Generative Artificial Intelligence (AI) for the Data Economy: Use Cases in Nursing

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ABSTRACT

Generative artificial intelligence (hereafter AI), which was decades in the making, elevates AI tools like ChatGPT from a socioeconomic enabler to a potential co-participant. But undoubtedly, a prerequisite for tackling the generative AI revolution is solving a broad spectrum of questions across industries, such as at risk of job displacement and other threats (e.g., for intellectual property) that cannot be managed. Generative AI relies on big data to mimic "the human creative process" by creating novel data similar to the kind it was trained on. That means that generative AI can be considered a part of the data economy. This way, we can borrow data science thinking and data economy practices to solve some through a multi-lens and interdisciplinary approach. We start by clarifying that data-rich markets (corresponding to generative AI) are radical, suggesting that in such radical data-rich markets, the decentralization of powers has gradually emerged (e.g., assurance contracts, prediction markets). These powers will change rational choice that may trigger a transformation in data governance, including non-profit or profit options, crowdfunding and venture capital competition, and owner- or user-centric orientation. Decentralization can also turn data owners into data producers. Merging the two roles (i.e., the data owner and producer) would address traditional criticism of generative AI, such as privacy, ownership, trust, and incentives. In addition, we discuss individual manual efforts for incremental learning of generative AI (crowdsourcing). We believe that the rapid growth of generative AI applications represents an inflection point in the development of the global data economy.

CCS CONCEPTS

• Artificial intelligence

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KEYWORDS

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1 Introduction

Generative AI transforms previous approaches to data-driven tasks, bringing opportunities to solve problems by creating new data that closely align with the patterns and characteristics of the training data. "New data," known in the data (or computer) science circles as AIGC: artificial intelligence-generated content. AIGC, as opposed to being created by human authors, can "automate the creation of large amounts of content in a short amount of time (Cao 2023)".

The generation process of AIGC is generally considered to consist of two steps: (1) extracting intent information from human instructions and (2) generating content according to the extracted intentions. However, as demonstrated by two studies (Stefanini 2022, Liang 2022), the above two steps are not entirely the case. The core recent AIGC advances stem from training more sophisticated generative models on larger datasets; for example, while the main framework maintains the same as GPT-2, GPT-3's pre-training data size grows from WebTex (38GB) to CommonCrawl (570GB after filtering). Beyond the benefits of increased data volume, use of lager foundation model architectures, access to extensive computational resources, and integration of new techniques (e.g., unimodal and multimodal models) are possible. In image generation, exemplified by integrating new techniques, stable diffusion proposed by Stability.AI (Rombach 2022) has achieved great success in generating a harmonious combination of diversity in the generated images and similarity to the training data by controlling the trade-off between exploration and exploitation.

By combining the advancements mentioned above, models in AIGC tasks can be adopted in various industries with broader social, cultural, economic, political, and legal contexts, which we call generative AI use cases.

A recent analysis by McKinsey estimated that "generative AI could add the equivalent of $2.6 trillion to $4.4 trillion annually across the 63 use cases … analyzed – by comparison, the United Kingdom's entire GDP in 2021 was $3.1 trillion (Chui et al. 2023)." Generative AI deployment could unlock $60 billion to $110 billion

in annual revenues across the pharmaceutical and medical-product industries. For example, lead identification – a step in the drug discovery process in which researchers identify a molecule that would best address the target for a potential new one – may take several months with "traditional" deep learning. Another use case can be found in Appendix, also given by the McKinsey report.

The approximately 3 million nurses working today make up the backbone of the U.S. healthcare industry (Mercer blog 2021). To explore generative AI use cases in nursing, we first consider triage, delegation, and education. The three are all priority work for nursing. Triage, originating from the French word "Tier," is the comparison or classification based on several patients' health conditions to ensure optimum care and quality; for example, when these patients arrive at the emergency department. Delegation is critical in nursing as it contributes to the acuity of patient care among staff of all categories, such as registered nurses (RN), licensed practical/vocational nurses (LPN/LVN), and unlicensed assistive personnel (UAP). Furthermore, nurses play a role in patient (and student nurse, LPN/LVN, UAP, etc.) education. That said, nurses must assess patients to pinpoint the best way to educate them (or to teach any student nurse) about their health and determine how much they already know about their conditions. We envision a starting point for the nursing use cases (see Appendix and Supplementary Files) that might be used for teaching, as all three tasks triage, delegation, and education are covered. We designed the training program to create multiple virtual avatars as influencers, a series of taking-photo digital courses for the registered nurse exam, a question bank by enhancing text generation with sentence selection, and one or more teaching assistant chatbots based on the Nursing Knowledge Graph.

Drawing on data science thinking and data economy practices, we elaborate on the possible economic effects of the proliferation of generative AI systems based on real-world nursing use cases. We aim to provide the readership with optimistic thoughts on the general trend to promote generative AI as part of the data economy in today's data-driven world. In short, we might let generative AI run free because it ultimately drives economic and employment growth.

2 Use Cases in Nursing

Use cases in nursing may rely on data technologies to reduce information asymmetry and monetize digitized contacts, enabling the transformation from "medical value" to "valuable medicine." Mutual assistance includes, but is not limited to, help obtaining the NCLEX® ATT (authorization to test), transferring licenses across states, improving studies to pass the exam, finding a job, etc. Since non-profit is our goal, we envisage the community should be a DAO (decentralized autonomous organization, a bottom-up entity structure with no central authority).

We locked down a primary business that is good for everyone within our community – virtual persona-based influencers. Generative AI can open up possibilities for such influencers by creating realistic and novel content. In preparing the material, we reviewed all priority work for nursing and found that triage, delegation, and education were all critical. Then, we determined a starting point: teaching (as the three tasks of triage, delegation, and education are covered). Triage, originating from the French word "Tier," is the comparison or classification based on several patients' health conditions to ensure optimum care and quality; for example, when these patients arrive at the emergency department. Delegation is critical in nursing as it contributes to the acuity of patient care among staff of all categories. That said, nurses must assess patients to pinpoint the best way to educate them (or to teach any student nurse) about their health and determine how much they already know about their conditions. We then designed the training program to create multiple virtual avatars as influencers, a series of taking-photo digital courses for the registered nurse exam, a question bank by enhancing text generation with sentence selection, and one or more teaching assistant chatbots based on the Nursing Knowledge Graph.

3 Conclusions

Data as a human-created resource plays a vital role in some of the significant economic transformations of this century. Data work for artificial intelligence is no exception.

It is impossible to address almost all questions in this perspective paper. As data optimists, we envisage that the answers should "let data speak for itself" to point the way forward. This is much more constructive than claims based on a lot of bias and a lack of facts. And we do see possible economic effects of the proliferation of generative AI systems. These arise from the behavior of markets and socioeconomic participants (or actors). The former is decentralization; the latter are (1) rational choice for non-profits, crowdfunding, or/and owner-centric investments, (2) the merging roles of data owners and data producers, and (3) participants' contribution as crowdsourcing (for incremental learning of generative AI).

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