

The Good, The Bad, And The Nuanced: The Effects of Generative Artificial Intelligence on The Job Market

Abstract

The influence of Artificial Intelligence (AI) on the job market remains a subject of intense debate due to insufficient data. This study conducts a thorough literature review, synthesizing contemporary AI research to explore its impact on the job market, encompassing positive, negative, and nuanced aspects. Methodologically, a three-phase review categorizes scholarly articles, revealing recurring themes such as economic impact of AI, job displacement, ethical considerations of AI, and the complex entanglement of positive and negative effects. Findings underscore the complexity: AI presents opportunities for productivity gains but also poses risks of job displacement and societal inequalities. Emphasizing adaptable work structures and balanced policies to manage workforce transitions, the study calls for inclusive approaches to navigate future AI developments in the job market.

Introduction

The recent rapid advancements in Generative Artificial Intelligence can be described as a modern Industrial Revolution. Similar to the Industrial Revolution, Artificial Intelligence is transforming the job market, economy, and society at large. This modern revolution has raised questions about how this technology will shape job markets, fostering a growing fear that Artificial Intelligence might replace human workers and lead to significant job loss. These discussions have been ongoing in our class over the term and led us to wonder how much truth there was to this fear and to what extent AI could really impact the job market. In order to assess the credibility of this fear, as well as investigate the many impacts of Artificial Intelligence on the job market, our group decided to conduct a literature review. The goal of our literature review is to synthesize recent studies discussing the diverse effects of AI on the job market to develop a conclusion that summarizes current scholarly discourse in this field. We hope that our study will provide individuals across various industries and varying levels of familiarity with AI a clearer idea of how Artificial Intelligence might impact the job market and potentially their respective fields of work. Additionally, we aim to identify some areas for future research in this field.

In terms of novelty, we found several literature reviews which explored this interdisciplinary field, but the majority of them centered on aspects different from our intended focus. There were only two literature reviews that delved into the same topic as ours. The first is titled “Labor Displacement in Artificial Intelligence Era: A Systematic Literature Review” (Ye, 2020) and it presents a systematic review of scholarly articles discussing AI technology’s impact on labor displacement. This article draws a conclusion very similar to ours, which will be discussed later, but it focuses predominantly on labor displacement while our study’s focus is broader to include effects on the labor market in general. The second relevant literature review is titled “The blended future of automation and AI: Examining some long-term societal and ethical impact features” (Khogali, 2023) and it summarizes how automation and AI may affect businesses and jobs. This study discusses many similar topics to ours such as job loss but extends into areas beyond our focus such as employees' well-being, dehumanization of jobs, fear of AI, and autonomous technology developments. Hence, our research, while complementing aspects of these studies, stands distinct in its scope within this disciplinary field, offering a novel perspective.

In this paper we will first describe our methodology, then present our results, next we’ll discuss the results in the context of our thesis, and finally we conclude by discussing the key takeaways of the paper and areas of future research. As we will come to show, we find that there is currently a lack of

necessary data to make a strong conclusion about the overall effect of AI in the job market. But despite this limited data, our review of current AI research suggests that nearly all industries will feel some impact from AI. Our study aims to explore the diverse effects of AI on jobs—covering its positive, negative, and nuanced aspects.

Methods

As outlined in the introduction, our group conducted a literature review on scholarly work discussing the effects of Artificial Intelligence on the job market. Our research can be broken down into three different phases: gathering data, refining collected information, and analyzing the data.

In our comprehensive data collection process, we accessed scholarly articles and papers from diverse sources, including Web of Science, JSTOR, Google Scholar, and the Social Science Research Network (SSRN). Some papers were readily available in PDF form online, contributing to the efficiency of our data gathering. Additionally, certain resources were accessible through Portland State University (PSU), providing us with an extensive selection of scholarly content. For papers not directly accessible, we initiated requests through Interlibrary Loan services. In selecting data for analysis, we focused on articles exploring the impact of artificial intelligence on the workforce. We employed a categorization approach, classifying articles into three groups: positive effects (good), negative consequences (bad), and nuanced effects. This method allowed us to efficiently capture diverse perspectives, ensuring a comprehensive examination of AI's influence on the workforce.

Conducting a Thematic-Pattern Analysis on our collected data involved a systematic examination of articles focusing on the positive, negative, and nuanced effects of artificial intelligence on the workforce. First, we thoroughly reviewed each article, identifying recurring themes and patterns related to the respective categories. For articles highlighting positive effects, themes such as technological advancements, efficiency gains, and job creation were identified and analyzed. Similarly, articles addressing negative consequences were scrutinized for themes encompassing job displacement, ethical concerns, and societal challenges. Nuanced effects were explored by identifying themes that captured the intricate interplay between positive and negative aspects. Through this process, we were able to distill key insights and patterns across the spectrum of effects.

In a literature review, we systematically examined and synthesized existing research on the effects of artificial intelligence (AI) on the workforce. Beginning with the categorization of articles into positive, negative, and nuanced effects, we then delved into a comprehensive analysis of the literature within each category. By critically assessing the strengths and limitations of each study, we identified common themes, patterns, and gaps in the existing knowledge. This literature review provided a robust foundation for our research, offering a contextualized understanding of the current state of knowledge on the multifaceted impacts of AI on the workforce.

Results

Our findings showcase key trends on the effects of AI on the workforce. Our graphs will illustrate the distribution of articles across publication years and categorization into positive, negative, and nuanced effects. We also classify articles as literature reviews, data collection studies, or commentaries, offering insights into research methodologies. Thematic analysis reveals the diverse topics covered, from technological advancements to job displacement and ethical considerations. These visual representations provide a succinct overview of the evolving landscape in AI workforce research.

Article Publications by Year

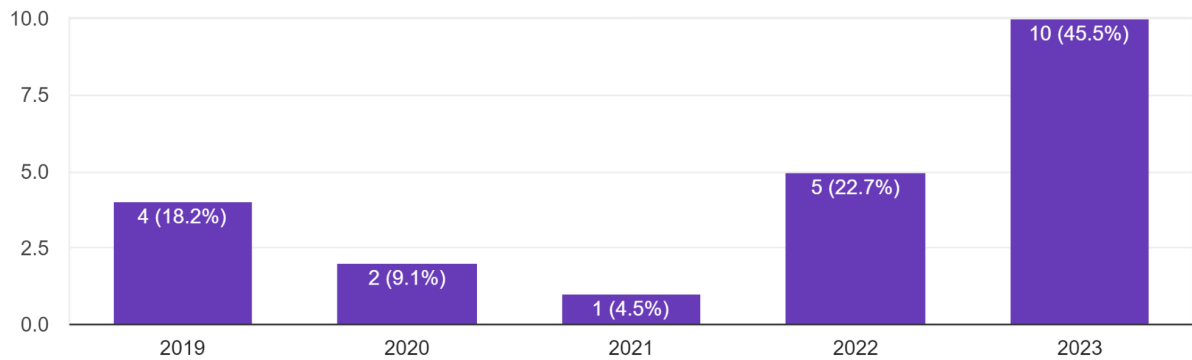


Figure 1. In our dataset of publication years, we observe that the majority of articles were published between 2022 and 2023. This highlights the increasing prominence of the topic concerning AI's effects on the workforce.

Article Discussion of Impacts

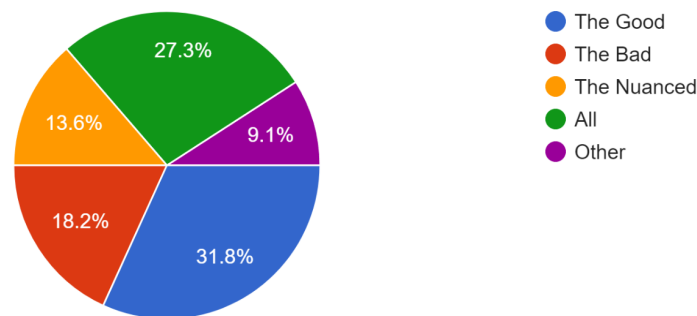


Figure 2. Out of all of our articles, we found a slightly larger amount of the ‘good’ impacts, followed by articles that provide multiple viewpoints and then ‘bad’ impacts.

Types of Articles

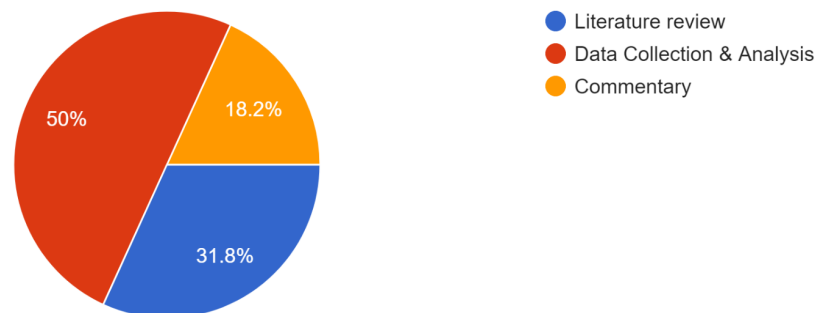


Figure 3. In our research we found that half of the articles we collected were data collection & analysis, with literature reviews consisting of 31% of our articles and 18% commentary.

Focused Topics

22 responses

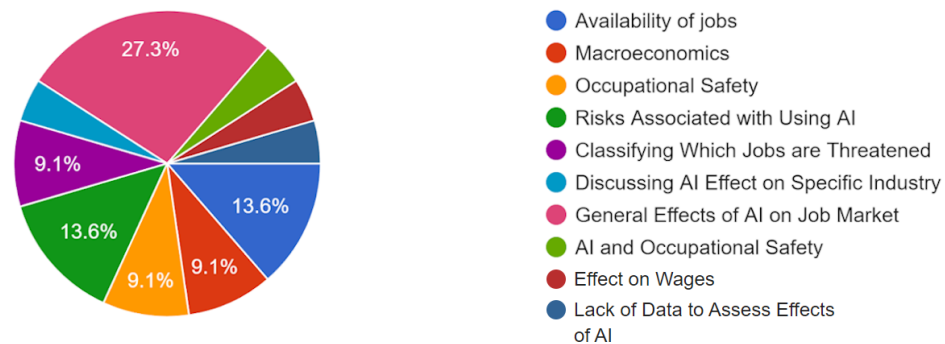


Figure 4. In our research, we found that 27.3% of the articles focus on the general effects of AI on the job market. Additionally, 13.6% of the articles cover the availability of jobs, while another 13.6% address the risks associated with using AI. Further topics fit around 9.1% each to 4.5% each.

Discussion

Throughout the analysis of our papers we found many conflicting conclusions, making it difficult to summarize the overall impact of AI on the job market. The reason for these conflicting results has been chalked up to a lack of relevant data due to the novelty of AI (Frank, 2019). The data we're referring to here is detailed information about jobs and the skills required to do them. Having this data is crucial because this kind of information helps researchers predict which jobs have skills which are easier to automate, and therefore which jobs may become totally automated by AI (Frank, 2019). One of the biggest reasons for this lack of necessary data is the sheer novelty of Artificial Intelligence. As time passes and we prioritize this invaluable data collection, we can expect that job-automation predictions will improve (Frank, 2019). When researchers can accurately predict which jobs are more or less likely to be automated it will assist in transitioning workers from highly automatable to less automatable jobs (Paolillo, 2022). Therefore this would help the workforce adapt to Artificial Intelligence via retraining, and lessen the negative impact of AI (TTC, 2022). Overall, the conflicting conclusions we noticed in these studies is due to a lack of data critical to understand which jobs will actually be affected by AI. Over time as research catches up to AI we can expect this data will be collected and better predictions will be made, helping us as a society get ready for the changes AI will bring to the job market.

Although challenged by limited data and conflicting findings, our analysis uncovered a number of discernible patterns within the papers studied. These patterns enabled us to make strong predictions about certain effects of AI on the job market, which can be neatly categorized into three distinct groups: positive impacts, negative impacts, and more nuanced effects. We will now explore these impacts in this section.

Good impacts of AI on Job Market

AI's Influence On Job Availability

The first pattern we noticed among the studies we analyzed revolves around AI's influence on job availability. Scholarly literature generally agrees that AI will phase out certain jobs, but that it will also generate new ones (Lu, 2020; Tiwari, 2023; TTC, 2022). So overall, there might be a reduction in the number of jobs available, but it is anticipated to be relatively modest (Guimarães, 2022). Although it is

predicted that there will be net reduction in jobs, this consensus is viewed positively, particularly when taken in context with the widespread fear of job displacement caused by AI. Furthermore, researchers have identified methods to retrain and transition workers into less automatable roles, offering even more of a silver lining amidst concerns about job displacement caused by AI (Paolillo, 2022). However, it is important to note that these new job opportunities will mostly cater to highly skilled workers (TTC, 2022). Although it is not exactly clear which jobs will become fully automated, one common prediction is that it will be mostly low-skill jobs (Bonfiglioli, 2023). If this prediction ends up being true then the types of jobs being eliminated and created will not equal, meaning those who are losing their jobs will not be qualified for the jobs being created. This could lead to potential inequalities in employment opportunities that could further exacerbate wealth inequality in America.

AI's Effect On Occupational Safety

The second pattern we noticed in the studies we analyzed was AI's potential to positively impact occupational safety. AI can increase safety in the workplace by “predict[ing] safety risks in the workplace, identify[ing] hazards, and provid[ing] recommendations for preventive measures” (Gihleb, 2023). This predictive ability helps organizations anticipate and avoid safety issues, making workplaces safer for employees and supporting their well-being (Gihleb, 2023). More specifically AI-enabled sensors, AI-enabled robotic devices, and AI-enabled virtual reality can be integrated into the workplace or onto the worker's person to increase safety through a variety of methods (Howard, 2019). For example AI-enabled sensors can be used to monitor air-quality levels in workplaces that are often exposed to dangerous pollutants and chemicals, ensuring a safer environment for employees (Howard, 2019). In conclusion AI has a positive effect on workplace safety especially when combined with other technologies, as it can leverage various capabilities to create a secure environment for employees.

AI's Effect On Global Economy

The second pattern we noticed in the studies we analyzed was AI's effect on the global economy and worker productivity. The integration of Artificial Intelligence (AI) into the workforce significantly increases worker productivity by assisting workers with tasks or completely automating them, which expedites work and also can improve the quality of work (Khogali, 2023; Chui, 2023; TTC, 2022). This is supported by several statistics, one example from “The Economic Potential of Generative AI” correlates AI with an annual labor productivity growth rate of 0.1% to 0.6%, indicating a consistent increase in work output (Chui, 2023). This surge in productivity translates into substantial economic benefits, estimated at annual gains between \$2.6 trillion to \$4.4 trillion (Chui, 2023). It's clear that by increasing productivity and quality of work AI can drastically affect the global economy however, despite these economic gains, concerns persist about its equitable distribution (Khogali, 2023; TTC, 2022). While AI advancements promise positive economic impacts, there is no guarantee of improved well-being and prosperity for *all workers*. Addressing these concerns through policy and legislation is crucial to ensure that the positive effects from AI translate into equitable economic gain and a sustainable future for all.

In summary, AI exerts a positive influence across job availability, occupational safety, and the global economy. As we've explored in this section it is widely accepted that AI enhances productivity, improves safety measures, and drives economic growth. On the flip side it is crucial to ensure that equitable benefits, challenges of job displacement, and wealth inequality are properly addressed via policy interventions to guarantee workers an inclusive future.

Bad Impacts of AI on Job Market

The emergence of GenAI has instigated sweeping transformations across diverse industries, carrying significant repercussions for the worldwide workforce. This section aims to illuminate the adverse effects of GenAI by synthesizing insights from three distinct studies. These investigations delve into the repercussions on online freelancing platforms, scrutinize the impact on the Australian workforce, and assess the potential negative impacts of AI automation on global job markets.

Who is AI Replacing?

The introduction of ChatGPT signifies a significant change in how we interact with artificial intelligence, particularly with the potential for massive automation of tasks previously performed by humans. A comprehensive study by Demirci et al. that looked at the impact of GenAI within online freelancing platforms revealed a notable 14% decrease in job opportunities across diverse fields like writing, statistical analysis, electronic engineering, accounting research, and web development after ChatGPT's introduction (Demirci et al., 2023). This study prompts broader reflections on the implications for various professions beyond the study's immediate focus. This effect may be a result of the efficiency boost from GenAI across multiple fields within online freelancing platforms suggests that these findings might extrapolate to other sectors of the jobs market. All the jobs that fell within the study's "automation-prone" category were found to experience a decrease in demand after ChatGPT was released which suggests that all jobs exposed to automation may be at risk of being replaced by GenAI (Demirci et al., 2023). Interestingly, the reduction trend was not found within the "manual-intensive" category of jobs which suggests that the impacts of GenAI might disproportionately affect jobs whose tasks are exposed to automation when compared to manual labor centric jobs (Demirci et al., 2023). As freelancers face potential displacement, the future of these professions in the gig economy deserves careful consideration and serves as a potential marker for affected jobs outside of online freelancing platforms.

What are the Risks?

As the integration of GenAI becomes more prevalent in the workplace, a study focused on the Australian workforce by Walkowiak and MacDonald unveils the extensive exposure of tasks to these advanced language models. Walkowiak and MacDonald define exposure as the likelihood of GenAI to automate specific tasks that were carried out by human workers. They found that an alarming 38.9% of tasks were directly exposed to LLMs, with 80% of workers allocating 20% of their time to such tasks (Walkowiak and MacDonald, 2023). This study also found significant risk exposures within jobs directly exposed to GenAI spanning privacy (12.4%), cybersecurity (13.7%), breach in professional standards (13.6%), unethical bias (14.1%), misinformation (10.6%), safety and physical harm (26.4%), liability and accountability (26%), and intellectual property risks (9.8%) (Walkowiak and MacDonald, 2023). These findings highlight the need for careful consideration of the potential risks associated with the widespread integration of GenAI into the workplace. This study sheds light on the risks associated with physical harm and safety concerns, illustrating the need for stringent measures to ensure the well-being of workers in environments where GenAI is prevalent. The heightened liability and accountability risks point to the necessity of clear frameworks and guidelines to manage the legal repercussions of tasks involving GenAI. Additionally, this study underscores the nuanced challenges posed to intellectual property, demanding a reevaluation of existing legal and regulatory frameworks to manage the legal repercussions of GenAI utilizing intellectual property or being operated outside of a country's copyright laws. As organizations across the globe embrace GenAI technology, it becomes imperative to proactively address these

challenges and foster a responsible and ethical integration of GenAI into the workplace to mitigate potential risks and safeguard the well-being of employees.

A Global Analysis

Exploring the profound implications of AI on the job market, a study by Gmyrek et al. delves into the potential global effects of GenAI on both job quantity and quality. Notably, they found gendered effects of automation may cause a disproportionate impact on women's employment, with potential job losses concentrated in female-dominated occupations. This study found that the potential exposure to automation disproportionately affects the share of women's employment by more than two-fold in high income countries (7.9% vs 2.9%) and in upper-middle income countries (2.7% vs 1.3%) (Gmyrek et al., 2023). This disparity, particularly concentrated in female-dominated occupations, poses a significant threat to the strides made in enhancing women's labor market participation over past decades. Furthermore, the widespread adoption of GenAI may increase the divergence in productivity between high and low income countries. Gmyrek et al. found that with a larger proportion of jobs falling into the "augmentation" category may suggest that GenAI systems could predominantly function as productivity tools benefiting high income countries the most due to their existing infrastructure. This potential scenario poses a risk of low income countries falling behind, hindered by limited access to reliable infrastructure. There is a critical need for addressing these disparities to ensure a more equitable integration of GenAI across global economies. The impediments to harnessing the benefits of GenAI, particularly in regions characterized by limited infrastructure hinge on access to reliable broadband and electricity. Lower income countries may not benefit as much when compared to high income countries due to challenges in attaining reliable broadband connectivity, reliable electricity, and even skill limitations (Gmyrek et al., 2023). In response to these obstacles, development of targeted policy initiatives tailored to countries that currently lack the essential physical infrastructure and skills required to fully harness the potential of GenAI should be made a priority. This proactive approach aims to facilitate a more inclusive and equitable global transition into the era of generative AI.

The negative impacts of GenAI on the workforce is multifaceted, encompassing changes in job availability, workforce exposure, and global ramifications between different economic levels of countries. As society navigates this technological shift, policymakers must proactively address challenges and implement solutions to ensure a balanced and equitable integration of GenAI into the global workforce, fostering a future where the benefits of artificial intelligence are accessible to all.

Nuanced impacts of AI on Job Market

In this section, we aim to identify themes that capture the intricate interplay between positive and negative aspects of AI's effects on the workforce. By delving into various dimensions, we seek to unravel the multifaceted dynamics that characterize how AI technologies influence the job market. The analysis endeavors to provide a nuanced understanding of the implications, recognizing not only the challenges and disruptions posed by AI but also the potential opportunities and enhancements it introduces to the contemporary workforce landscape.

Freelance Work

Freelancers possess the unique opportunity to transform the perceived threat of being replaced by artificial intelligence into a strategic advantage by strategically crafting and offering services that enhance the capabilities of AI. Rather than viewing AI as a direct competitor, freelancers can strategically position

themselves to provide services that leverage the strengths of AI technologies. This is also possible through the adaptive nature of fields that many freelancers work in, such as content creation or programming. In a recent survey conducted as part of research on the effects of AI on online labor markets, researchers found a 7.81% increase in transaction volume for freelancers that embraced AI opposed to a 4.51% decrease for those who resisted using AI. (Liu et al., 2023) These results underscored the transformative impact of artificial intelligence on the freelancing landscape. The noteworthy uptick in transaction volume for freelancers aligning with AI reflects a strategic response to technological advancements. Those who actively embraced AI technologies may have diversified their skill sets, offering services that complement or enhance automated capabilities. This surge in demand suggests a growing market preference for freelancers who harness the efficiency and innovation associated with AI integration. Conversely, the 4.51% decrease in transaction volume for freelancers resisting AI adoption signals potential challenges with the increasing influence of AI in freelance fields. It implies that there might be a decline in demand for services that have not adapted to or incorporated AI advancement. These results underscore the nuanced effects of AI on freelancers, highlighting how embracing technology can lead to increased demand for work, while resistance can result in a decrease in transactions. This shows the importance of adapting to AI for freelancers in dynamic fields like content creation and programming.

Radiology

The impact of artificial intelligence (AI) on the field of radiology is nuanced, reflecting a dynamic interplay between technological advancements and traditional medical practices. As AI systems increasingly assist in diagnostic processes, the nuanced effects encompass both opportunities for enhanced efficiency and challenges related to integration into established healthcare workflows.

Regardless of the nuanced aspects, much discussion has been focused on the negative effects of AI on the field of radiology. This has added on to the already widening gap between demand for the diagnostic radiology workforce and an increasingly aging population. At an artificial intelligence conference several years ago, deep learning pioneer Geoffrey Hinton made a provocative assertion that, “We should stop training radiologists now.” (Agrawal et al., 2019) In a 2022 survey, it was found that one-sixth of medical students who responded would have chosen radiology as their first choice, and did not due to concerns about AI. (Murugesan et al., 2022). In fact, AI has already found application in radiology, exemplified by programs such as ChestLink. This initiative identifies chest X-rays without abnormalities, generating a conclusive patient report without requiring radiologist intervention. This streamlined process alleviates the radiologists' workload, enabling them to concentrate on cases involving pathologies. (Murugesan et al., 2022) Through this implementation, it is evident that while AI has been integrated into radiology, it has simultaneously improved the workflow of radiologists, enabling them to carry out additional tasks with increased efficiency. Nevertheless, based on these discoveries, it is conceivable that roles held by individuals in radiology who aren't radiologists could be entirely automated. Conversely, radiologists engage in numerous non-predictive tasks, making it improbable for artificial intelligence to automate these particular responsibilities.

Long-Term Impacts

Some important ways to address these nuanced effects on the job market are to emphasize the importance of distinguishing between prediction tasks and decision tasks. (Agrawal et al., 2019) Artificial intelligence directly substitutes capital for labor in prediction tasks and indirectly influences decision

tasks by altering the relative returns to labor versus capital. The impact of AI on a worker's job is predicted by the extent to which their core skill involves prediction, with transcription jobs being automated due to their reliance on this skill. Through these findings in the nuanced effects of AI on the workforce, we can shape targeted workforce development programs that enhance skills in decision-making and complement AI capabilities, fostering resilience and adaptability in the face of evolving job demands. Examples would include the case of freelance work where training on AI is encouraged to lessen the gap between freelance workers who have adapted AI versus those who have not. (Liu et al., 2023) Additionally, policymakers can utilize this knowledge to establish frameworks that ensure a balanced integration of AI, preserving job opportunities while encouraging upskilling in areas less susceptible to automation. Ultimately, a nuanced understanding of AI's impact enables us to proactively navigate the changing landscape, ensuring a more sustainable and inclusive future for the workforce.

Conclusion

The multifaceted impact of AI on the job market unveils a complex landscape with positive, negative, and nuanced dimensions. While AI presents opportunities for increased efficiency and productivity, as evidenced by GenAI's potential economic contributions, it simultaneously poses challenges related to job displacement, multiple risk exposures, and global inequalities. The nuanced nature of AI's influence is evident in the adaptability of freelancers and collaborative efforts between AI and human professionals in fields like radiology.

Despite the inherent uncertainties and data limitations, it is clear that future developments in AI will demand careful consideration of these factors to ensure a balanced and inclusive approach to technological advancements. The need for policies managing worker transitions, strengthening social dialogue, and addressing infrastructure and skill gaps is paramount.

As we navigate this evolving landscape, crucial questions arise for us to ponder:

- Who benefits financially from the increased productivity enabled by AI?
- What responsibilities does the government have to equitably distribute the wealth generated by AI advancements?
- Given the anticipated job loss and industry disruptions, should we consider implementing a universal basic income?
- How can we best assist workers in adapting, acquiring new skills, and securing new employment opportunities?
- Who bears the responsibility for funding these initiatives?

Group Contribution

- Stuart Rimel: Bad Impacts of AI on Job Markets, Conclusion
- Layla Smith: Introduction, Challenges of estimating effects of AI, Good Impacts of AI on Job Market, set up system to create statistics for results, formatted paper to fit MLA standards.
- George Olson: Methods & Results, Nuanced effects
- We agree that all group members made a valuable contribution and therefore believe it is fair that each member receives the same grade for the discussion.

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