The Challenges of Generative AI in Knowledge Management

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I am pleased to write this editorial for the Pakistan Journal of Information Management and Libraries. As a professor in Knowledge Management (KM) and a former Librarian, I thought it would be useful for the audience of this journal to hear about one of the most pressing issues in the KM field. Since KM and Library and Information Science share strong ties, they also reap the same benefits and face similar challenges when it comes to technology.

They both have people at the core of their disciplines; but while librarians are often concerned with users, KM professionals focus more on organizations. In both cases, new technologies arise regularly, demanding strategic adjustments as knowledge management processes and systems are tested. In this editorial, I discuss one of the most widely discussed technologies facing knowledge management professionals today: Generative AI. The first mention I found of "generative AI" was in a 2001 paper by Tate (Tate, 2001), entitled Intelligible AI Planning — Generating Plans Represented as a Set of Constraints, although White (n.d.) suggests that Generative AI can trace its roots back to the 1960s, which built on the previous work in deep learning, which can be traced back to the 1950s. Using Google Scholar, I searched on the phrase "generative ai" for the years listed in Table 1 below.

Table 1

Frequency of Term "Generative AI" in Google Scholar

Year	# of results
2023	20300
2022	577
2021	300
2020	161
2015	20
2010	18
2005	16
2000	7
1995	2

As evidenced by the data in Table 1 it is quite evident that there is a tremendous and very recent interest in Generative AI, particularly in the last four years, with a large jump in peer-reviewed articles in 2023.In perusing the titles, it

struck me that there is a divide in perspectives on Generative AI; one perspective suggests the many benefits of this technology, while there is a second perspective of concerns and warnings about its potential for harm. For the readers of this journal, I thought it might be useful to summarize some of the issues from both perspectives, since Generative AI is still in its infancy and there is much work yet to be done.

Benefits of AI

There are several general benefits in using Generative AI. This class of artificial intelligence systems have the capability to generate new content, including text, images, music, and other forms of data, often using deep learning techniques. Generative AIthus automates content creation, reducing the need for human intervention in certain tasks. Generative AI can also optimize processes and solutions in various domains, leading to an increase in efficiencies and innovation. Generative AI can also be used to generate data for training models, particularly where data is scarce or difficult to obtain. Generative AI, particularly those models based on deep learning, can learn patterns from existing data and generate new data points that share similar characteristics. In other words, Generative AI can extrapolate from available data to "fill in" data to predict and fill in the missing values (i.e., providing imputed data). Generative AI models can also generate realistic images based on patterns learned from a dataset. In that case, if there are missing or corrupted parts in an image, it can attempt to generate a plausible completion. Natural Language Processing (NLP) models, including generative language models, can also be used to generate text based on context. If certain parts of a text are missing, the model may be able to impute coherent and contextually relevant content to fill in the gaps. Similarly, generative models can be used to provide synthetic data that closely resembles the distribution of real data. This is particularly helpful when real data is missing or not available.

In sum, the benefits of Generative AI include the ability to create and automate the production of useful content, to optimize solutions and spur innovation, to personalize user experiences, and generate data where data is limited or missing. These benefits are not without caution, however. Keep in mind that the landscape of AI is constantly shifting, and the specific details can vary based on the implementation and its context. Further, there are several concerns for Generative AI systems that need to be considered. These include ethical concerns (e.g., bias and unintended consequences), security issues, loss of control, copyright and legal issues, intensive computational resources, and trust. Let's look at each of these individually.

Disadvantages and Concerns about Generative AI

Bias and Unintended Consequences

When developing a machine learning model, including generative AI models, it is trained on a particular dataset. If this training dataset is biased, meaning it contains unequal or unfair representations of different groups, situations, or perspectives, the generated content can reflect and perpetuate those biases it internalizes during the training process. In addition, Generative AI can generate content that is offensive, inappropriate, or harmful.

Security and Misuse

According to the University of Virginia Information Security, A deepfake is "an artificial image or video (a series of images) generated by a special kind of machine learning called "deep" learning" (UVA Information Security, 2023). Generative models can be used to create convincing deepfake content, including videos, images, and audio recordings, or other deceptive content (e.g., data). These can be misused for spreading false information, impersonation, or malicious activities. Malicious use of Generative AI can also pose security threats such as phishing.

Lack of Control / Legal Issues

The content generated by Generative AI can be unpredictable, making it difficult to ensure that the output matches the intended objectives. This lack of control hinders the applicability of the generated content, particularly in cases where accuracy and precision are necessary. Because generative AI is heavily involved in content creation, the original human authorship may become unclear, thereby limiting accuracy in determining its source as well as giving proper attribution to its original author or creator. This can lead to issues regarding the ownership and copyright of content generated by AI, which may further lead to legal challenges.

Intensive Computing Resources

Training and running generative models can be significantly intensive in terms of computational requirements, which requires significant resources. Generative AI relies on large datasets to learn patterns and generate useful responses. The more data the model is trained on, the more it will learn and generalize. A large amount of data provides more contexts that allow the system to provide better responses. The training process utilizes an iterative process (i.e., deep learning), that requires extensive computational resources.

Trust and Acceptance

People may be reluctant to fully trust content generated by AI, especially in those cases where accuracy and precision are vital (e.g., pharmaceutical measurements), for the same reasons identified under loss of control. If Generative AI is not predictable, it is concerning that these systems may not be trustworthy with healthcare and other vital aspects of life.

In conclusion, it's important for developers, policymakers, and society at large to work together to develop ethical guidelines, regulations, and best practices for the responsible use of Generative AI. This includes implementing safeguards against misuse, ensuring transparency in AI systems, and addressing legal and ethical considerations related to ownership and accountability. Additionally, efforts to educate the public about the capabilities and limitations of AI can help build trust and foster responsible AI adoption.

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