

Introduction to Generative AI

Dr. Ranjan Kumar Mondal

Assistant Professor, Department of CSE, Swami
Vivekananda University, Kolkata, WB

ranjankm@svu.ac.in

Abstract

The world has been enthralled by generative AI, first introduced by ChatGPT and swiftly expanded upon with GPT-4 and other comparable models by OpenAI's rivals. The use of generative artificial intelligence (AI) on the street is undeniable, and debating whether or not generative AI will gain traction is now mostly moot. It will, and what hasn't been discussed yet, is how significant it will be and if using AI to create text and other types of material would have any adverse effects. Changes in technology bring changes in society. Thus, we should continually be asking how new technologies contribute to, create, or could even undermine the "good society." This makes generative AI another example of autonomous technology that is politically and culturally disruptive. In this brief article, I draw attention to some of the critical problems that need to be addressed about this technology's effects at the micro, meso, and macro levels.

Overview

The world has been enthralled by generative AI, first introduced by ChatGPT and swiftly expanded upon with GPT-4 and other comparable models by OpenAI's rivals. Regardless of the ethical and practical problems raised by academics, generative artificial intelligence (AI) is being used in the real world; therefore, it is no longer relevant to debate whether or not this technology will become widely used. It will, and what hasn't been discussed yet, is how significant it will be and if using AI to create text and other types of material would have any adverse effects. Since social

development results from technological progress, we should always ask how new technologies contribute to, develop, or even threaten the “good society” [1]. This makes generative artificial intelligence (AI) another example of autonomous technology that is politically and culturally disruptive [2, 3]. In this brief article, I draw attention to some of the critical problems that need to be addressed, including the repercussions at the micro, meso, and macro levels.

What’s that?

The term “generative AI” is used here to refer to a broad category of machine learning solutions that have been trained on vast amounts of data to generate output in response to user prompts or commands. For instance, “ai personified overflowing the world with texts and images and other media, futuristic, high resolution, dark” generates the figure shown in Fig. 1 when entered into the picture generator for Midjourney.

As was already noted, ChatGPT generates a variety of text-based output formats. A large Language Model (LLM) focusing on natural language processing is what it is. For instance, ChatGPT generates the following response when asked, “Can you define a huge language model in one sentence?”:

A significant language model is a machine learning model taught to produce text resembling human language. It is trained on a sizable dataset and produces very lifelike and cohesive text, thus called “large.”

OpenAI, the same company that created earlier iterations of GPT, is the creator of ChatGPT. Similar tales and worries arose over GPT-3 in 2020, but as it was far less accessible to the general public and less suited for everyday discourse, interest in it was mostly restricted to the press, academic, and industrial groups. However, GPT-4, launched in 2023, was integrated into ChatGPT right once and made widely accessible.³ By industry, I mean people who create or use these models for commercial endeavors, which I’ll touch on in a moment. Others own their own

LLMs; prior examples include DeepMind's Gopher, Meta's OPT-175B, and Google's LaMDA.⁶ But, after ChatGPT was introduced, other companies hurried to catch up and release their new LLM implementations, such as Google's Bard, DeepMind's Chinchilla, and Meta's LLaMA.⁹ Additional models have been released regularly throughout 2023, including Google's PaLM 2 on May 10 and Anthropic's Claude 2 in July. Notably, Meta's Llama 2 was made accessible for free for both commercial and research usage in July 2023,¹¹ perhaps upending rival companies' business plans. Although there are now a variety of economic models, Microsoft, for instance, has invested in OpenAI to make ChatGPT accessible via its many Office apps [4].

As mentioned, generative AI models that employ diffusion models or Generative Adversarial Networks (GANs) to create pictures also use AI. Prominent instances include OpenAI's Dall-E,¹² Midjourney,¹³ and Stable Diffusion.¹⁴ These models generate many picture formats at the user's request, enabling customization of subject matter, style, tone, situation, etc.

However, these mediums are not the only ones that use generative AI. For instance, movies are now being produced, so envisioning a day in the distant future when generative AI can create full shows at our orders is not a massive stretch of the imagination [5]. AI is also readily capable of producing speech and music, and it can combine current methods to make multi-modal media. Consider asking a ChatGPT that is more sophisticated to create a brief biology textbook using images from its partner Dall-E, for example. Combining language models with picture generator prompts is only a little step forward for those already utilizing language models to create effective commands. Technologically banal, yet socially profound.

What is its capacity?

The use of generative AI skyrocketed in late 2022, and ChatGPT was a pivotal contributor to this development. Although the technology was not new, it was made publicly and freely available, and it had matured to the point that many

people could quickly use and benefit from it. Consequently, continuing to argue that LLMs won't be effective or have a significant influence is no longer logical. They're Already productive and making a difference.

As a confessed techno-skeptic, how can I know if generative AI will succeed? By witnessing the effects it has already had on the eyes and ears. The capabilities of this technology are already well known, and there are several news stories on and even written by ChatGPT. However, even more noteworthy are the accounts of non-specialists and people with no prior tech or AI knowledge using ChatGPT.

For instance, my son and his classmates at school quickly learned about ChatGPT and began using it as soon as it was made accessible. I'm sure some use it to cheat, but most do it to acquire ideas and start points for other tasks. To obtain a general understanding of a subject and create text summaries, resumes, etc., I have neither programming experience nor specialized knowledge of AI. To put it simply, ChatGPT was helpful from the start. People used it, too.

Academics and administrators in higher institutions are finding it challenging to manage ChatGPT's effects. When students may utilize generative AI to write all or portions of their writings and no system can detect the presence of ChatGPT material in what is turned in, take-home examinations, for instance, must be redesigned. While some already utilize technology in the classroom and encourage their students to utilize it in fresh and inventive ways, others are afraid and upset about this disturbance. It's unclear how ChatGPT will affect higher education specifically, but it appears confident that some changes will occur.

Beyond this, however, a diverse range of professions are already using it. As both junior and senior personnel see the potential of the new technology, consultants are already putting together presentation outlines, drafting reports, carefully wording letters, etc. While some people share their newly acquired power tools, others should be expected to utilize them covertly. Not to mention, individuals have been using this technology to construct enterprises for a while

now. An early instance was Lensa.ai, an app that created the author's profile photo (Fig.) using StableDiffusion to create profile pictures from user-uploaded selfies. 2.

As previously said, generative AI can produce any media, including text and graphics, and additional media are either now covered or will be shortly after. However, the potential of generative AI is much more significant, so we shouldn't be deceived by what it can do now. The fact that creative AI can produce text and that text can essentially do everything that a computer can accomplish is vital to note. A particularly fascinating example is programming, where one could theoretically achieve anything by having LLMs generate different types of code. How new apps, templates, 3D models, instructional material, etc., may be produced demonstrates excellent potential. The recent ACM essay pronouncing the end of programming [6] reflects the influence of generative AI's programming capabilities.

Do we need to be concerned?

Although generative AI has vast creative and productive potential, there are risks and possible problems to be aware of.

What have experts and others cautioned against as generative AI permeates every industry? Differentiating between consequences on a societal level (macro level), on sectors, groups, or organizations (Meso level), or on an individual basis (micro level) is one approach to organizing the many issues.

Macro-level difficulties

First, there are worries that political stability and democracy may suffer due to generative AI. One example is the almost limitless quantity of political information that generative AI can produce and distribute. One thing to be wary of is fake news, which includes text and made films that show actual people or events in inventive and inventive ways (deepfakes). Concerns about humans losing their sense of genuine or false or greater polarization arise when AI fills the information environment with fresh material [7]. The

suggested use of generative AI to enhance democratic and deliberative processes is also connected to democracy [8–10]. Undoubtedly, one of the most significant advantages of generative AI is its ability to promote consensus and improve decision-making; yet, there is a chance that this use of AI might weaken democracy as we know and appreciate it [11].

Second, as previously said, generative AI can displace all types of labor, including so-called “knowledge workers” [12]. Even if AI does not replace humans, there is still a chance that work will change. In such cases, we should be cautious about how power constellations shift and whether they align with the dignity of work, as highlighted by, for instance, the Sustainable Development Goal (SDG) 8 of the United Nations [13]. Since generative AI is expected to influence both innovation significantly (SDG 9) and economic growth (SDG 8), it will be crucial to ensure these effects are favorable and supportive of socially sustainable development. But it’s also important to remember that even if creating generative AI models is theoretically feasible for everyone, doing so involves a significant investment of resources, and a society that uses these models increasingly runs the danger of becoming more reliant on big tech firms [14].

The third concern is the tendency of generative AI to uphold the status quo. It is predicated on past facts, and if these models gain traction, they may obstruct the intended improvements in society. Moreover, prejudice and discrimination have a long history in human history, and systems built on historical data tend to replicate these wrongs in novel and opaque ways [15].

Lastly, energy is needed for AI, and generative AI loves large volumes of data, which implies increased energy use. This results in an elevated carbon footprint associated with AI [16]. When weighing the benefits and drawbacks of generative AI, it is essential to take into account the greenhouse gas emissions produced during the training process, given that the information and communication technology industry is a major (and rising) contributor to world emissions.

Problems at the meso scale

First, generative AI will alter professions and the power dynamics between occupations, employers, workers, and other groups. This is connected to the more significant problem of labor and work shifts. What happens to copywriters when LLMs can compose text for news, advertising, etc.? What about independent photographers? Do news organizations use Midjourney or Dall-E for their picture needs rather than purchasing stock photographs or employing photographers? However, as technology advances, professions shift as well [17]. The dynamic to be anticipated is shown by the case of typographers, who moved from having an essential and protected role in the news value chain to either being obsolete or needing to enter adjacent professions.

Second, there are significant obstacles in how generative AI generates, appropriates, and extracts material created by human labor. This is a grave problem, mainly because these models may also be used to replicate certain styles. As a result, material produced by humans will be transformed into something entirely new by creative AI, rendering the original producers obsolete. The fact that human content producers are not compensated or have any remedy available to them highlights a severe weakness of the laws that currently govern the collection and use of data for model training. This problem also has to do with how Google was permitted to, among other things, “appropriate” street pictures (Google Street View) and extract text from books by scanning them (Google Books) [18].

Lastly, since the detrimental effects are concentrated rather than dispersed uniformly, biased and discriminating systems will also have meso-level repercussions [15]. These harmful impacts are particularly concerning because, according to historical statistics, disadvantaged groups are already more likely to experience prejudice. Moreover, the same groups are often underrepresented in the committees that design and oversee the systems above. The many methods for making money from generative AI systems also highlight the risk that these tools may create “digital divides” between those with and without access [19]. Such divisions could exist between

groups in developed countries. Still, it's also essential to take into account the differences between, say, those living in underdeveloped and least-developed countries and those in countries with generally strong internet and computer infrastructure. Many people won't be able to use ChatGPT, not even the "free" version.

Small-scale difficulties

Each person will experience macro and micro-level effects to variable degrees, but inevitable consequences are best understood by examining how generative AI could directly affect people.

First, there's always the worry that we may experience cognitive atrophy due to new assistive technology. When we give AI this much power, we face the danger of eventually losing the ability to execute intellectually and cognitively demanding jobs, including our creative labor [20]. ChatGPT could harm our writing abilities, just as calculators have affected our mental math ability.

Second, some worry that generative AI designed for human-human interaction will become more persuasive and may easily stray into the manipulation space [21]. For instance, researchers at OpenAI have written about how they anticipate increasing alignment-related challenges once capable generative AI systems that optimize some parameters could readily modify human behavior and perceptions to achieve such goals [22]. Although there haven't been many reports of significant human suffering, such as suicides, being connected to LLMs yet, industry insiders worry that it will happen eventually [23].

Lastly, people may start choosing generative AI over human relationships because it may be alluring and fascinating. Text and video together, for instance, may enable the creation of a new intimate partner, similar to what Replika—"the AI companion that cares—is already accomplishing.¹⁵ When generative AI and robotics are combined, we'll have companion robots that offer intimacy, enjoyment, and care without drawbacks to having a human partner [24]. These companions, however cozy, may be harmful to our prospects

of meeting human mates (who are now obsessed with AI partners) and our capacity to be patient and kind partners to people.

Fig. 3 indicates the possible risks. This level also shows how the three levels work together and how hazards from one level affect the other levels.

In summary

“Progress never stops” is not an effective way to accomplish goals. Typically, these creators wouldn’t have desired for their work to be

Employed to train these models, but they are left with little voice in the future we choose [25]. As such, we must carefully assess every technological breakthrough’s implications before accepting its unaffordability. After doing this, we can understand how new technologies alter societal structures, power dynamics, and values. Only then can we distinguish actual progress from more advanced technology. We can and should cease preventing what seems to be progress if it turns out to be harmful to human welfare and our shared values as a species.

To be a positive force in society, generative AI must uphold rather than compromise our core principles. Of doubt, there will be disagreements about these principles, but freedom, democracy, sustainability, well-being, and justice are a few examples of values that promote a decent society [26]. As was said, generative AI systems can go against these principles, but there are also reasons to believe that they might strengthen and advance them.

It is undeniable that generative AI has great promise and that these technologies will improve some people’s lives—And other people’s money reservoirs. Since the technology is helpful, it probably shouldn’t be discontinued entirely. Appropriate regulation must be in place to guarantee that the creation and use of generative AI do not result in the detrimental effects mentioned at the macro, meso, and micro levels. For instance, if our goal is to use generative AI to boost economic growth, we should make sure that the

growth that is produced is consistent with SDG 8, which calls for “sustained, inclusive, and sustainable” growth that also contributes to “full and productive employment and decent work for all” [13].

This implies that human agency and our ability to shape and control technology must be emphasized. Collingridge’s paradox contends that although technology may be relatively readily governed while it is still in its early stages, our understanding of those regulations’ implications and justifications is still developing [27]. Enforcing social control over technology becomes more problematic as it is deployed and widely dispersed [28], even when the arguments for doing so have often proven painfully obvious [27]. The latter is now the case with OpenAI’s approach of unleashing generative AI on human societies. Individuals, organizations, and communities must work to make technology supportive of a decent society despite the challenges this entails [1].

Conclusion

Generative Artificial Intelligence has rapidly evolved from a niche research area into a transformative technological force shaping society at multiple levels. Its capacity to generate human-like text, images, audio, and multimodal content has already altered education, industry, governance, and personal life. While its productive and creative potential is undeniable, the technology also raises profound ethical, social, economic, and environmental concerns. At the macro level, generative AI influences democracy, labor markets, sustainability, and global power structures. At the meso level, it reshapes professions, redistributes economic value, and risks reinforcing existing biases and inequalities. At the micro level, it affects individual cognition, behavior, relationships, and autonomy.

Therefore, generative AI should not be viewed merely as a technological advancement but as a socio-technical system requiring thoughtful governance. Ensuring transparency, accountability, fairness, and sustainability in its development and deployment is essential. With appropriate regulation, ethical oversight, and human-centered design, generative AI

can support societal well-being and inclusive growth. Without such measures, however, it risks undermining fundamental human values. The challenge ahead lies not in stopping technological progress, but in guiding it responsibly to serve a just, democratic, and sustainable society. As highlighted by Collingridge's dilemma and risk society theory, delayed regulation can amplify unintended consequences, making early and informed intervention crucial for aligning technological innovation with human values and social justice [26–28].

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