

Expert Views on ...

... Artificial Intelligence

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We asked Prof. Helmut Hlavacs, a well-known Computer Scientist and Prof. Christian Montag, a recognized expert in the field of Cyberpsychology, about the challenges and issues with generative AI and then we asked ChatGPT.

What does AI mean for the development of society?

Helmut Hlavacs: The science of artificial intelligence has made enormous progress in recent years, and here in particular in the field of generative models. Such models can generate digital assets from a small amount of basic information, and impress with a quality never before achieved. Assets include images of people, animals, landscapes and other objects, sounds, speech output in general and mimicking spoken words of specific people, video and short movies, and most importantly written text generated by so-called Large Language Models (LLMs). ChatGPT and similar products from other sources generate correct sentences with seemingly meaningful content that matches the input. These models, which are based on billions of independent parameters, were trained with the help of millions of graphics, texts, videos, etc. freely available on the Internet. It is worth noting here that LLMs generate words only by their probabilities; they are not unlike a parrot that can repeat words but does not understand their meaning. Nevertheless, the quality of the generated texts, images, 3D models, and soon longer videos is so high that the products can already be used in a very useful way. Application areas in economy, administration, entertainment, medicine, therapy and production are numerous and not yet assessable in their totality. Entire professions will fundamentally change their ways of working, from manual tedious work to highly efficient use of software that generates assets quickly and whose output is then made usable. Graphic designers, for example, will soon no longer initially design products themselves, but will instead have AIs make numerous suggestions, work on them, and then possibly copy or refine them in their tried-and-true tools. There are already tools for the interactive generation of images, for example DragGAN. This type of cooperation between humans and AIs will also become visible in other areas. The reason why AIs will not yet completely replace humans, however, is precisely the lack of understanding of the intentions behind the prompts entered.

Christian Montag: “Overall, the impact of ChatGPT on society will depend on how it is developed, deployed, and regulated. It offers immense potential for positive change but also requires careful consideration of ethical, social, and legal implications to harness its benefits responsibly.” I like this answer to your question, and it has been generated by ChatGPT, when I asked this generative AI your question. The quality of the sentences and content produced shows that we already see a powerful AI that can support humans in many tasks. The most critical area where I see problems at the moment is discussions about what jobs will be on the line, because of the spread of generative AI. Another relevant area in which clear problems may arise is the massive distribution of deep fakes, which can be created using software, such as DALL-E 2 or Midjourney. How can we ban deep fakes when they become increasingly difficult to detect? I think we will see a race between groups that come up with the best ways to create deep fakes and those who are able to detect them. Perhaps, we are browsing in the near future with anti-deep fake software, as we do today with antivirus software.

ChatCPT: ChatGPT, as an advanced language model, has the potential to impact society in several ways:

1. Enhanced communication: ChatGPT can facilitate more effective and accessible communication between people. It can help individuals express their thoughts, find information, and engage in meaningful conversations on a wide range of topics.
2. Information and knowledge sharing: ChatGPT can serve as a valuable tool for sharing information and knowledge. It can provide instant access to vast amounts of information, helping users learn about various subjects, discover new perspectives, and broaden their understanding of the world.
3. Personalized assistance: With its ability to understand and respond to queries, ChatGPT can offer personalized assistance in areas such as customer support, education, and healthcare. It can provide guidance, answer questions, and offer solutions, potentially improving efficiency and accessibility of services.
4. Creative inspiration: ChatGPT can act as a source of inspiration for creative endeavors. It can generate ideas, suggest improvements, and assist in creative writing, thereby supporting artistic expression and innovation.

5. Accessibility and inclusivity: By breaking down language barriers and providing information in a user-friendly manner, ChatGPT has the potential to enhance accessibility and inclusivity. It can empower individuals with limited language proficiency or disabilities, enabling them to participate more fully in society.
6. Ethical considerations: As ChatGPT and similar technologies advance, it is crucial to address ethical concerns. Issues such as bias, privacy, and responsible use need to be carefully considered and mitigated to ensure that the technology benefits society in a fair and responsible manner.

Overall, ChatGPT has the potential to revolutionize the way we communicate, access information, and interact with technology. Its impact on society will depend on how it is developed, deployed, and regulated, with a focus on ensuring inclusivity, ethical considerations, and responsible use.

How can generative AI change research and teaching?

HH: LLMs can now write generic texts in a short time, for example “boiler plate” texts for proposals, introductions to papers, descriptions of technical principles in reports, etc. A short test has also resulted in very useful lists of possible research questions for a certain field of computer science, which could be used for a third party funding application without any changes. It is always important here not to trust the generated texts, but to examine them for errors in content. Close cooperation between humans and AI is therefore also important here, if one does not want to risk nonsense claims. In teaching, one can quite quickly generate graphics for slides, diagrams, lists of important contents of a field to be taught, synthesize new tasks to be solved by the students, and the like.

CM: Currently, many professors and teachers worldwide discuss the impact of generative AI on human learning processes. Simply saying that we forbid this technology in the realm of learning would also lead to not considering the potential of generative AI, such as supporting us in preparing our presentation, running data analysis, or supporting us in data visualization. Currently, it is clear that products such as ChatGPT also hallucinate; hence, they are coming up with false information. This shows that we may also have to change the way we test the students. Instead of asking them to write a piece of research, we might present them with a text that ChatGPT has produced and ask them to find mistakes or ask about overall soundness. This said: In the future, analytical and writing skills will still be important, and if you want to transport your ideas with your individual voice, I advocate the use of your own thinking and writing. In so far, analytical and writing skills still need to be trained. However, I am also aware that ChatGPT may be able to copy our writing style. Needless to say, that we first have to find our own voice.

ChatGPT: Generative AI has the potential to bring about significant changes in teaching and research. Here are a few ways it can impact these areas:

1. Data analysis and pattern recognition: Generative AI models can analyze vast amounts of data and identify patterns that may not be immediately apparent to humans. In research, this capability can aid in data exploration, hypothesis generation, and identifying trends or correlations that lead to new discoveries.
2. Simulation and modeling: Generative AI can be used to simulate complex phenomena and create virtual environments for experimentation. This can be particularly useful in fields such as physics, chemistry, and biology, where conducting real-world experiments may be challenging or expensive. Simulations can provide insights, validate theories, and help researchers refine their understanding of complex systems.
3. Content creation and augmentation: Generative AI models can assist in creating educational materials, such as interactive simulations, virtual lessons, or multimedia content. They can also help in automating certain tasks, freeing up educators’ time to focus on higher-level activities like personalized instruction and mentoring.
4. Language translation and understanding: Language models powered by generative AI can aid in language translation, allowing researchers and educators to collaborate more easily across linguistic barriers. These models can also assist in understanding and summarizing large volumes of text, making research literature more accessible and accelerating the process of literature review.
5. Personalized learning experiences: Generative AI can enable personalized learning experiences tailored to individual students’ needs and learning styles. By analyzing data on students’ performance, preferences, and progress, AI models can recommend personalized content, adaptive learning paths, and targeted interventions to enhance the learning process.
6. Collaborative research and knowledge sharing: Generative AI can support collaborative research by facilitating knowledge sharing, brainstorming, and co-authoring. Models can generate ideas, suggest research directions, and help researchers synthesize and analyze information more efficiently.
7. Ethical considerations: It’s important to address ethical considerations when applying generative AI in teaching and research. These include concerns such as bias, data privacy, transparency, and responsible use of AI-generated content. Ensuring fairness, accountability, and transparency in the development and deployment of generative AI models is crucial.

Generative AI has the potential to augment human capabilities, accelerate research, and transform teaching practices by providing new tools and insights. However, it should be seen as a complement to human expertise rather than a replacement. It is essential to strike a balance between leveraging the power of generative AI and maintaining the critical thinking, creativity,

and ethical decision-making that humans bring to teaching and research.

What problems can AI cause?

HH: LLMs know nothing, they skillfully repeat “sounds” or “characters” in grammatically correct order without understanding their meaning. John Searle created the Chinese Room argument for this in 1980, where a translator sits in a closed room and is given Chinese characters in the form of questions and their answers. The translator now gets better and better at assigning characters as answers to new questions (he “learns”) without actually understanding any of these characters. Clearly, gross errors can happen here as soon as previously unknown characters appear as questions. ChatGPT and other LLMs would simply guess here, insert characters and words even if the meaning is completely wrong. Thus, resumes of nonexistent phantom persons are quickly and convincingly constructed by ChatGPT, and look deceptively real, although fictitious.

As a heuristic we can already say that the more general the topics are, about which ChatGPT writes texts, the higher their reliability seems to be. A possible reason could be that there are more and more comprehensive texts about general topics on the Internet, and the learned quality is therefore also greater than it is the case with texts on very specific topics. For example, if I ask ChatGPT to write 10 pages about a certain topic, but there are not so many texts about this topic in the whole internet, ChatGPT has to start fantasizing at a certain point. The unreflective use of ChatGPT especially in teaching has other dangers, which unfortunately have already been realized. If you ask ChatGPT whether a paper submitted by students was generated by ChatGPT, you will not get a reliable answer - it may be true or not. Recently, in the USA, an naive professor declared such papers (and thus already completed degrees) to be invalid after ChatGPT had declared itself to be their author. Of course, this has no significance, ChatGPT should never have been used in this way.

ChatGPT: While generative AI has numerous benefits, it can also give rise to certain problems and challenges. Here are some of the potential issues associated with generative AI:

1. Bias and fairness: Generative AI models learn from the data they are trained on, and if the training data contains biases, the model can replicate and amplify those biases in its gener-

ated content. This can lead to biased or discriminatory outputs, perpetuating societal inequalities.

2. Misinformation and manipulation: Generative AI can be used to create highly realistic but fabricated content, such as deepfakes or false information. This raises concerns about the potential for widespread misinformation, manipulation, and the erosion of trust in digital media.
3. Intellectual property and copyright: Generative AI can generate content that may infringe upon intellectual property rights and copyright. Determining the ownership and originality of AI-generated works can become complex, potentially leading to legal and ethical challenges.
4. Privacy and data protection: The use of generative AI often requires access to large amounts of data, which raises concerns about privacy and data protection. There is a risk of sensitive information being inadvertently exposed or misused, requiring robust privacy safeguards.
5. Ethical dilemmas: Generative AI can present ethical dilemmas, particularly when it comes to the creation of AI-generated content that mimics human behavior. Questions arise regarding the transparency of AI systems, consent for using AI-generated content, and potential impacts on individuals' well-being and privacy.
6. Overreliance and human displacement: There is a risk of overreliance on generative AI systems, leading to the potential displacement of human expertise and creativity. While AI can assist in various tasks, it should be used as a tool to augment human capabilities rather than replace them entirely.
7. Lack of accountability: As generative AI systems become more sophisticated, it can become challenging to attribute responsibility for their outputs. This lack of accountability raises concerns about potential misuse, malicious intent, and the ability to identify and address harmful or unethical AI-generated content.

Addressing these problems requires a comprehensive approach that includes ethical development and deployment practices, robust regulatory frameworks, transparent and explainable AI systems, ongoing research on bias mitigation, and responsible use of generative AI technologies.

It is crucial to proactively anticipate and address these challenges to ensure that generative AI is developed and used in a responsible, fair, and beneficial manner, with appropriate checks and balances in place.