

DOI: https://doi.org/10.48009/4_iis_2024_126

Analyzing artificial intelligence frameworks: Phenomenologists against machines

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Abstract

This study was conducted to analyze the results of using generative artificial intelligence (AI) in the analysis of data in studies employing qualitative methodologies. The researchers sought to investigate the question: Can a human qualitative evaluator uncover the same themes as a generative AI bot from semi-structured interviews? A non-evaluator researcher was used to select the topic, exclusionary criteria, source of transcripts, and the transcripts to be analyzed. Two evaluator researchers then analyzed the data using Quirkos software to produce themed discoveries. A bot was used to complete the same task. The results obtained from the two evaluator researchers and the generative AI were then compared with the study conducted by Morgan (2023). The researchers concluded that a generative AI bot is a good starting point for theme analysis, but humans are still needed for nuanced analysis and emotional understanding in analysis.

Keywords: ethics, information technology, undergraduate students, artificial intelligence, AI, phenomenology, grounded theory, qualitative studies, European theater, World War II

Introduction

The ordinary chaos surrounding cultures of experience is eminently predisposed to paradoxical shifts by the natural evolution of human scientific discovery. These communities of natural practice evolved from the fundamentals of biology, mathematics, physics, and, slightly later, the adoption of the social sciences. The expected inquisitive evolution of scientific practices today (2024) has formed the accepted scientific paradigms. The roots of new data discovery are at the core of all the paradigms and their inedible shifts (Kuhn, 1996). The scientific discovery paradoxes examine the problem spaces. Researchers' explorations into the phenomenology of assumptions seek to gain meaning (Sinn) and understandings (Verstehen) of human behavior and interactions with one's kind and, eventually, the paradigm of human-computer interactions (Schutz, 1967).

Humans always try to "understand more than we can tell" (Polanyi, 2009, p. 4). Human discoveries embark from data formation, a collected catalog of signals, frequencies, numbers, or measurements in the sciences. These data characteristics can be culturally constructed (tacitly or explicitly) from the natural order of processes to communicate information. Linking the two worlds of information with scientific knowledge creates the science of information systems (Debons, 2008). The science of computation started with Charles Babbage's exploration of the reasoning behind the mechanical differences between engines. This discovery later constructed the Atanasoff-Berry Computer in 1942, the joint adventure of professor Dr. John Vincent Atanasoff and graduate student Clifford Berry (Harris and Pollette, 2023).

Technology orchestrates our everyday lives and creates a modern world that separates today from past generations. It shoulders modern society and defines areas of time (Arthur, 2009, pp. 10-11). Information Technology (IT) is a relatively young discipline with new theories propagated with three concentrations: technologies are combinations of elements; all technologies utilize phenomena with humans; and technology programming is used to create best practices (p. 203).

Innovation-driven Information technology constantly develops, evolves, and expands rapidly, including its developing transfer methodologies. Technological advances explicitly share information ubiquitously in a global society, fostering scholarly debates about dissent and destruction of society (Turkle, 2011) or value, which hinges on success in mitigating risks, business cost reduction, and investment futures (Carr, 2004, pp. 8-9). With the onset of Smart devices, scholars fear and praise the exchanges. Carr (2010) ascribes the prowess of innovative technologies. The researcher asserts that it scatters the calm and “uncluttered linear mind” into a shifted “disjointed” and “overlapping burst” seeker mind for “faster and better” information (p. 10). Scholars state these actions have created unconventional human addictions to computing speeds. This need for computing power has led to rapid advancements in innovations and intelligent technologies. Today's innovative technologies (2024) are self-tasking artificial intelligence (AI) bots. The bots are prompted to categorize and synergize data using shared globalized data collections to help make sense of human queries. The human-computer AI-assisted phenomenon has led to a culture of knowledge sharing and empowerment.

It would not be difficult to convince most people that what they are witnessing daily is a unique and fascinating time of technical change and evolution. Someone would simply have to watch television, surf the Internet, or visit a mall to observe that the way we transact daily life is changing around them. Most people worldwide have never witnessed a pandemic that brought loss and a limit to freedoms that many took for granted until recently. The field of Information Technology (IT) is a relatively young discipline with new theories (and others borrowed from older disciplines), best practices, and increased processing power emerging by the day. The way that information is located is also changing just as rapidly from phoning a friend or colleague to using a search engine, or even tasking an artificial intelligence (AI) to help with making sense of the data collected (Costa, 2024). It is in this observation that the focus of this paper is centered. How does the ability to rapidly find information, collect data, and use various AIs to analyze the data collected to find commonalities shape and garner support for qualitative studies in the field of IT?

This paper is designed to allow people with or without preferences for quantitative or qualitative studies to take an objective look at how emerging technologies increase the ability of technology to improve and assist researchers in qualitative studies. Most would agree that while viewed as sterile and clinical, many researchers find comfort in an observation such as "the numbers don't lie." Another way to make these observations is that mathematical computations have a logical beginning and reach a regimented end (Creswell, 2009). On the other hand, qualitative studies are very reliant on a human factor, the researcher, to determine when all possible data has been exhausted and identified, and then to determine how to give meaning to what is obtained (Kogen, 2024). It is the contention of the researchers carrying out this study that a generative AI analyzing data should come to a relatively same conclusion analyzing the same data as a pair of experienced researchers who favor qualitative methods.

This paper focuses on understanding the efficiency of the results obtained by a generative AI are at creating rapidly assorted data into a sound theoretical framework for commonalities. The paper will pollster whether qualitatively trained phenomenologists can analyze and ascribe a discovery framework (driven by collected data) to information like the AI's assertion. The researchers will assert their training against a contemporary generative AI bot to analyze the data collected to find commonalities and garner its support or dissent from qualitative studies in IT. To avoid adding bias in the selection of data and topic of interest, source of interviews, exclusionary criteria for the search, and transcripts to be scrutinized were selected independently by the non-evaluator researcher. No additional evidence relating to the selection or exclusions used was

provided to the analyzing researchers until after their analysis was complete. Considering this supposition, this paper is arranged in the following manner: literature review, presentation of a methodology, a comparison of results, discussion, conclusion, and implications and ideas for future work.

Literature Review

Many researchers develop a bias toward a type of research study and a methodology based on familiarity and a sense of efficacy created by successfully creating and carrying out previous studies. Additionally, over time this bias may be exacerbated by the amount of work required to analyze data for numerical analysis or thoroughly exhaust a narrative to identify all themes and keywords. In other cases, limitations may come in the form of understanding which questions should be asked and how to give meaning to the resulting data collected (Creswell, 2009). If one considers the twentieth and twenty-first centuries alone, it is easily observable that emerging technologies are lessening these burdens and allowing researchers to utilize the body of existing knowledge in new ways and use technology to analyze new data that is accumulated.

This bias based on experience and familiarity is best described by Maslow's (1966) observation that if you only have a single tool identified as a hammer, then all problems and questions begin to look like nails. Ideally, researchers would decide whether a study should employ quantitative, qualitative, or mixed methods to collect and analyze data by looking at the population, the data to be collected, and the nature of the study to make these decisions regarding the type and methodology for a study. These determinants could take many different forms (Creswell, 2009). For example: Which type of questions should be used? Who are the respondents? Should the respondents receive additional protection from harm? To what extent is the technology needed to make sense of or draw support from the data? How unique is the idea? Is there existing knowledge related to the topic? To properly frame the topic in the current academic environment, a couple of factors should be identified and explained. The field of Information Technology (IT) must be identified and understood in its proper evolutionary place as a discipline. The COVID environment must be considered considering how it has changed the way people go about their daily lives, interact with others, and go about conducting their jobs and careers. Additionally, researchers who choose to embrace technology have a powerful new tool in the form of generative AI.

While Information Technology as a discipline is a relative newborn compared to other fields of study, it is obvious that the field is in its infancy. It is worth considering that one only has to go back to the mid-twentieth century to find an environment where computational devices beyond simple calculations or rudimentary programmable logic controllers (PLCs) were only available to a limited number of academics, the military, government agencies, and the aforementioned industrial processes. Additionally, a newborn paradigm or emerging field is likely to borrow many theories and processes for research from existing fields to avoid some very useful wheels that already exist.

In terms of social phenomena, society has recently witnessed a pandemic previously unseen in magnitude by most people currently alive. While this pandemic may have had little effect on the growth of technology, the pandemic did go a long way toward changing opinions about working, socializing, and living in virtual online communities (Sengupta, et al., 2023). Many people who rarely used the Internet as a medium for communication or a source of information, became more proficient almost overnight when the ability to act as normal was potentially life-threatening. Whether from necessity or personal epiphanies, people from all walks of life began to learn new ways to interact and gather information. Whether random coincidence or calculated personal growth, this change has facilitated the removal of many spatial and temporal barriers

(Opacic & Koderman, 2024). Considering emerging technology, such as Artificial Intelligence, individuals and researchers have access to a seemingly sentient friend, helper, or co-worker that has an amazing ability to answer complicated questions, see meaning in a large jumble of seemingly random data, and possibly to confirm suspicions or ideas that are otherwise difficult to support without the assistance of many other researchers. To those willing to embrace generative AI as a tool to assist researchers in their work (Costa, 2023), the proverbial toolbox must be expanded to contain way more than Maslow's hammer (Maslow, 1966). This technology can be used to help determine how data should be collected, what is important in the data, and formulate ideas that can result from the data analysis. This information can in turn be used as a source of how quantitative studies should proceed if the mixed methods approaches are used or it can be used to support qualitative and quantitative research directly.

In the case of qualitative studies and grounded theory, bots can be used to recognize themes and determine when critical points in analysis have been reached. Data is typically collected in the form of an interview or narrative which leads to a point where the researcher must decide that all key facts have been derived and additional analysis will produce no new significant information (Huh et al., 2023). This tipping point where additional research will lead to no identification of new themes is called theoretical saturation (Naeem et al., 2024). In other words, additional analysis will yield diminishing returns versus effort expended (Creswell, 2009). When examining transcripts of interviews or various narratives assimilated from respondents, researchers must analyze the information to discover themes that present themselves and thus create data. This process of analysis must be an exhaustive, iterative process that continues until further analysis yields no new results (Naeem et al., 2023). If one considers the iterative nature of the process of reaching saturation, one can easily see that tasking a computer program or bot with this repetitive process allows multiple searches for themes in data to reach saturation without the expenditure of time required by a human researcher. This then leads to concern relating to the quality of generative AI results, ethical considerations, and responsibility for predictions (Hall & Liebenberg, 2024).

Morgan (2023) investigates the potential of utilizing a generative AI to analyze qualitative data. Once the results of bot's analysis are obtained, they can be compared to the results produced by a traditional qualitative researcher utilizing manual coding. This type of comparison also allows scholars to draw conclusions about the relative efficiency of effort exhausted in the analysis process. The main findings of this line of inquiry centered around the assessment of data analysis, the effectiveness of recognizing and identifying descriptive themes from qualitative datasets. It should be noted that generative AI bots struggle with more nuanced, interpretive themes mainly relating to feelings and emotions originating in human nature. This indicates that while AI can handle straightforward data summarization, it fails to capture deeper insights and complex patterns. Morgan also suggested that the ease of use of AI has potential efficiencies, especially in the early stages of data analysis. For the role of qualitative analysis, AI can add a new tool for the researcher when conducting initial coding and organizing large datasets, however, the human element remains essential for the interpretive process that involves understanding and constructing deeper meanings of the data. Morgan posits that while generative AI has the potential to be beneficial to qualitative researchers in their data analysis methods, it should still be viewed as an assistive tool rather than a replacement for human judgment. The interpretation will still require "nuanced human understanding" to be complete.

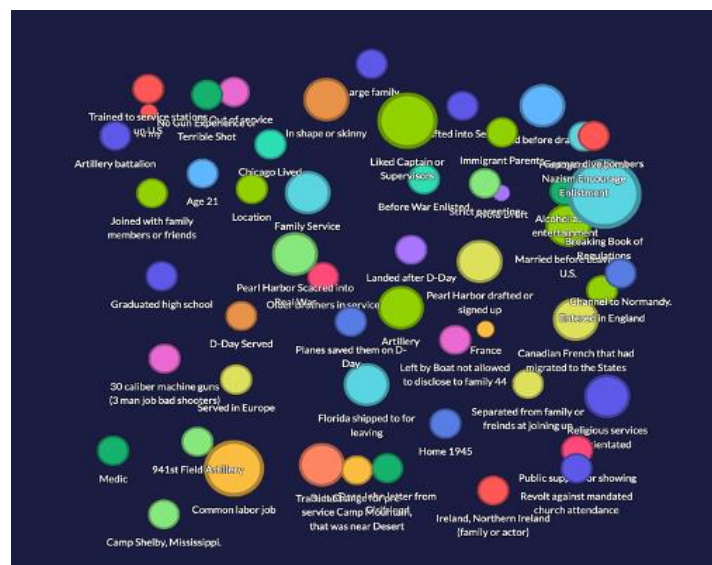
Methodology

With permission from Morgan (2023), the researchers adopted and adapted the prescribed validated instrument's constructed methodology on generative artificial intelligence's ability to aid qualitative research and analysis. The researchers utilized the instrument to investigate the differences between human

The non-evaluator researcher chose the topic of soldier's experiences while serving in the European theater during World War II. With IRB approval and expressed permission of the curator of the oral history collection at the Abraham Lincoln Library and Museum, data on the topic was collected. To find comparable data and remove cultural bias, some exclusionary criteria were applied. Data were selected from published datasets provided by soldiers who only served in the European theater during World War II. After these selection criteria were applied, two datasets were selected based on the following characteristics: available in fair use as a printed transcript and audio recording, contained information identifying the demographics for the soldier and where they served during the war, and the soldier had no prior military service.

RQ1: *Can a human qualitative evaluator uncover the same themes as a generative artificial intelligence (AI) bot from semi-structured datasets?*

To analyze the datasets, Quirkos qualitative instrument was utilized. In the first dataset, the research concluded the qualitative thematic spiral in 13 hours and 43 minutes. To reach the saturation point in the two datasets, the researchers acquired some 89 quirks or nodes of first-round discoveries. The first set of data produced some 54 quirks, and the second set discovered some 45 quirks or nodes (10 categories overlapped from the first set of data) of notation (see Appendix 1 for coding examples) see Figure 1.



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A second round of evaluation was conducted seeking any overlapping themes between the two sets or identifying possible connected sets. A few notes were discovered highlighting cross-sectional similarities of identification such as the topic of gaining a furlough, the humanity of war, common labor jobs, joining the service from family allegiance or influence, being born into a large family, arriving at a traditional boot camp, high school graduates, and joined the Army and later became infantry members. From this third deconstruction of quirks or nodes, overarching concepts or parent themes started to appear crafting the need for additional parent nodes of firearms training, artillery battalion, family service, enlistment, boot camps, and Pearl Harbor. After the end of the round, some 21 outliers remained unassociated with the growing parent quirks.

The fourth deconstruction focused on understanding the 21 commonalities of the outliers. A node of youth life appeared from quirks of the nature of parents against the service, in shape or athletic, homes had limited electricity and food, and post-depression living. After consideration, some quirks were added to the growing theme of the Humanity of Combat including German planes diving from the sky while troops were in motion, Replacement depot infantry, and Loss of family while in combat. A smaller theme arrived noting religious affiliation or orientation with interesting sub-nodes of public support of the war and joining up for service after hearing propaganda sermons, Revolt against mandated religious attendance, and Propaganda against Axis ideology in sermons and public. The final round leaves a series of six floating quirks unattached to a parent theme: Canadian French that had immigrated to The United States and were drafted into service, Alcohol as entertainment, Breaking the books of Army regulations, Limited space on ships or camps to rest, Home in 1945, and Dear John Letters (Figure 2).

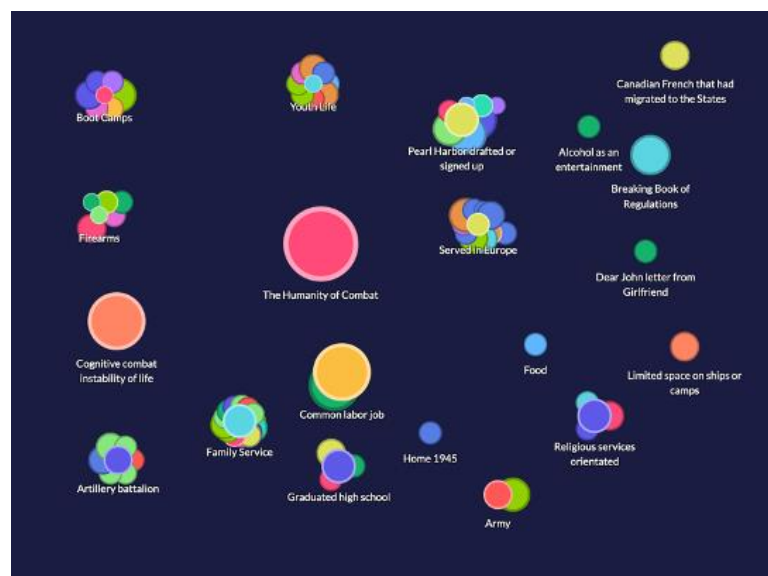


Figure 2: Analysis of the outliers and parent themes.

Overall, the human qualitatively trained researcher uncovered 12 themes: Youth life (8 internal quirks); Boot camp experiences (6 internal quirks); Firearms training (5 internal quirks); Cognitive combat instability of life (7 internal quirks) and too outliers inside the parent noting Loss of combat memory and How horse drawn transportation was a means for infantry to engage; Artillery battalions assignments (6 internal quirks); Family service (14 internal quirks), internal parent theme noted Marriages prior to shipping out, Girlfriends attending furloughs, and Older brothers already in the service as strong joining

artifacts); Common labor jobs prior to the war (7); Humanity of Combat (10); Served in Europe conflict notes (10); Pearl Harbor signed up prior to being drafted (7) one should note this section included notations about civilians not having knowledge of the war prior to the announcement of Pearl Harbor's bombing; Religious services (5) and this section included notes about Propaganda inside of the services; and Joined the Army and infantry (2). The researchers add the fact each of the data points presented a notable consideration. As an example, the subjects came from large families with traditions of service, and each had above-normal IQ scores that led one to become an Army combat infantry medic. The final theme of Education was not moved into the Youth life parent theme as its construction is paramount to the Army's evaluation considerations to educate a potential enlisted soldier into higher levels of service like the combat medic corps training. Overall, the researchers generated 12 themes and six outliers. This could be again spiraled to move Firearms training inside Boot camps where the training was engaged, and overall, the research could spiral into Humanity of combat (10), Served in Europe conflict notes (10), Pearl Harbor–signed up before being drafted–into Army and infantry, but this would limit the discussion and dramatic essence portrayed in the individualism of the themes.

Generative AI Analysis

The artificial intelligence analyzed the semi-structured datasets. The researchers followed Morgan's (2023) simple constructs such as: Analyze the two datasets for common themes and outliers. As a note, most common generative artificial intelligence models state on their prompts that they excel, "In tasks that require advanced reasoning, complex instruction interpretation, and enhanced creativity" (OpenAIa, 2024). While some models will operate slower and with less success from experiential learning and past returns on gathering open-source material across the vast world-wide web, some such as ChatGPT models, boast "it delivers superior outputs for tasks demanding higher reasoning skills" (OpenAIa, 2024) and as a system of discovery is inherently notably ready for analysis at any given time without limitations that humans would encounter such as time, space, or feelings toward a subject or dataset that might cause limitations. As an example, when prompted, the generative artificial intelligence tool tested stated, "Sure, I'd be happy to help you analyze the data sets for common themes and outliers" (OpenAIb, 2024) and was capable of accommodating the researchers in what Morgan considered speedy efficiency. The artificial intelligence bot in this study's case processed the data in 13 minutes and 21 seconds compared to the researchers' lengthy analysis period of nearly 14 hours and limited efficiency. When uncovering the overall findings, similar to the human researcher, the generative AI model resolved to common themes between the two datasets to only include their experiences in the military, specifically their time in combat and the equipment they used. Outlier themes could include their differing attitudes towards combat or their post-service aspirations, such as one wanting to become a medic (OpenAIc, 2024).

Furthermore, when analyzing datasets, the intelligent bot responded by discussing themes as separated entities of fact and not combination of datasets such as one soldier's experiences by notating singular like concepts of being educated or the view of the lack of food options on a ship. Subsequently, the analysis of the second soldier's dataset focuses on only time in the Army, travels to Europe, and more attitudes towards combat. However, the bot can interpret some joined larger concepts or constructs in common themes such as education and learning experiences in military service, and some repeated outliers of specific details repeated such as the lack of food overall or a lackadaisical attitude towards combat. When the bot reanalyzed the combined datasets for a second test, the generative bot uncovered further common themes found in both datasets such as discussions about family and childhood experiences. Although the researcher noted both datasets talk about siblings, childhood memories, and growing up in a particular place, the bot did uncover some joined and singular outliers between the two datasets like the theme of siblings serving in the military, experiences during the depression, and selling eggs, which comparatively were associated with parent themes by the researchers.

In aid to finding additional themes related to the researchers' findings on war experiences, the researchers questioned which war themes were present in the two datasets. The generative AI bot noted, "Based on the context provided, the themes related to war that can be identified to include the personal experiences and reflections of soldiers who served in World War II, as well as the impact of war on civilian life during the Great Depression" (OpenAId, 2024). Since the bot seemed to not distinguish differences in the dataset's experiences, the researchers asked the bot to analyze the datasets for clarity in determining the soldiers' combat experiences specifically. Interestingly in the reevaluation, the bot considered some deeper personal observations by stating, "One soldier had a combat experience where he could not remember what happened and found it difficult to cope, while the other soldier had battlefield experiences where he was able to handle himself well and even finish the day marching in combat boots" (OpenAIe, 2024). This rephrased recollection offered the first hints to some emotional understanding of the dataset's insights. Overall, the most interesting findings collected from the bot by the researchers were the bot's statement, "Based on the provided context, it is difficult to determine ten common themes between the two soldiers" datasets (OpenAIf, 2024), which acknowledges the bot's limitations.

Discussion

Morgan's (2023) artificial intelligence (AI) used to analyze qualitative datasets found similar results in the researchers' analysis. In this pilot study, the human researcher was able to uncover cognitive considerations and deeper emotional connections to the data. However, like in Morgan's research, the AI bot could not replicate the insights and deeper themes of discovery. However, similar to Morgan's analysis, the bot fell behind the human researcher in identifying themes related to human feelings and emotions. The evaluators research uncovered some 89 themes in the first round of coding. Additionally, this pilot study also observed that generative AI bots only took minutes to uncover surface themes like education, family, or sense of duty but neglected to understand the emotional connections to the topics that a human researcher uncovered in days. Similarly found in the literature in cases of qualitative studies and grounded theory, bots can be used to recognize themes and determine when critical points in analysis have been reached (Huh et al., 2023). Data is typically collected in the form of an interview or narrative which leads to a point where the researcher must decide that all key facts have been derived and additional analysis will produce no new significant information. This tipping point where additional research will lead to no identification of new themes is called theoretical saturation (Naeem et al., 2024) this too was confirmed by the researchers and contrast the ability of bots. In other words, additional human analysis will yield diminishing returns versus effort expended (Creswell, 2009). When examining datasets, researchers must analyze the information to discover themes that present themselves and outside the scope bots can determine (Naeem et al., 2023). Similar to information found in the literature, the iterative nature of the qualitative process of reaching saturation, the researchers' pilot study concurs tasking a bot with iterative processes frees the researcher for tasks requiring human understanding to identify sentient themes (Hall & Liebenberg, 2024).

The researchers agree with Morgan's (2023) assessment that generative AI's abilities in analyzing datasets, especially large sets, may create an essence of ease of use and potential time savings. The scholar's main findings were that the performance on data analysis was relatively effective in reproducing descriptive themes from qualitative datasets. Additionally, the researchers in this study agree with Morgan that generative AI struggles with more nuanced, interpretive themes. Generative AI in its current construction fails to capture deeper insights and complex patterns that Morgan points out. Similarly, the human researcher analyzed the data and was able to form it into parent themes, and sub-themes, and uncover outliers not unlike the AI, but with stronger connections to deep meaning and insights into the datasets. The scholars do again agree with Morgan's (2023) suggestion that generative AI has the potential to be beneficial

as an assistive tool rather than a replacement for human judgment. Interpretation will still require ‘nuanced human understanding.’ It is worth noting that while Carr (2010) ascribes the prowess of innovative technologies, implementation of technology alone does not guarantee successful conclusion or efficiency in analyzing outcomes of datasets.

Conclusion

Generative Artificial intelligence (AI) bots are in their infancy stages as an innovation in information technology and create a paradoxical phenomenon. Its paradoxical society use today is in a discovery point of conception. For use as a qualitative instrument for researchers, the researchers acknowledge that generative AI is too limited in scope to prove meaningful insights that Morgan (2023) uncovered. Although AI is growing exponentially in its talents every second, it has a surface value to researchers only at this point and should not be considered invaluable. The researchers of this pilot study have come to view generative AI as a simple tool with limitations at this time, but once it is refined the resulting new instrument should be capable of aiding researchers in performing complex analysis. This study, like Morgan’s study, is faulty in scope by its failure and inability to generalize the analysis to more complex considerations or foster a global interpretation.

To further the research, the scholars suggest a larger data set and a cross-sectional study on multiple artificial intelligence bots or tools. As of today, nearly every mainstream organization in the information systems businesses is working diligently to create their modification of a generative AI. The new research should examine how these organizations are creating their own bots and evaluating what this tool means to the organization. Additionally, the researchers of this study acknowledge their limited knowledge in this paradoxical field.

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