. It has been trained on a massive corpus of text, including books, articles, websites, and other sources, and it uses this accumulated knowledge to generate responses to user queries.

While ChatGPT does not rely on explicit rules or predetermined responses, its ability to generate text is based on statistical patterns and associations it has learned from the training data. In this sense, ChatGPT is not based on a traditional rules-based approach but rather a probabilistic approach that uses statistical methods to generate text.

This presentation will describe some of ChatGPT ethical and scientific impact in changing our habits.

Keywords: generative IT, machine learning, data collection and analysis

Title: Why to include Secure Software Development in the IT curriculum?

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Summary:

The goal of integrating secure software development (DevSecOps – Development, Security, and Operations) mindset from the beginning of the SSDLC (Secure Software Development Lifecycle) process is to develop secure system design and reduce the risk of software vulnerabilities that attackers exploit. So how do we incorporate such tools in the classroom? This presentation will reflect on the recent executive order ” to enhance software supply chain security” and review the Cybersecurity Maturity Model Certification (CMMC) secure software risk management requirements. The presenter will share resources and techniques and showcase how to incorporate secure software development tools and frameworks concepts while teaching programming languages.

AI in Education: Addressing Fairness and Bias Concerns

Dr. Ridwan Noel, Texas Lutheran University

Artificial intelligence (AI) is rapidly transforming the education sector, with AI-based tools becoming increasingly prevalent. These tools offer several potential benefits, including personalized learning, adaptive learning, and real-time feedback. However, it is important to be aware of the potential for bias in these tools. Bias can occur at any stage of the development and use of these tools, from the data that is used to train the models to the algorithms that are used to generate outputs. Bias can also occur in the way that the tools are deployed and used by students and teachers. If AI-based educational tools are not designed and used carefully, they can perpetuate existing inequalities and disadvantages to certain groups of students. There are a number of things that developers and users of AI-based educational tools can do to mitigate bias. Developers can use diverse training data, test their models for bias, and employ human oversight. Users can be aware of the potential for bias and evaluate the tools critically. By following these solutions, developers and users of AI-based educational tools can help to ensure that these tools are fair and unbiased for all students.

Title: Empowering Educators: The Importance of AI in Education

By Dr. Hijazi and Mrs. Fatema Jamous

Abstract

With an emphasis on how artificial intelligence (AI) might improve teaching and learning, this talk examines the revolutionary role that AI is playing in education. It starts by looking at how AI can be used to personalize education. By using algorithms, it can create content that is specifically tailored to each student's needs, which increases engagement and results. The conversation then turns to AI's ability to automate administrative duties like attendance and grading, freeing up teachers to focus on lesson planning and student engagement.

The talk also demonstrates how AI can evaluate educational data to reveal patterns and results in learning, supporting teachers in making defensible choices about curriculum development. It also discusses the moral issues surrounding the application of AI, such as algorithmic bias and data privacy, and offers a framework for responsible use.

The talk concludes by highlighting AI's enormous potential to transform education and empower teachers. It also promotes a balanced approach in which technology works in tandem with human expertise to shape the direction of education in the future.

Key words: AI, Artificial Intelligence, education, effect, bias, data, privacy

Title: The Responsibility of Administrators in the Use of Generative Artificial Intelligence

By Dr. Sam Hijazi & Mohamad Alarnous

Abstract

The important roles that administrators play in incorporating generative artificial intelligence (AI) into organizational procedures are the main topic of this presentation. It emphasizes how important it is for administrative settings to strike a balance between ethical concerns and technological advancements.

The advantages of generative AI for administrative tasks—such as improving report generation, automating data processing, and assisting with decision-making—are discussed in the talk. These developments have the potential to transform conventional administrative tasks by increasing productivity and offering insightful information.

The use of AI ethically is a major theme. The talk covers issues including protecting user privacy when using AI, dealing with algorithmic bias, and guaranteeing decision-making transparency. It also discusses how AI is affecting the workforce and how important it is for people to adapt their skills.

The presentation concludes by highlighting the significance of administrators managing AI responsibly. To ensure AI's ethical integration and alignment with organizational goals and ethical standards, it requires thorough knowledge and explicit guidelines. In order to effectively navigate the complexities of AI in administration, the talk advocates for continuous education and a collaborative approach among stakeholders, technologists, and administrators.

Keywords: AI, Artificial Intelligence, GAI, Administrators, Ethics