How will AI Generated Content (AIGC) Lead a Technological Revolution?

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Abstract: AIGC is not new but in 2022/2023 once again becomes under the spotlight with the help of ChatGPT, as it is expected to generate trillions of dollars in economic value in the future. AIGC will potentially lead the next technological revolution, but how? This blog starts with a brief review on the Internet and Digital Revolution, where we can tell after thirty years how super efficient communication, mainly for human generated content transmission, has changed our life, education, politics, and research. AIGC allows super efficient content customization for many tasks and scenarios, creating tremendous impacts on all the places. With human and machine intelligence, we are living in the best era of harmony and intensity.

Introduction

Content generation enabled by Artificial Intelligence (AI) is not new. In past decades, AI generated content (AIGC) was sometimes useful but most of the time unsatisfactory, which might have lowered our expectations. Then the box full of surprises was open in 2022: GPT-3.5 and Codex(March 15), DALL·E 2(September 28), ChatGPT(November 30), etc. These AI systems offer an input interface of text data that can be given or voice-transformed, and generate many types of data such as text, image, video, audio, code, table, or complex (semi-)structured data. If one is able to describe a task and some demonstrations in language, those can be easily put into the systems to see what is created and customized to the needs. Millions of people are using or challenging these AI systems; and though several limitations are identified, the public becomes appreciative of the **efficient content customization**. Some are predicting or stating that AIGC is leading a technological revolution. Is it true? What in our world may soon or later be changed by the AIGC? Can we use something we learned from the past to understand what we will see?

There are several technological revolutions such as the Industrial Revolution(1780-1840) and Technical Revolution.(1870-1920) The most recent one is the information and telecommunications revolution or known as *Digital Revolution.(1975-?)* *The Internet* was one of the key technologies that led such a revolution, starting from a message that was sent over the ARPANET in 1969. The public soon became appreciative of the possibility of super **efficient communication** that could be used to transmit information at an unprecedented speed. Because of that, our world has been changed: we have a much higher level of life experience, work efficiency, and expectations on almost everything. So, what kind of higher level of life experience, work efficiency, and expectations can we have with AIGC? Before answering this question, I would like to briefly review what has been changed by the Internet.

How the Internet has Changed Our World

All started from a protocol established over 50 years ago. It basically allowed devices to transmit thousands of bits in a second from one place to another. But when the bits became messages, news, pictures, files, etc. our world was changed: the Web was no longer just spiders' territories, and numerous software have been developed and deployed on the Web. 50 years ago, people were criticizing the unreliability of this new technology: Bits were lost, files were broken, images

could not be opened. But soon the Internet became the best method to send all these things, though mail trucks are not completely replaced yet. Because technologies can be rapidly improved by “fine-crafting” which is usually less challenging than the first step.

We hear a lot of criticism of AIGC for the limitations of those AI systems, especially ChatGPT: sensitive to input, lack of common sense and knowledge, unjustified information, and even harmful content, etc. Those are not discouraging but motivating scientists, engineers, and entrepreneurs to fine-craft the systems. This blog is to note down the motivation: it will remind me of the possibilities of our world’s bright future with AIGC.

OK. What has been changed by the Internet and by the technological revolution it leads?

Life. You write emails not letters for long distance communication. You have Map apps and do not use much time to plan ahead when you travel. You have social apps and do not have to leave your house to make new friends. You go to Google or Wikipedia to look up information not heavy Encyclopedia books. You won’t have to find a table for a game with multiple players.

Education. You gain lots of knowledge and skills from the Web, not teachers at local schools. You can take classes online, which became a common learning method in the pandemic. Your kids can have a video chat with book authors, which is more fun than reading a bio in the book.

Politics. You can voice your opinions as a citizen or for your cohort on messenger, blog, and social media. You know government transparency to the public is a realistic expectation of democracy. You are playing a role in the dynamics of political conflict, corruption, and values.

Research. You get to take classes about digital economy and digital currency in Business School. You ask questions about fake news, online propaganda, and social media campaigns to your sociology (or even computer science) professors. You find some psychologists and psychiatrists are studying Internet gaming disorder. You are amazed by big data and AI because trillions of bytes are being collected, managed, used, and learned through the Internet.

How AIGC will Change Our World

Nowadays the mobile Internet has reduced the cost of sharing *human generated information / content* (e.g., messages, photos) to a certain extent that we enjoy “instant” communications which may be even faster than instant noodles. However, content customization is still quite expensive. We are willing to pay time, money, and effort to obtain the abilities of customized content production. We appreciate customized birthday cards and cakes. We do homework, projects, and exams to earn a degree that allows us to write a news article, present a lawyer argument, propose a scientific hypothesis, and design a research study. We take lessons to figure out how to design movie posters, advertising slogans, and video ads for customers. We know one can have a well paid decent job if he/she writes storybooks or science books, creates songs and albums, designs clothes, recipes, buildings, and vehicles. We believe that without professional training, it’s *impossible* for any of us to create anything as satisfactory as a normal professional does. Now, AI systems are able to respond to the human needs of quality content

customization. AIGC will sooner or later be everywhere: comprehensive answers to hard questions, nice essays on specialized topics, imaginative artwork based on a textual input, etc. *Integrating with technologies such as programming software, Office software, virtual reality, 3D printing, mobile apps, wearable devices, etc.* AIGC provides or will provide efficient customized solutions to a few perspectives that include, and not are limited to:

Life. With AIGC, we receive customized recommendations and answers on search engines. We can send well-formatted emails that need minimal edits to colleagues or superiors on Mail apps. We will have free assistants who offer draft articles, draft paintings, draft graphic designs, or version 0.1 of new softwares in a minute that are already customized to the description of the creative work. So, our work is to utilize the drafts to make a final production better than ever.

We enjoy chatting with those who are empathetic, knowledgeable, sharing interesting life experiences, and talking clearly and friendly. Most of us might “play” with social chatbots but not truly use them for social interactions because we assumed their lack of such abilities. Today’s AIGC can be optimized on numerous bytes of data that are reflections of such human abilities covering common sense, world information, professional knowledge, life experiences, written and oral communications. We will enjoy the highly enabled AIGC and customize it for humor and love, for personalities, and for different purposes such as alleviating stress, depression, and anxiety. AI can be a listener, a friend, and even a pet.

Being outside in nature feels so good. It improves our physical and mental health status, motivation, relationships, and job performance. We go camping, hiking, surfing, and skiing, even though we know half of the time would be spent on the way. Integrating AIGC and virtual reality will enable us to instantly enjoy the activities. AIGC will plan virtual trips in 3D scenes with lots of customized details that current softwares do not have: sounds, conversations, views, rocks and woods on trails, waves and animals in sea water, interactions with plants, animals, etc.; all can be generated by the AI systems. Without the AIGC, users would act like task performers; with the AIGC that provides details, users would feel like free humans in a real physical space.

AI teammates and opponents in games are basically categorized by skills. New AI systems will capture personalities from the world data, simulate any type of them, and generate content (conversations and behaviors) customized to the personalities that a user desires for AI teammates or AI opponents, such as the Supervisor (ESTJ), Giver (ENFJ), or Visionary (ESFJ).

Education and Training Programs. A growing number of school districts are banning the language model ChatGPT due to cheating concerns, but some experts believe schools should instead try using the software to their advantage. On one hand, the efficient customization models may create draft learning materials such as sections, chapters or a whole textbook, quizzes, or even lecture videos upon the instructors and departments’ needs. Though those materials need to be carefully checked, edited, and finally approved for use by a human expert team, lots of time can be saved to make up-to-date course design feasible. On the other hand, if the solutions and/or essays generated by the language models are good enough (e.g., getting full points in a homework assignment), instructors would have to design more challenging work,

which would lever up students' knowledge and skills after finishing the course. The process requires the instructors to improve their knowledge and skills too. Banning the tools is to avoid leaving the comfortable zone and to secure jobs without additional effort. But that would not guarantee long-term survival.

Training programs will be changed fundamentally. Similar to the changes in education, customized materials of training programs will be generated by AI and edited and approved by humans. With the materials, trainees will learn how to leverage the AIGC to achieve a higher level of performance in specialized tasks.

Politics. AIGC will be used to assist the customization of political speeches that aim to get effect through persuasion. Politicians wish to increase people's interest and to make people agree with their ideas to inform the general public of their ideology and message. AI can customize the speeches to different cohorts of various backgrounds. In the other direction, the citizens of different backgrounds can use AI to customize (or most of the time, formalize) their voice to the public and/or government.

Research. Technologies are developing, so are basic and applied research. New research fields and new centers/departments will open soon. The AIGC applications aforementioned such as customized chatbots, "pets," and virtual 3D trips will fundamentally change human interactions and human minds. Therefore, they will revolutionize the research areas such as sociology, psychology, and health science (including physical health and mental health).

Customized AIGC will be able to simulate human samples of different backgrounds for studies in political science.*(Argyle et al. Out of One, Many: Using Language Models to Simulate Human Samples. arXiv:2209.06899.)* We can use it to study the complex interplay between ideas, attitudes, and socio-cultural context that characterize human attitudes, before collecting real data from human subjects which are very expensive, of limited scale, and full of uncertainties in the collection process. In business schools, key accounting skills may include processing analytics reports from the AI systems. AI and human intelligence will be interacting with each other, forming new research problems and topics beyond computer science.

What Human Workers will be Valued still or even Higher

Human workers who create content/service that AI cannot do. In quite a few jobs, people feel that AI is unpredictable and unreliable, lacking basic commonsense and understanding of the world. We will still have to rely on humans ourselves where we cannot take any risk of the AI's unpredictability or unreliability. Lots of such jobs involve policy making or decision making.

Human workers who provide useful feedback to improve AIGC. There are at least three types of feedback. The first type is identifying what is factually false, wrong, or misleading in AIGC. These human workers must have excellent professional knowledge. The second type is identifying if the AIGC is "original" enough. These human experts must know at least a clue of almost all the work and/or sources that humans have done and released for the job. The third type is extracting textual instruction from one's human knowledge to improve AIGC. If one can

continuously contribute something that the AI systems do not have and most humans believe an AI system should have, his or her knowledge will be valued. The philosophy is not too different from knowledge-based AI systems (or known as expert systems): In the 1980s, human experts were hired to write as many rules (e.g., if-then statements) as possible until the rules became too detailed or too complex to be written down. Now human knowledge is being extracted and used in a much less restricted form than rules, as far as it can be used by reinforcement learning. The AI's training process continuously checks if any knowledge remaining in human minds is not "found" in the machine intelligence; if yes, then the process aims to extract and fuse it into the AI's large number of parameters. There could be a bottleneck point that humans would not be able to provide useful information any more for the deep AI, just like exhaustive rules for the expert systems, while the artificial general intelligence might not yet be achieved.

Human workers who combine AIGC and human intelligence to achieve a higher goal. We should get used to working with AIGC in our jobs and daily life. It will just be like a Casio calculator, the Oxford English Dictionary, the Google Map, etc. We will still train ourselves to do calculations, explain words, and remember roads for convenience or efficiency. We may sometimes be proud of having such skills or more precisely, not losing such skills entirely. But we know when and how it is best to use the tools. Compared to ChatGPT, the earlier tools had malfunctioned too; but it did not take a long time until they were widely produced and used. All the tools, if not abandoned, are making our lives easier and better. We are living in the best era!

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