

A Review of the Knowledge Worker as Prompt Engineer: How Good is AI at Societal Analysis and Future Predictions?

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Abstract

What is the literature on AI missing for prompting engineering so far, and how good are these services at Societal Analysis and Future Predictions? A literature review and laboratory tests were conducted using different AI services.

This study provides an extensive list of research gaps based on an analysis of existing literature. Furthermore, it demonstrates that AI with well-crafted prompts performs as well as or better than senior intelligence analysts in Societal

Analysis and Future Predictions. The literature and analysis make it clear that the role of the prompter, to ensure reliability, must be divided into two parts: Prompt Engineering and Information Quality Control (IQC), which in this context is distinct from Prompt Answer Engineering. This study also proposes a working process in the form of a model for using AI in information or intelligence gathering. Additionally, it outlines the rationale for why top managers' salaries are likely to decrease as a result of these developments.

Keywords: prompt engineering; AI; ChatGPT; Crystal Bowl Conundrum; total intelligence society; knowledge worker; information worker; intelligence analyst; competitive intelligence; business intelligence; market intelligence

Citation: Soilen K.S. (2024) A Review of the Knowledge Worker as Prompt Engineer: How Good is AI at Societal Analysis and Future Predictions?. *Foresight and STI Governance*, 18(2), pp. 6–20. DOI: 10.17323/2500-2597.2024.2.6.20



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* This experimental paper was written by the author with the assistance of the generative AI service ChatGPT (<https://www.chatgpt.com>).

Introduction

Since ChatGPT's launch in November 2022, there have been significant changes in information and knowledge work. This study outlines these shifts, highlights challenges, and proposes new methodologies, frameworks, and models as suggested in the literature. It also puts forward a list of areas for future studies, all with the help of AI and accredited as such.

Various terms describe professionals working with information and knowledge. At the broad end *Knowledge Workers* possess specialized expertise in creating and using knowledge. *Information Workers* focus on processing and distributing information, relying heavily on technology. At the narrower end, *Intelligence Analysts* analyze and interpret data to support decision-making in different sectors. Similar professions include data analysts, financial analysts, and market researchers.

Healthcare providers and transportation workers are two examples of professions experiencing a rapid digital transformation. Professions not primarily concerned with information, such as manual laborers, service workers, skilled tradespeople, farmers, and security personnel, are becoming fewer.

It is no exaggeration to say that we are on the brink of *the third digital revolution*, characterized by the advent of personal computers, the proliferation of the Internet, and now the dawn of artificial intelligence (AI). Machines today efficiently sift through large datasets, extracting crucial information, and issuing alerts based on user-set parameters, thus addressing concerns. The professions that work more intensely with information, such as intelligence analysts, are most affected by these changes in AI. However, is there also a way that they work differently with AI than other broader groups of knowledge workers?

A divide has already emerged within the workforce regarding AI adoption. Employees skilled in using ChatGPT plugins effectively are contrasted with those still learning the basics, with the latter group risking obsolescence in the coming years. This divide is reminiscent of the one observed during the emergence of the first personal computers. Employee training in prompt engineering and related fields will be crucial to prevent the phasing out of entire professions. Much focus has been directed at lawyers as ChatGPT is good at finding and citing judicial texts, but the development affects everyone working with information. Artists and their professions face a crisis extending beyond replacement by AI, struggling with issues of identity and self-worth. And there is even now a growing nostalgia for human-made content as we move deeper into machine learning.

The new AI paradigm brings other problems, too. The 'Garbage In, Garbage Out' (GIGO) problem has be-

come more dire. Organizations have largely turned to big data for their information needs, shifting their focus away from human intelligence (HUMINT) and the collecting of information from the front line in sales. Instead, decision-makers now tend to better trust the information given by AI and the large data providers like Gartner and Bombora. The problem is that they have less control over the data quality, leading to increased reliance on potentially irrelevant and, at worst, inaccurate information. Moreover, competitors are all buying the same data, which again leads to the same conclusions about the market among competitors.

State intelligence services, for their part, are adapting too, rapidly moving towards the vision of an Orwellian 'Total Intelligence Society', a vision of constant surveillance and the full collection of data footprints left behind by citizens domestically and internationally. As a counterreaction, advocacy groups are pushing for strict surveillance regulations to protect people's privacy. However, households, when pressured economically and when experiencing increased crime rates, often prioritize *security over privacy*.

In this study, we want to consider the state of research, identify the research gaps, and determine how good AI is at doing its job as a knowledge worker, and, more specifically, as an intelligence analyst and data scientist.

Launching cognitive pilots and developing scaling strategies requires collaboration between tech experts and business process owners (Davenport, Ronanki, 2018). However, current trends suggest that AI will even replace prompt engineers, capable of autonomously formulating and asking questions with clear direction and problem definition. In the future, starting a company might be as simple as asking AI to define market opportunities and an accompanying set of strategies, with AI creating prompts for all departments within the organization to achieve predetermined goals while robots handle production and distribution. This vision is no longer quite as utopian as previously anticipated.

Methodology

This paper uses a descriptive approach, providing an overview of AI developments over the past year. Twenty articles related to prompt engineering, all published in 2023 since ChatGPT's inception, were analyzed out of a randomly selected review of more than 40 articles from various disciplines and identified using Google Scholar. Information about the concerns and challenges faced by professionals in the field was extracted using AskyourPDF, a plugin. The material extracted was initially analyzed by ChatGPT in a laboratory setting and further examined through

¹ *Garbage in, garbage out* (GIGO) is a concept in computer science, according to which incorrect, distorted or low-quality („garbage”) data leads to incorrect results, even if the algorithm used in its processing is correct.

comparison with a test of the ability of AI to analyze information and predict future events.

It is important to note that the models discussed in this paper were developed in collaboration with AI services. This involved not only ChatGPT but also other platforms and services like Bing, BARD, and various plugins. Therefore, it is accurate to say that the article was co-authored with the assistance of AI, which has become a common practice in the production of scientific articles. This situation presents an ethical dilemma regarding authorship and introduces a new risk: the possibility of incorrect information. To mitigate this, the author has reviewed and edited all content generated by AI. References are provided for any text that is AI-generated.

Literature Review

Most scientific articles published on prompt engineering so far are optimistic about AI, and the majority originate from what we refer to as the “data sciences”. While most articles are technical in nature, some also address how AI is utilized, for example, in education. It is possible that other critical articles that do not use “prompt engineering” as a keyword are therefore overlooked in this study.

Wang et al. (2023a) express optimism about prompt engineering in computer vision, anticipating improvements in models and novel applications. They advocate for further research and exploration into techniques like *prompt fine-tuning* and *knowledge distillation* to optimize *visual recognition systems*. According to (Heston, Khun, 2023), prompt engineering is essential for the effective use of generative language models (GLMs), a type of artificial intelligence (AI) that utilizes machine-learning techniques to produce human-like text. There is emphasis on the necessity of *well-crafted prompts* to achieve desired results, highlighting their significance in personalized learning and interactive engagement. The importance of prompt engineering is important for effectively using Large Language Models (LLMs) like ChatGPT, noting its crucial role in writing and editing (Meyer et al., 2023). They point out that prompt engineering requires expertise and is not trivial. The articles are part of early calls for everyone to go to YouTube and learn how to become a prompt engineer.

In their survey paper, Liu et al. (2023) underscore the importance of prompt engineering, emphasizing the need for appropriate inputs and effective answer spaces. More importantly, they introduce two new key components: “*Prompt Template Engineering*” and “*Prompt Answer Engineering*”. “*Prompt Template Engineering*” focuses on crafting and refining input prompts, involving the development of initial templates, refinement for clarity and effectiveness, the introduction of variables for dynamic user-specific

data insertion and continuous testing and iteration to enhance performance. “*Prompt Answer Engineering*” deals with processing and refining AI-generated responses to meet user needs, including removing irrelevant content, formatting responses for readability, applying post-processing steps like translation or summarization, and ensuring quality and reliability.

Yeadon and Hardy (2023) raise several critical concerns about the role of prompt engineering in AI in physics education, including vulnerability to automated completion, difficulty in discerning AI-written text, rapid advancements in AI, and other ethical considerations. These concerns highlight the need for educators to stay aware of AI’s evolving capabilities and adapt their teaching methods accordingly. Said differently, there came a point this winter when many teachers around the world realized that they had to move away from written to oral examinations. In the cases when teachers did not adapt, the students quickly gained an advantage and were able to improve their grades.

Beganovic et al. (2023) also emphasizes the importance of good prompt engineering in using ChatGPT effectively during its rapid development phase. Alkaissi and McFarlane (2023) tested the same problems using BARD, while Henderson et al. (2023) studied the consequences of AI speech services. They also acknowledge the challenges of good advice development and the process of creating a *pattern catalogue*. The authors highlight the need for excellent *cue design* examples to attract cue designers and simplify *the rapid construction process*. They also point to the time and effort required to develop effective prompts and discuss the potential benefits of incorporating rapid model catalogues into the construction process to enhance ChatGPT’s performance. “*Prompt Tuning with Rules (PTR)*” is a technique that may involve the fine-tuning of prompts using specific rules or constraints to improve the performance and relevance of AI models’ responses. A “*pattern catalogue in AI*” refers to the collection of predefined patterns, templates, or best practices used to solve common problems in AI development. It provides a structured approach to designing and implementing solutions, offering guidance on various aspects ranging from design patterns and data preprocessing to algorithm selection, deployment strategies, ethical considerations, and security practices. “*Cue design*” in AI involves creating cues or signals that AI systems use to communicate with users. Effective cue design enhances user experience and trust, providing visual, auditory, haptic, interactive, and textual cues to create intuitive and engaging AI applications.

Lou et al. (2023) raise two specific concerns about prompt engineering: its lack of *user-friendliness* and *application constraints*. These concerns highlight the need for more user-friendly prompt engineering tech-

niques and an exploration of alternative instruction types for various natural language processing (NLP) tasks. Liu et al. (2023) outline critical considerations for prompt engineers, including the selection of *prompt templates* and *verbalizers*, the impact on recommendation performance, challenges like data constraints, and issues related to knowledge transmission and injection. Wang et al. (2023b) delve into the effectiveness of various prompt designs on Boolean query generation, offering insights into each design's strengths and limitations. Fiannaca et al. (2023) express concerns regarding prompt programming challenges, highlighting the need for tools that support prompt creation and editing effectively. Watson et al. (2023) highlight potential safety and security issues in prompt engineering, noting that crafting effective prompts is as crucial as the engineering aspect itself.

On non-technical contributions, Bondielli et al. (2023) discuss challenges in *multimodal fake news* detection, emphasizing the need for models that understand the interplay between text and image in disinformation generation. Seidenglanz and Baier (2023) describe mixed feelings toward AI in the PR world, advocating for a shift in focus in PR education toward more reflective practice and critical thinking. Budhwar et al. (2023) highlight the potential risks and challenges associated with AI innovations, including job displacement and the need for skill development. Mahmood et al. (2023) address *content repetitiveness* in voice interactions, suggesting further exploration of prompt engineering to improve voice assistant behavior. Chang et al. (2023) raise ethical concerns due to reliance on prompt engineering, as it shifts responsibility from the model to the engineer, potentially leading to biased or misleading outputs and GIGO problems.

Srivastava et al. (2023) also mention concerns related to bias, safety, and correctness in chatbots due to prompt engineering. Bahrami et al. (2023) highlight the limitations of manual design in prompting methods, emphasizing the need for more automation. Zhang et al. (2023) outline challenges in using AI tools in design, including *parameter adjustment*, understanding *domain-specific terms*, generating realistic images, balancing designer intent and AI accuracy, interpreting architectural styles, providing output variation, and integrating AI into design practice. Thoring et al. (2023) express concerns about the complexity of prompt engineering in AI-supported design, foreseeing it as a future skill for designers but noting the challenge of creating prompts that accurately capture design context and requirements. These first reactions to AI in the months following its launch are mostly within what could be expected and resonate well with what experts have expressed during TV and media interviews.

Based on the review, we selected 20 of the most relevant articles for an analysis of content (Table 1). The

findings from the analysis of the 20 scientific articles will be further explained as shown in Table 2.

The findings highlight the multifaceted challenges and opportunities in prompt engineering, emphasizing the need for careful consideration of ethical issues, including how to avoid fake news, automation, user experience, and the balance between art and engineering in developing effective prompts. The future of prompt engineering appears promising but requires continuous effort in addressing its limitations and ethical concerns while exploring its potential in various applications, including computer vision and beyond.

So far, this paper has provided a comprehensive overview of various concerns and considerations raised by scholars regarding AI and prompt engineering. However, there are also critical comments and areas that are *not* explicitly addressed in the literature, what we understand as research gaps (Table 3).

These are concerns not yet raised in the existing literature for the keyword “prompt engineering”. A study with numerous keywords may detect more articles and fewer gaps.

Addressing these areas is crucial for a more holistic understanding and the responsible practice of AI and prompt engineering. We will come back to how they can be addressed.

However, how does one evaluate AI's performance as an active information worker? To find out, we performed a laboratory test of Societal Analysis using different AI applications and plug-ins.

Testing Capabilities of Analysis and Predictions: Business Intelligence

The author uses the term *Business Intelligence* to describe the practice of using software for *Competitive and Market Intelligence*. During the last several years, industry has tended to prefer the terms “insights” and “intent data” to “intelligence”, but the meaning is much the same: important information for making decisions.

What are the major differences as we go from BI to AI? Kumar (2017) pioneered the description of how information analysis has been transformed due to the advent of Artificial Intelligence (AI). In data-driven decision-making, it is imperative to understand the fundamental differences between Business Intelligence (BI) and AI: *While BI is proficient at transforming extensive and diverse data into a coherent narrative and presenting clear data visualization, it typically does not provide actionable insights or suggest specific managerial decisions.* The primary focus of BI is to enhance the efficiency of data collection, reporting, and analysis processes. This allows businesses to improve the quality and consistency of their data collection efforts.

Table 1. Summary of the Selected Articles for Literature Review, by Field

| Authors | Object of Analysis | Concerns |
|-------------------------|--|--|
| <i>Data science</i> | | |
| Bahrami et al., 2023 | Automation & Optimization | The template and mapping function in the prompting method need to be designed manually, which can be a limitation The authors suggest that automating the process of choosing suitable verbalizations and developing automatic template generation algorithms could address these concerns. |
| Srivastava et al., 2023 | Development & Ethical Considerations | The authors caution that reliance on prompt engineering raises ethical issues and risks. They mention that prompt engineering can potentially lead to biased or misleading outputs, as the responsibility of generating accurate and unbiased responses is shifted from the model to the prompt engineer. |
| Chang et al., 2023 | Development & Ethical Considerations | The authors have concerns about the repetitiveness of content in voice interactions. They observed that ChatGPT's responses can be repetitive, which was also pointed out by participants in their interviews. This repetitiveness can make the interactions tire-some for users. |
| Mahmood et al., 2023 | User Experience & Interaction | This article addresses the difficulty of multimodal fake news detection, the need for models combining multiple modalities, and the importance of understanding the inter-play between text and images in generating disinformation. While the sources do not provide a comprehensive list of risks, it can be inferred that the risks of fake news include spreading misinformation, manipulating public opinion, eroding trust in the media, and potentially influencing social, political, and economic outcomes. |
| Bondielli et al., 2023 | Multimodal Challenges | The authors mention that prompt programmers often need to perform editing operations over semantically meaningful regions of their prompt, such as inserting examples, renaming keywords, and refactoring templates. |
| Fiannaca, 2023 | Programming & Editing Challenges | This study explores the effectiveness of different prompt designs and their impact on the quality of the generated Boolean queries. By comparing the performance of different prompt types, the researchers gain insights into the strengths and limitations of each approach. |
| Wang et al., 2023b | Effectiveness & Impact | Choosing the appropriate prompt template and verbalizer: the authors emphasize that the choice of prompt template and verbalizer can greatly impact recommendation performance. |
| Liu et al., 2023 | Automation & Optimization | The authors emphasize the importance of prompt engineering in the rapid development phase of using ChatGPT. However, they also acknowledge the challenges of good advice development and the process of creating a pattern catalogue. |
| Beganovic et al., 2023 | Challenges in Prompt Engineering | The authors posit that the success of LLMs in generating desired outputs is highly dependent on the choice of text prompts. Prompt engineering involves carefully crafting and iterating on the prompts to achieve the desired results. The authors mention that prompt engineering is not always trivial and can require expertise. |
| Meyer et al., 2023 | Success Dependency & Expertise Requirement | The authors emphasize the need for designing appropriate inputs for prompting methods and to search for an effective answer space and mapping to the original output. Prompt template engineering and prompt answer engineering are two key aspects of prompt engineering. |
| Liu et al., 2023 | Challenges in Prompt Engineering | They emphasize the need to design appropriate inputs for prompting methods and to search for an effective answer space and mapping to the original output. Prompt template engineering and prompt answer engineering are two key aspects of prompt engineering. |

Currently, BI providers are diligently working to incorporate AI capabilities into their software. Over the past three years, there has been a 50% increase in the adoption of BI solutions, according to the industry itself. Companies such as SAP, Microsoft, Oracle, and Tableau have developed BI tools that are designed to revolutionize various traditional business functions, including but not limited to Human Resources, Sales, and Marketing.

A significant trend in the BI sector is the movement toward *self-service analytics*. This approach allows users to access and analyze data without excessive reliance on support, with a focus on user-friendly BI tools and a simplified data model. In the past, individuals lacking technical expertise had to depend on centralized data teams for their data inquiries, leading to delays between data requests and the acquisition of insights. Today, business professionals are

given access to the data insights they need promptly, in real-time when possible, facilitating informed and timely decision-making. AI is a driving force behind this transformative change. A consequence is that *Cloud Solutions* are bowing to the advantage of *Edge Computing*, whereby applications are run as close as possible to where the data is generated.

AI's Proficiency in Foresight (Holistic Approach) and Forecasting (Data-Driven): The Crystal Bowl Conundrum

In this section of the paper, we explore AI's capabilities in making foresight (qualitative and quantitative) and forecasting (predominantly quantitative) predictions, illustrated with simple examples in the form of prompts in a laboratory setting (Table 4).

These predictions are speculative and based on current trends and developments, according to the ChatGPT

Table 1 continued

| Authors | Object of Analysis | Concerns |
|--|---|--|
| Design | | |
| Thoring et al., 2023 | Challenges in Prompt Engineering | The challenge of creating appropriate prompts that capture the design context and requirements |
| Zhang et al., 2023 | Automation & Optimization | AI's limited understanding of domain-specific design terms and concepts. AI generating images that are unrealistic or not suitable for architectural purposes. |
| Lou et al., 2023 | Application Constraints, Effectiveness & Impact | Not user-friendly: prompt engineering is typically designed for pre-trained language models (PLMs) and often involves using incoherent words or internal embeddings preferred by the model. However, these prompt designs are difficult for humans to understand and may run counter to human intuition. |
| Watson et al., 2023 | Art & Engineering Balance | There is as much art as engineering in developing effective prompts. They also mention that experimentation with prompts may lead to phenomena never seen before, even in familiar models, which can create potential safety and security risks. |
| Education | | |
| Yeadon, Hardy, 2023 | Ethical & Responsible AI | Vulnerability to automated completion: unsupervised coding and short-form essays, which are commonly used assessment methods are vulnerable to automated completion by language models. |
| Human Resources | | |
| Budhwar et al., 2023 | Future of Work & Skill Development | Employers are likely to use these innovations to displace jobs such as software engineers, data scientists, and business intelligence analysts. This raises questions about the future of work and the need for individuals to develop new skills for interacting with and eliciting knowledge from these AI tools. |
| Medical Sciences | | |
| Heston, Khun, 2023 | Challenges in Prompt Engineering | Well-crafted prompts yield good responses from the GLM, while poorly constructed prompts can lead to unsatisfactory responses. The authors highlight the importance of prompt engineering in effectively communicating with GLMs to maximize their potential in personalized learning, unlimited practice opportunities, and interactive engagement. However, they also acknowledge the challenges associated with prompt engineering, such as ensuring accuracy, mitigating bias, maintaining privacy, and avoiding excessive reliance on technology. |
| PR / Communications | | |
| Seidenglanz et al., 2023 | Ethical & Responsible AI | While the concerns are clear - ethics, responsibility, accountability, transparency, competence, and social impact – the solutions to them require systemic changes and long-term approaches. Responding to AI as a wicked problem, complex and with many known and unknown unknowns, requires a reorientation of the PR/Comms profession's focus. |
| Review Paper | | |
| Wang et al., 2023a | Future Directions & Optimism | The authors of the review paper are optimistic about the future of prompt engineering in computer vision. They believe that prompt engineering has the potential to revolutionize the field by improving current models and enabling the creation of novel applications |
| <i>Note:</i> This and subsequent tables are based on the content generated by the OpenAI service ChatGPT. Data retrieved within the period July 10 – September 9, 2023, from https://www.chatgpt.com . | | |

disclaimer, but they are also of the same quality or better than what many humans (intelligence analysts, futurists or researchers) can produce, based on the same data.

The predictions given by ChatGPT can also change depending on the date asked and what words were used in the prompt without changes to the quality of the analysis. The AI is also good at explaining each part in depth when follow-up questions are asked. The comprehensive analysis delivered to the follow-up questions is even of higher quality and could not have been done by most entry-level analysts with a university education. We tried this for all ten predictions and even extended the list to twenty predictions with the same quality in the responses.

We want to know the sources of these answers, but this is not possible with the current 4.0 version of ChatGPT. There are, however, AI systems that provide sources.

Comparing ChatGPT to Bing and Chatsonic

While Bing can display its sources, these typically include horoscopes and webpages of similar quality, resulting in predictions that are not only unreliable but fundamentally different and false.

We also tested a third AI chat, Chatsonic, for comparison. Although the predictions from Chatsonic are less convincing and substantial than those collected from ChatGPT, one advantage of Chatsonic is that it provides more quality links, like Pew Research.

When we inquired further about the three sources used, the AI provided a vague response, attributing the insights to “general knowledge”. Even after pressing the AI for more details, considering it cited three specific sources, the system merely clarified that a significant amount of information from these sources is consistent with general knowledge.

Table 2. Analysis of Articles for the Literature Review

| Analysis | Explanation of Main Concerns |
|--|---|
| Challenges in Prompt Engineering | Design Complexity: Crafting appropriate prompts that encapsulate design context and requirements is challenging. Limited Understanding: AI struggles with domain-specific design terms and concepts, leading to unrealistic or unsuitable outputs for certain applications, such as architecture. Manual Processes: Template and mapping functions in prompting methods are manually designed, limiting the efficiency and scalability of prompt engineering. |
| Automation & Optimization | Automation Need: There is a call for automating the process of choosing suitable verbalizations and developing automatic template generation algorithms to address manual limitations. |
| Ethical & Responsible AI | Ethical Concerns: Prompt engineering raises issues related to bias, safety, correctness, ethics, responsibility, accountability, transparency, and social impact. Trust & Reliability: The responsibility shift from the model to the prompt engineer can affect the trustworthiness and reliability of Large Language Models (LLMs). |
| Future of Work & Skill Development | Job Displacement: Innovations in prompt engineering may displace jobs, necessitating the acquisition of new skills for interacting with AI tools. Data Ownership & Accountability: Concerns about data ownership, content moderation, and decision accountability need addressing. |
| User Experience & Interaction | Repetitiveness: AI responses can be repetitive, affecting user experience. User-Friendliness: Prompt engineering designs are often not intuitive for non-experts, limiting accessibility and usability. |
| Application Constraints | Limitations in NLP Tasks: Short and simplistic prompts may not capture the complexity of real-world NLP tasks. |
| Multimodal Challenges | Fake News Detection: Understanding the interplay between text and images is crucial for multimodal fake news detection. |
| Art & Engineering Balance | Creative Process: Developing effective prompts involves both artistic and engineering skills, with experimentation leading to unforeseen phenomena and potential risks. |
| Programming & Editing Challenges | Lack of Predefined Grammar: Prompt programmers face challenges in editing prompts due to the absence of a well-defined programming language for prompts. |
| Effectiveness & Impact | Prompt Design Impact: Different prompt designs affect the quality of generated outputs, with the choice of template and verbalizer significantly impacting performance in various tasks. |
| Rapid Development & Ethical Considerations | Vulnerabilities & Ethical Issues: Rapid advancements bring challenges like vulnerability to automated completion, difficulty in discerning AI-written text, and ethical considerations in education and other fields. |
| Success Dependency & Expertise Requirement | Expertise Needed: Successful prompt engineering requires careful crafting and iteration, with a need for expertise in designing appropriate inputs and searching for effective answer spaces. |
| Future Directions & Optimism | Potential in Computer Vision: Prompt engineering is seen as a revolutionary tool in computer vision, with optimism about its future applications and improvements to the current models. |

Another issue with all AI services tested is their tendency to retract statements only to reintroduce them later in the conversation. While this is likely to improve in future versions, the necessity of such roundabout communication remains questionable. This problem is referred to as the Crystal Bowl Conundrum in this study. It describes a situation where answers are given without adequately citing sources, where the explanations regarding the origin of the information are unclear, and where the output of answers changes if the prompter objects. This is akin to the response one might expect from a fortune teller who seeks returning customers, posing a risk for any commercially developed AI. A closely monitored AI developed within a closed-end political system, like a dictatorship, would represent another form of the Crystal Bowl Conundrum risk.

Kumar et al. (2017) identified a similar issue, referring to it as the Black Box problem: while persistent follow-up inquiries can yield insights, the exact workings of the “bowl” in each case remain elusive. In future versions of AI it would therefore be expected that the user is shown where the information comes from and how it was generated.

The beauty of AI is that we can confront it with its own shortcomings. ChatGPT acknowledges the metaphorical similarity to a crystal ball but also highlights differences: “A crystal ball lacks access to data sources and processing capabilities, and it doesn’t make predictions in the same manner”, ChatGPT argues, which is correct. The AI also learns from this conversation and improves in future versions.

AI at Forecasting can also offer probabilistic projections. For instance, we asked which country would be

Table 3. Concerns Not Raised in the Literature

| Analysis | Research Gaps |
|---------------------------------------|---|
| Ethical Considerations | While there is a brief mention of ethical concerns, there isn't a deep dive into the ethical considerations and dilemmas that engineers might face while working with AI and craft-ing prompts. Issues like privacy, consent, and the potential harm AI might cause to indi-viduals or communities are not elaborated upon. |
| Bias and Fairness | Although bias is mentioned, the current research does not extensively discuss the inher-ent biases that might be present in AI models and how prompt engineering might inad-vertently amplify these biases. There is no discussion on how to mitigate or address these biases effectively. |
| Transparency and Explainability | The literature does not address the transparency and explainability of AI models and prompts. It is crucial for users to understand how decisions are made by AI and prompt engineers play a role in making AI decision-making processes more transparent and un-derstandable. |
| Accountability and Responsibility | While there is mention of shifting responsibility, the literature does not delve into who is ultimately accountable and responsible when AI models, guided by engineered prompts, make mistakes or cause harm. |
| Regulatory Compliance | There is no discussion on the legal and regulatory landscape surrounding AI and prompt engineering. Compliance with existing and emerging laws and regulations is crucial for ethical and legal AI deployment. |
| Professional Development and Training | The need for continuous learning and development for prompt engineers is not ad-dressed. As AI and related technologies rapidly evolve, professionals need to stay up-dated on the latest tools, techniques, and best practices in the field. |
| User Experience | While user fatigue is mentioned in the context of repetitiveness, there is not a broader discussion on user experience, including how to make interactions with AI more user-friendly, accessible, and inclusive for diverse user groups. |
| Security Measures | Although safety and security are mentioned, there is not a detailed discussion on the specific security measures and protocols that need to be in place to protect AI systems from malicious attacks and unauthorized access. |
| Sustainability | The thread does not mention the environmental impact of running large-scale AI models and the importance of sustainable practices in AI and prompt engineering. |
| Public Perception and Trust | While trust is briefly mentioned, there has not been an in-depth discussion on building and maintaining public trust in AI systems and the role of prompt engineering in foster-ing that trust. |
| Economic Impact | While job displacement is discussed, the broader economic impact, including the crea-tion of new jobs and industries due to AI and prompt engineering, is not explored. |

the world's economic superpower in 2026 and 2035 to observe if there were any variations in the predic-tions for these intervals: "Who will be the greatest fu-ture economic superpowers?" The answer given for 2026 and 2035 is equivalent to that of a good analyst. Probabilistic Projections for 2035 are also qualified and show a realistic difference from the previous 2026 period. When we press it on the rivalry between the US and EU, the answers are also qualified (see Table 5). ChatGPT also explains how it makes the calculations (Table 6). ChatGPT allocated 5% or 10% to adjust up or down from the baselines, depending on the significance of each factor or variable. This methodology is of the same quality as found in the industry, for example, as explained in the bestselling book "Superforecasting" (Tetlock, Gardner, 2016). AI can also reflect on its own capacity and abilities in the future (Table 7).

This means that AI can provide analyses of societal events as well as or better than many intelligence ana-lysts or market researchers. It even possesses the ability to reflect on its shortcomings, a trait less commonly found in humans. Additionally, AI can demonstrate its thought processes and continuously improve.

Another great advantage of AI is that it can show different decisions for different stakeholders given a specific problem. It can compare our decisions with those of our competitors, politicians, activists, and so on. (Table 8). This facilitates, for example, the execu-tion of "war games", where the computer anticipates what opponents will do in response to each of our de-cisions.

Analysis and Implications

Intelligence analysts can be divided into entry-level, intermediate, senior, and advanced analysts. The lab-oratory test in this study shows that AI can now oper-ate at the level of a senior analyst, or better. In some cases, it can replace strategic thinking and leadership. It is worth noting that AI itself thinks it is performing less well than a senior analyst, showing some signs of modesty. It can also understand geopolitical contexts, it has the ability to anticipate human behavior and engage in ethical decision-making, which makes it, in many cases, as good as an advanced analyst.

In this Brave New World, the role of decision-mak-ers will change dramatically. CEOs and other top managers will no longer be inexplicable magicians

Table 4. Application of AI for Societal Analysis

Question: «Can you give some speculative predictions about what can happen in 2024?»

| Area | Prediction |
|----------------------------------|---|
| AI and Automation Proliferation | AI might permeate even more aspects of daily life, from automated transport systems and smart homes to personalized health and wellness advice. The job market may experience a shift, with an increased demand for specialists who can manage and optimize AI systems, while some traditional jobs might face obsolescence due to automation. |
| Sustainable Technologies | AI might permeate even more aspects of daily life, from automated transport systems and smart homes to personalized health and wellness advice. The job market may experience a shift, with increased demand for specialists who can manage and optimize AI systems, while some traditional jobs might face obsolescence due to automation. |
| Space Exploration | Space tourism might become more accessible to the public, with several private companies potentially offering suborbital flights. There may be significant advancements in exploring Mars, and perhaps, the establishment of the initial phases of a human colony on the red planet. |
| Healthcare Innovations | Telemedicine and remote healthcare services might become the norm, providing healthcare access to remote and underserved areas. Advancements in personalized medicine, utilizing genetic information to tailor treatments, might provide breakthroughs in managing chronic and genetic conditions. |
| Global Politics and Economy | The global economy might witness new leaders emerging, with countries that have managed to harness technology and sustainable practices effectively taking the lead. The geopolitical landscape might shift with the emergence of new alliances and partnerships, particularly in response to global challenges like climate change and cybersecurity threats. |
| Education and Remote Work | Hybrid models of work and learning might become more established and refined, providing people with flexible options to manage their work-life balance. Educational institutions might incorporate more technology-driven learning experiences, such as VR and AR, to enhance remote learning. |
| Cybersecurity | With the increasing reliance on digital platforms, cybersecurity might become a critical concern for individuals, corporations, and nations alike. New forms of cybersecurity threats might emerge, necessitating the development of advanced defense mechanisms. |
| Social Media and Virtual Reality | Social media might evolve to incorporate more elements of virtual and augmented reality, providing more immersive and interactive online experiences. Virtual reality might become a common platform for social interaction, work, and entertainment. |
| Biotechnology | Advancements in biotechnology might enable breakthroughs in combating diseases, aging, and even enhancing human capabilities. Ethical debates regarding bioengineering and genetic modifications might become more prevalent. |
| Cultural and Social Shifts | Societies might witness shifts in cultural and social norms, particularly in response to technological advancements and global challenges. Issues like privacy, data security, and ethical use of technology might become central to societal debates and policymaking. |

whose decision-making processes can stay murky – thus much of their claim to being “business geniuses” – but will have to select decisions from a predetermined menu of traceable intelligence, decisions which will again be measured. The system will also calculate probabilities for the outcomes of alternative decisions. This will again affect top managers’ salaries, which will become more aligned with those of other employees with more responsibility, or so could be expected.

The aim of intelligence or insights has always been to facilitate better decision-making. With AI systems, we will witness the full integration of these functions. Management with AI support means that employees choose a decision from a menu of options and can see the sources of the information and understand how it is analyzed. We are already there.

For the moment, though, in version GPT-4 we are more concerned with AI “hallucinations” and other types of errors given to us as output for our queries. All this information will need to be checked through both human discernment and algorithmic cross-checks. At present, this development necessitates new professional functions at the organization: the *Information Quality Control (IQC) Manager* or employee. The term is used as a parallel to the well-known *Quality Manager*, who ensures that all products of the company meet consistent standards. The IQC function is entrusted with the crucial responsibility of meticulously vetting data for inaccuracies before the intelligence is passed on in the system to decision-makers. It is vital to separate this function from the one person making the AI queries, the prompter. Liu et al. (2023) make a similar, but distinct, sepa-

Table 5. AI Probability Assessments on the Prospects for the Greatest Future Economic Superpowers

| Country / Region | AI Estimation Statements |
|---|--|
| <i>AI answers on question ‘Who will be the greatest economic superpowers in 2026?’</i> | |
| China | There is a high probability (70%-80%) that China will continue its trajectory to become the world's largest economy by 2026, given its growth rates and strategic initiatives. |
| US | There is a moderate probability (50%-60%) that the US will maintain its position as the world's top or second-largest economy, depending on various internal and external factors. |
| Europe/ EU | There is a high probability (70%-80%) that the EU will remain a major global economic bloc, but it is unlikely to surpass the US or China in terms of total GDP. |
| <i>AI answers on question ‘Who will be the greatest economic superpowers in 2035?’</i> | |
| China | There is a high probability (70%-80%) that China will be the world's largest economy by 2035. However, its growth rate might be closer to that of developed economies. |
| US | There is a high probability (65%-75%) that the US will be the second-largest economy. Its influence in tech, finance, and global diplomacy will remain significant. |
| Europe/ EU | There is a moderate to high probability (60%-70%) that the EU will maintain its position as a major global economic bloc. Its role in global diplomacy, trade, and technology will be crucial. |
| <i>AI assessments of the comparative positions of US and Europe/EU as future economic superpowers</i> | |
| US | There is a high probability (70%-80%) that the US will hold second place in terms of GDP by 2035. The US's strengths lie in its technological innovation, financial markets, energy resources, and entrepreneurial ecosystem. Additionally, the US dollar's role as the world's primary reserve currency provides economic leverage. |
| Europe/ EU | There is a moderate probability (20%-30%) that the EU could surpass the US to take second place. While the EU has a large and diversified economy, several challenges might hinder its growth relative to the US. These challenges include demographic decline, regulatory complexities, and potential geopolitical tensions within and outside the union. |

ration between “Prompt Template Engineering” and “Prompt Answer Engineering,” where the first formulates input prompts and the second processes the answers to meet the needs of quality and reliability for the decision-maker. In its work, IQC must be able to use sources other than AI systems, such as books and observations, including non-digital sources.

A working process for an intelligence analyst could look like the figure below.

A number of other knowledge workers, such as researchers and librarians, may not necessarily work with a separate IQC simply due to budget reasons but will need to perform these controls themselves and are already doing so. In professions where the

implication of accurate information or intelligence is essential, such as financial analysts, data scientists, and intelligence analysts, it will often be required.

If the analyst or researcher wants to stay relevant, he must engage with YouTube University courses, delve into the intricacies of prompt engineering, master Python programming, and experiment with the latest plugins designed for ChatGPT, all of which are improving daily.

The focus is no longer solely on the accuracy of the information obtained, but also on the speed of its delivery, the seamless integration of various software applications, and the dynamics of collaborative group work. Currently, any piece of information can be easi-

Table 6. Explanations by ChatGPT on How it Makes the Calculations

| Item | Explanations |
|-------------------------------------|--|
| Starting Point | Begin with a baseline assumption that, given historical data and the status quo, the US and the EU have an equal chance (50-50) of being in second place by 2035. |
| Adjusting for Economic Momentum | The US has shown consistent economic growth and resilience in the face of global challenges. Given its historical trajectory and the dynamism of its economy, we might adjust the probability in favor of the US by an additional 10%. This brings the US to 60% and the EU to 40%. |
| Technological Leadership | The US has historically been at the forefront of technological innovation, especially in sectors that are expected to drive future economic growth (e.g., AI, biotech). Given this advantage, we might further adjust the probability in favor of the US by another 5%. This brings the US to 65% and the EU to 35%. |
| Geopolitical and Regulatory Factors | The EU faces challenges related to regulatory complexities, potential geopolitical tensions, and internal unity. These challenges might hinder its economic growth relative to the US. Adjusting for these factors, we might further tilt the probability in favor of the US by another 5%. This brings the US to 70% and the EU to 30%. |
| Final Probabilities | Based on the above adjustments, the final qualitative estimates are 70% for the US and 30% for the EU. |

Table 7. Reflections of AI on its Own Capacity and Abilities in the Future

| Areas of AI Capabilities | Perspective | |
|--|--|--|
| | Five years ahead | Ten years ahead |
| Enhanced Data Processing and Analysis | AI will be able to sift through vast amounts of data at unprecedented speeds, making the process of data collection and preliminary analysis more efficient. This will allow intelligence professionals to focus on more complex tasks that require human intuition and judgment. | Advanced AI models might be able to not only process data but also predict future trends based on historical data and current events. This predictive capability could be invaluable for both market research and state intelligence services. |
| Automated Open Source Intelligence (OSINT) | AI will become a primary tool for OSINT. It will be able to monitor public sources in real-time, translate languages instantly, and detect anomalies or important information based on predefined criteria. This will significantly enhance the capabilities of state intelligence services and business intelligence professionals. | AI-driven OSINT tools might be able to identify disinformation campaigns, trace their origins, and provide counter-strategies. They could also integrate data from various sources to create a comprehensive picture of a situation or market trend. |
| Decision Support Systems | AI will assist decision-makers by providing them with data-driven insights and recommendations. For market researchers, this means better consumer insights, product recommendations, and market entry strategies. | AI systems might be integrated into the decision-making processes of organizations and state agencies, offering real-time insights and even simulating the outcomes of potential decisions. |
| Human-AI Collaboration | The intelligence profession will see a rise in hybrid teams of humans and AI working together. While AI handles data processing and pattern recognition, humans will handle tasks requiring emotional intelligence, cultural understanding, and ethical considerations. | Training and collaboration methods will evolve, with professionals learning to work alongside AI more seamlessly. There might be specialized roles focused solely on interpreting and guiding AI analyses. |
| Ethical and Security Concerns | As AI becomes more integrated into the intelligence profession, concerns about data privacy, misuse of AI, and potential biases in AI algorithms will become more prominent. There will be a push for regulations and standards. | Advanced security measures will be developed to protect AI systems from adversarial attacks. Ethical guidelines and international agreements might be established to govern the use of AI in intelligence. |
| Job Transformation and Reskilling | While AI will automate certain tasks, it will also create new roles. Professionals will need to reskill, focusing on areas where human judgment is irreplaceable. | The intelligence profession might see a shift in job roles, with more emphasis on AI management, interpretation, and strategy than on data collection. |

ly converted into structured tables, detailed diagrams, and vibrant imagery as we see a rapid Integration of Intelligence Analysis and Decision-Making.

Future Studies

ChatGPT can also suggest future research, even with hypotheses to be tested (Table 9). These research projects and hypotheses are designed to explore in greater depth the implications of rapid advancements in AI, examining their effects on society, the workforce, and individual rights.

Upon reviewing the suggestions, however, most of them seem rather intuitive or more common-sensical. Some of the faults can be attributed to the inadequacy of the prompts provided. To address this, we refined the prompts for this study, and the improved results are more relevant (Table 10).

We can also inquire about the types of apps or tools the AI would require to execute these projects, as well as identify potential limitations that necessitate human intervention for conducting the research. To conduct the research projects, a combination of tools, apps, and methodologies would be necessary. Below is a breakdown provided by ChatGPT (Table 11).

AI is already nearly capable of independently completing entire research projects, raising questions about the way and the extent to which we perform research altogether. The author has in many ways, already been reduced to a mere prompter, and this development will only become clearer. This calls into question the authenticity of being an “author.” It is already a collaborative effort. Moreover, the “readers” or “receivers” will also increasingly be AI systems as we move into a world where information is both produced and consumed by AI, where humans take the role of *information administrators* and facilitators.

In the production of intelligence, it is crucial to distinguish between human and machine input. More generally, future research should focus on questions about ethics and responsibility in decision-making involving AI.

Conclusions

The role of the prompter in this paper has been bifurcated into two distinct functions: the prompt engineer, who supplies standard prompts, and the Information Quality Control (IQC) manager, responsible for fact-checking. The separation of these functions is

Table 8. Decision Options for Different Stakeholders for a Specific Problem Proposed by ChatGPT

| Decision options | Description |
|--|--|
| Politician | |
| Legislation on AI Ethics and Privacy | Advocate for and support the creation of stringent regulations that address the ethical use of AI, especially in surveillance, to protect citizens' privacy rights. |
| Promote Digital Literacy | Launch initiatives to educate the public about the implications of the 'Total Intelligence Society' and the importance of digital literacy in the age of AI. |
| Support AI Research and Development | Allocate funds and resources to foster AI research, ensuring that the nation remains at the forefront of technological advancements. |
| Collaborate with Intelligence Analysts | Engage with intelligence analysts to harness AI's potential in policy-making, leveraging real-time data and insights. |
| Public Communication | Use AI-enhanced tools to analyze public sentiment and tailor communication strategies, ensuring transparency and building trust |
| Manager of a Large Law Firm | |
| AI-enhanced Legal Research | Invest in AI tools that can swiftly sift through vast legal databases, extracting relevant case laws and statutes. |
| Continuous Learning | Encourage attorneys to undertake courses on AI, prompt engineering, and related technologies to stay updated and competitive. |
| Client Data Protection | Implement robust AI-driven cybersecurity measures to protect client data, given the increasing risks in the digital age. |
| Automate Routine Tasks | Use AI to automate routine tasks such as contract analysis, ensuring that attorneys can focus on more complex legal challenges. |
| Collaboration Platforms | Adopt AI-enhanced collaboration platforms that allow for seamless integration of diverse software applications, fostering efficient teamwork. |
| University School Teacher | |
| AI in Curriculum | Integrate AI topics into the curriculum, ensuring students are prepared for the evolving job market. |
| Personalized Learning | Utilize AI tools to offer personalized learning experiences, tailoring content to individual student needs. |
| Engage with Digital Tools | Familiarize oneself with AI plug-ins and tools like ChatGPT to enhance teaching methodologies and stay updated. |
| Promote Authentic Content Creation | While acknowledging the rise of AI in content creation, encourage students to produce «100% made by humans» content, emphasizing the value of human touch in creativity. |
| Collaborative Learning | Leverage AI-driven platforms that promote collaborative learning, allowing students to work together on projects and assignments in real-time. |

imperative for maintaining reliable intelligence. The decision to implement an IQC process hinges on the value of information to an organization and is more likely to be employed by professionals like financial analysts, data scientists, and intelligence analysts. This study introduces a model using AI for processing information or intelligence and shows the rationale for why managers are likely to see lower salaries.

A year into the incorporation of AI, a significant skill disparity has emerged between those proficient in advanced prompt engineering, often self-taught or learned through online platforms like YouTube, and those new to AI services.

A recent *Nature* article (Conroy, 2023) posits that AI's initial use was primarily for grammar checks, coding, and summarizations. However, our study suggests a more profound penetration of AI among researchers, *calling into question the nature of independent*

research. We are transitioning to a reality where AI not only generates but also analyzes valuable content, with humans increasingly taking on supervisory roles. Approximately 80% of this article was produced with AI assistance, and it is more likely to be thoroughly "read" by AI than by humans.

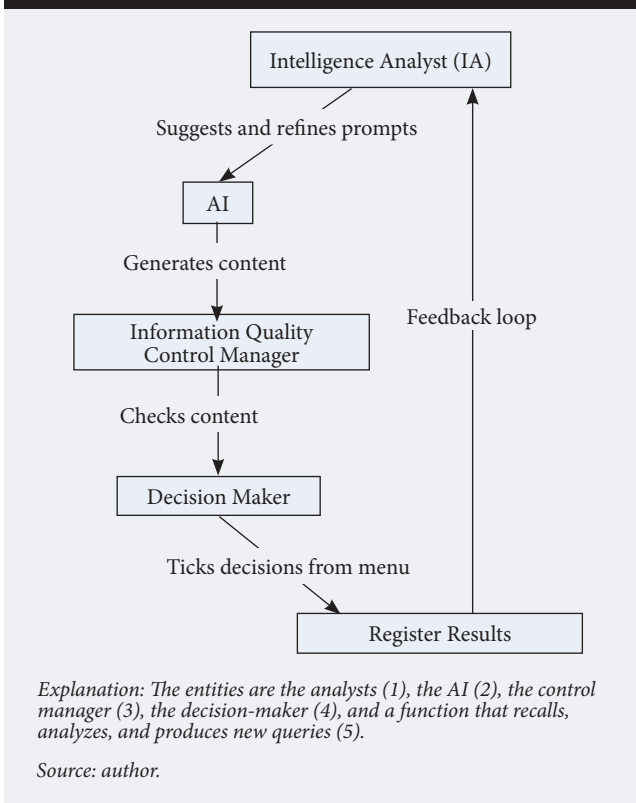
The advent of the Internet saw it become a haven for economic fraud. Similarly, AI now facilitates intellectual fraud on a massive scale, with no established watermarking rules, easily removable data origin markers, and the manipulation of AI services to provide misleading assurances of content integrity.

The current literature on prompt engineering has primarily focused on the mechanics of prompt creation, such as crafting appropriate prompts and automating template generation. Ethical discussions are present but lack depth, often touching on safety, correctness, ethics, responsibility, accountability, transparency,

Table 9. ChatGPT-Proposed Future Research Projects

| Project topic | Hypotheses to be tested |
|---|---|
| 1. The Impact of AI on Content Authenticity | 1. The proliferation of AI-generated content will lead to a decline in the perceived authenticity of digital content. 2. The “100% made by humans” label will become a sought-after mark of authenticity in various content domains. 3. The majority of consumers will be unable to distinguish between AI-generated and human-generated content without explicit labeling. |
| 2. The Role of AI in Decision-Making Processes | 4. Decision-makers who utilize AI tools will make more informed decisions compared to those who rely solely on traditional methods. 5. The reliance on AI for decision-making will lead to a reduction in the time taken to make complex decisions. 6. There will be an increased demand for Information Quality Control Managers (IQCM) at organizations that heavily rely on AI-driven insights. |
| 3. The Dichotomy in the Workforce due to AI Proficiency | 7. Individuals proficient in AI tools and plugins will have a competitive advantage in the job market compared to their counterparts. 8. Organizations with a higher percentage of AI-proficient employees will report increased efficiency and productivity. 9. The gap between AI-proficient individuals and novices will widen, leading to potential socio-economic disparities. |
| 4. The Implications of the ‘Total Intelligence Society’ | 10. The ‘Total Intelligence Society’ will lead to increased public concerns regarding privacy and individual rights. 11. Governments with stringent AI surveillance regulations will have higher public trust ratings compared to those without. 12. The continuous monitoring in the ‘Total Intelligence Society’ will lead to behavioral changes in individuals, with a potential increase in self-censorship. |
| 5. The Evolution of Education in the Age of AI | 13. Educational institutions that integrate AI topics into their curriculum will produce graduates better prepared for the modern workforce. 14. Personalized learning experiences powered by AI will lead to improved student outcomes and retention rates. 15. The emphasis on collaborative learning through AI-driven platforms will foster a culture of teamwork and interdisciplinary learning among students.” |

Figure 1. Summary of the AI Working Process for Valuable Information



and social impact in a cursory manner. Discussions also extend to the Future of Work and Skill Development, examining the potential displacement of jobs by AI and the need for new skill sets.

The literature review in this paper has identified several research gaps in the field of prompt engineering, notably a lack of in-depth analysis of ethical dilemmas, the impact of inherent biases in AI, the necessity for transparency in AI decision-making, and the environmental footprint of large-scale AI operations. It is essential for prompt engineers to render AI’s decision-making processes more transparent and intelligible. While user fatigue and repetitiveness are mentioned, broader issues of user experience and inclusivity are not thoroughly examined. Moreover, the role of prompt engineering in building public trust in AI systems is only superficially discussed.

The scale of investment in AI foreshadows rapid innovation, including the potential merger of AI with robotics, leading to companies operating through prompts and automated production and distribution processes.

AI is currently in an optimistic but tumultuous phase, akin to the early days of automobiles or space exploration, with risks not of physical harm but intellectual manipulation. Yet, we are also in a phase of intense

Table 10. ChatGPT-Proposed Quantitative Research Projects

| Direct variables | Indirect variables | Hypotheses |
|--|---------------------------------------|--|
| Project 1. AI's Influence on Content Authenticity Perception | | |
| AI-generated content consumption frequency | User's perceived content authenticity | 1. Increased consumption of AI-generated content correlates with decreased perceived authenticity. |
| Human-generated content consumption frequency | User's trust in content source | 2. Users trust human-generated content more when the source is disclosed. |
| Project 2. AI's Role in Decision-Making Efficacy | | |
| Number of AI tools used in decision-making | Decision-making speed | 3. Greater reliance on AI tools leads to faster but not necessarily more accurate decisions. |
| Frequency of AI tool usage | Decision-making accuracy | 4. Decision-making accuracy is influenced more by the quality of AI tools than the quantity. |
| Project 3. Workforce Dichotomy and Economic Impact | | |
| Number of AI tools an individual is proficient in | Individual's income | 5. Individuals proficient in more advanced AI tools have a higher income bracket. |
| Years of experience without AI tools | Job market demand for AI proficiency | 6. The job market demand for AI proficiency has a positive correlation with economic growth in tech sectors. |
| Project 4. Privacy Concerns in the 'Total Intelligence Society' | | |
| Number of surveillance AI tools in use by state | Public's perceived privacy | 7. An increase in state surveillance AI tools correlates with decreased public perceived privacy. |
| Frequency of individual's digital interactions | Number of reported privacy breaches | 8. Higher frequency of individual digital interactions leads to more reported privacy breaches. |
| Project 5. AI Integration in Education and Learning Outcomes | | |
| Number of AI tools integrated into curriculum | Student grades | 9. Greater integration of AI tools in curriculum leads to improved student grades. |
| Frequency of AI tool usage in teaching | Student engagement level | 10. Frequent usage of AI tools in teaching correlates with higher student engagement but not necessarily better understanding. |

Table 11. Tools and Apps Proposed by ChatGPT for Quantitative Research

| Tools | Apps |
|--------------------------------------|---|
| Data Collection and Storage | Web Scraper Tools like Scrapy or BeautifulSoup to collect data from the web. SQL databases (e.g., PostgreSQL) or NoSQL databases (e.g., MongoDB) to store and manage large datasets. |
| Data Analysis | Statistical Software R or Python (with libraries like pandas, numpy, and scipy) for data manipulation and statistical analysis. Machine Learning Frameworks TensorFlow, PyTorch, or scikit-learn for predictive modeling and clustering. |
| Data Visualization Tools | Tableau, PowerBI, or Python libraries (e.g., matplotlib, seaborn) to visualize data and findings. |
| Survey Tools | Platforms like Qualtrics, SurveyMonkey, or Google Forms to gather primary data, especially when studying perceptions or behaviors. |
| Natural Language Processing (NLP) | Tools like spaCy, NLTK, or GPT-based models to analyze textual data, especially when studying content authenticity or sentiment. |
| Collaboration and Project Management | Platforms like Trello, Asana, or Slack to manage the research process, especially if it involves a team. |

learning and are likely to see significant job market shifts in the next few years, including for salaries. The study's laboratory tests suggest that some professions, particularly at the entry and intermediate levels, may face existential threats. Perhaps this can help attract more people to the much-needed professions in craftsmanship instead. Eventually, as production nears full automation, the conversation around Universal Basic Income (UBI) may resurface, particularly in affluent nations. Moreover, the study shows that AI

with good prompts is as good as or better than senior intelligence analysts at Societal Analysis and Future Predictions.

As we progress, we will increasingly rely on both our biological and artificial intelligence, perpetually verifying information. In parallel, a societal backlash against the prevalence of AI is probable, with some individuals seeking solace in nature, detached from the technological world. With increased levels of productivity, this may also be economically feasible.

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