

DOI: https://doi.org/10.48009/3_iis_2024_132

Redefining careers in the age of artificial intelligence

James Lee, *Seattle University*, leej@seattleu.edu

Amrapali Samanta, *Seattle University*, asamanta@seattleu.edu

Misuk Lee, *Seattle University*, leem@seattleu.edu

Abstract

The job market, shaped by AI, is evolving, creating new roles and prompting a reconsideration of job structures. Despite concerns about job displacement, it's essential to recognize AI as a creator of new employment opportunities. Analyses foresee positive societal changes, including increased productivity, improved healthcare, and expanded education access. By 2025, while 85 million jobs may be displaced, 97 million new roles could emerge, highlighting evolving collaboration between humans and machines (World Economic Forum, 2020). This study analyses how AI affects jobs in two categories; possible jobs at risk of being replaced, and existing jobs not at risk of being replaced. Certain jobs like telemarketers, retail store jobs, support specialists, shipment jobs, tax preparers, hard manual labor, etc. are prone to replacement by AI/Robots. Whereas jobs that require more empathy, emotion, critical thinking, and skilled labor like writers, designers, psychologists, doctors, teachers, etc. are likely to persist. The study also reveals jobs created in the AI revolution which maps the gaps in the new jobs created in three categories: individual-oriented, task-oriented, and industry-oriented AI. The AI workforce framework is proposed in AI-driven skill sets, AI-enabled jobs, and AI-supported businesses.

Keywords: AI Job market, AI Workforce, AI Jobs, AI-driven skill sets, AI-enabled jobs, AI-supported business.

Introduction

The ongoing debate surrounding the impact of Artificial Intelligence (AI) on employment revolves around predictions of potential job losses and the simultaneous creation of new opportunities. While AI, machine learning, and robotics exhibit proficiency in a diverse array of tasks, there remains a need for automating non-routine functions that involve creativity, complex communication, problem-solving, and autonomous mobility. Recent job data indicates that AI was responsible for a small fraction of the jobs lost, accounting for less than 1% of the total job cuts between January and May 2023. Diverging predictions from Goldman Sachs suggest the potential replacement of up to 300 million full-time jobs by AI, while a McKinsey report outlines AI's potential contribution of around \$13 trillion to global economic activity by 2030, equivalent to 1.2% additional GDP growth per year (Talmage-Rostron, 2023). Amidst concerns about job displacement, it is crucial to recognize that AI is not just a harbinger of job losses; it also catalyzes the creation of new employment opportunities. Market analysts foresee positive societal changes, such as increased productivity, improved healthcare, and expanded access to education, thanks to the transformative effects of AI. The World Economic Forum's projection that, by 2025, AI may displace 85 million jobs while simultaneously creating 97 million new roles emphasizes the evolving collaboration between humans and machines (Talmage-Rostron, 2023).

In this dynamic and evolving landscape, the job market is experiencing a reshaping influenced by AI, which is not only creating new opportunities but also necessitating a reconsideration of existing job structures. As predicted by the World Economic, AI is expected to give rise to new job categories such as AI trainers, explainers, and sustainers, emphasizing the importance of responsible and effective AI operations. The impact of AI on jobs and skills is a significant concern, with a focus on how tasks and skills will evolve. Some tasks will be fully automated, while others will continue to require human input. This transition will be gradual and depends on existing job structures. It is generally accepted that policymakers, employers, and educators integrate AI effectively and ethically (Peter Dizikes, 2020), emphasizing the enhancement of durable human skills across industries, ensuring that AI complements that job role but does not replace the jobs completely of a workforce. Embracing responsible AI deployment, nurturing innovation, and prioritizing lifelong learning are deemed crucial for businesses and individuals to thrive in an AI-driven future (Peter Dizikes, 2020).

Through this research, our goal is to understand how Artificial Intelligence has been responsible for job displacement as well as for creating new job opportunities for humans. Then, the research proposes a framework that guides AI-driven skill sets, AI-enabled jobs, and AI-supported businesses. Below we discuss current jobs and jobs created and replaced by AI/robots in different fields and industries.

Methodology

Grounded theory is adopted to collect and categorize the data from all the readings currently available. The core of the grounded theory is a conceptual framework where researchers analyse any form of data and materials into a grounded theory based on its inductive iteration (Glaser and Strauss, 1967). There are three phases in the process of grounded theory in this study: open coding, axial coding, and selective coding (Strauss and Corbin, 1998).

Open coding is the first step of the analysis in identifying, naming, categorizing, and describing phenomena found in the text. This technique is applied during finding and reviewing the data, which are categorized into concepts rather than imposing concepts taken from other literature reviews. After open coding, axial coding was performed. Axial coding is correlating the relationships among the identified concepts of codes in open coding via a combination of inductive and deductive thinking (Glaser and Strauss, 1967). The relationship between a category and a property reveals the dynamic channel referred to as dimensions. Axial coding also provides explicit connections between categories to construct a more comprehensive scheme (Orlikowski, 1993). The last stage of our research cycle was to reflect, making core categories – selective coding. The selective coding is the process of integrating and refining categories. All the coding concepts and categories obtained from open and axial coding steps are re-examined if there is further data collection or categorization need. This procedure is iterative until researchers are satisfied with the conclusion, known as “theoretical saturation” (Glaser and Strauss, 1967).

The following two sections are results of open coding and axial coding while the section, ‘The AI Workforce Framework’, is from the selective coding. All the coding concepts are discussed with category names in the sections; ‘Current Jobs during the AI Revolution’ and ‘Jobs Created in the AI Revolution’.

Current Jobs during the AI Revolution

AI affects jobs in two categories; possible jobs at risk of being replaced, and existing jobs not at risk of being replaced. Certain jobs like telemarketers, retail store jobs, support specialists, shipment jobs, tax

preparers, hard manual labor, etc. are prone to replacement by AI/Robots. Whereas jobs that require more empathy, emotion, critical thinking, and skilled labor like writers, designers, psychologists, doctors, teachers, etc. are likely to persist.

Jobs at risk of being replaced by AI and Robots

There are jobs that are at the highest risk for replacement by AI. Currently, the adoption of AI is reshaping various industries and job roles. Telemarketing is now witnessing the automation of tasks such as making calls and scheduling appointments through AI. Also, in the realm of bookkeeping, businesses are embracing AI for accounting processes, benefiting from efficient and secure systems. Compensation and Benefits Managers are turning to automated benefits systems to overcome challenges in global expansion, streamlining the delivery of benefits to large workforces. Meanwhile, receptionists are being replaced by AI-powered robots and chatbots capable of handling tasks such as answering queries and scheduling appointments. With advertising shifting online, the role of human salespeople is diminishing as social media platforms offer precise target marketing tools. AI is streamlining research and analysis tasks, performing data analysis more efficiently than humans. In computer support, AI-powered chatbots troubleshoot technical issues and provide customer support, minimizing the need for human intervention. AI-powered tools are revolutionizing proofreading tasks with high accuracy, reducing the need for human proofreaders.

In the field of transportation, autonomous vehicles and drones are transforming the courier industry, potentially replacing human couriers in the delivery process. In cargo and warehouse work, AI is automating loading and retrieval tasks, enhancing shipping capacity. Insurance underwriting is being transformed through automation, analyzing data to assess the viability of insurance applicants. Self-checkout stations in retail stores exemplify AI's impact on the retail sector, reducing the need for human-operated registers through cost-effective automation. Hard labor industries like manufacturing have also been using automation and robots for a long time now and hence manual labor is being replaced slowly. (World Economic Forum, 2023)

Jobs not at risk of being replaced by AI and Robots

While AI and robots have the potential to automate many tasks and create a wide range of jobs, certain types of jobs are less likely to be fully replaced by technology due to their unique human qualities, ethical considerations, or the complexity of their tasks (World Economic Forum, 2023). Several professions remain resilient to automation due to the intrinsic human skills they demand.

- Human Resources Managers, with their emphasis on interpersonal conflicts and contextual understanding, are expected to thrive as companies scale and require more robust HR structures.
- Sales Managers, relying on emotional intelligence and network-building, find security in roles demanding constant adaptation and human intelligence.
- Marketing Managers, Public Relations Managers, Public Speakers, and Entertainers all hinge on human-centric attributes like personal connection, charisma, and contextual understanding, making these roles resistant to automation.
- Chief Executives, with their leadership complexities, event planners with their organizational and troubleshooting skills, writers requiring creativity, and software developers with their intricate tasks, form a spectrum of professions challenging to automate, contributing to expected growth in their respective fields.
- Similarly, researchers, editors, graphic designers, musicians, lawyers, filmmakers, and artists all involve elements of creativity, critical thinking, and nuanced decision-making that AI struggles to fully replicate.

- Professions in emotional support and therapy, healthcare, education, journalism, culinary arts, skilled trades, and personal services also remain distinctly human-centric, relying on empathy, personalization, and hands-on expertise that artificial intelligence cannot easily replace.

These roles show the enduring significance of human skills in various domains, ensuring their resilience amidst technological advancements. These jobs are less likely to be fully automated due to the need for uniquely human qualities, including creativity, emotional intelligence, ethical judgment, and complex interpersonal skills. However, it's essential to note that even in these fields, technology may augment certain aspects of the work or complement human capabilities.

Jobs Created in the AI Revolution

The emergence of entire categories of new, uniquely human jobs is expected with the rise of AI and machine-learning systems (Mendes, 2023).

Role-based AI: New AI-specific job roles that can be created

As AI technology continues to advance and integrate into various industries, new job roles are expected to emerge with specific responsibilities. In the evolving landscape of artificial intelligence, several emerging roles are poised to become integral to various industries. Three new categories of AI-driven business and technology jobs have emerged: *trainers*, *explainers*, and *sustainers* (Mendes, 2023). Trainers teach AI systems how they should perform, while explainers help interpret how AI algorithms reach their decisions. Sustainers ensure that the work of machines is both effective and responsible — that it is fair, transparent, and auditable. (Wilson, 2017)

Trainers' role-based jobs

- The realm of finance will see the rise of *AI-powered financial analysts* proficient in analyzing data and making predictions using AI tools.
- The education sector is set to witness an increase in *AI Educationists* who can teach and develop AI-driven educational materials.
- *Specialists in AI Personalized Medicine Development* will be vital in tailoring medical treatments using AI algorithms.
- As robotics and AI converge, *AI Robotics Integration Specialists* will be essential in industries like manufacturing and healthcare.

Explainers' role-based jobs

- *AI Business Strategists* will play a crucial role in developing strategies for businesses to stay competitive and foster growth.
- In the healthcare sector, *AI Healthcare Diagnosticians* will interpret AI-driven diagnoses and provide essential patient care.
- The creative domain will see the emergence of AI-enhanced creatives, including *AI artists and creative content developers*.
- The finance sector will require *AI Financial Planners* capable of offering data-driven financial advice.

Sustainers' role-based jobs

- *AI Ethicists* will be in high demand to ensure the ethical use of AI and address bias.
- With the growing threat of AI-driven cyber threats, *AI Cybersecurity Experts* will be crucial in safeguarding organizations.

- As the focus shifts to sustainable energy solutions, *AI in Sustainable Energy Specialists* will play a pivotal role in AI-driven energy optimization. (Sekhon, 2023)

Task-based AI: Technical categories of AI that can create new job

Jobs in this category have existed for more than a decade. However, with the new wave from the introduction and adoption of the generative AI era in 2023, the importance of jobs in this category provides the direction of companies' strategic positions in the years of high inflation in 2024 and forward. Companies are now hiring more talent in the below job areas (Verma, 2023) while big layoffs in other departments.

- *Machine Learning Engineers* play a crucial role in designing, developing, and maintaining ML models and algorithms, contributing to the advancement of AI technologies.
- *Data Scientists* are essential in the ML landscape, focusing on data analysis and model development using ML techniques to derive meaningful insights from complex datasets.
- *Data Analysts* are increasingly considered vital contributors, responsible for collecting and interpreting data for ML applications, ensuring the quality and relevance of input information.
- *Deep Learning Researchers* specialize in creating and optimizing deep neural networks, addressing the growing demand for sophisticated applications of deep learning across various domains.
- *Computer Vision Engineers* concentrate on applications such as image and video recognition, leveraging deep learning techniques to enhance visual understanding.
- *AI Artisans* harness the power of Generative AI to create art, music, and creative content, contributing to the expanding industry of content creation and social media influence.
- *Content Generators* develop automated systems for content generation in diverse sectors like marketing, journalism, and entertainment, showcasing the versatility of generative AI applications.
- *Natural Language Processing (NLP) specialists* play a key role in language-related tasks, including the development of chatbots and sentiment analysis, recognizing the importance of understanding human emotional intelligence and sentiments.
- *Chatbot Developers* are in high demand, creating and maintaining conversational AI systems for customer service and virtual assistants as virtual assistants gain prominence in various industries.
- *NLP Researchers* contribute to the advancement of the NLP field, developing new algorithms and techniques to improve language processing capabilities.
- *Blockchain Developers* are sought after for their expertise in designing and maintaining blockchain platforms and decentralized applications (DApps), playing a crucial role in the evolution of blockchain technology.
- *Blockchain Analysts* ensure the security and integrity of blockchain networks, addressing the growing importance of safeguarding decentralized systems. Engineers specializing in blockchain contribute to the analysis of transaction data, particularly in the realm of cryptocurrency exchanges and wallets, showcasing the intersection of AI and blockchain technologies.

Industry-based AI: Industries where AI can boost job opportunities

In addition to the above categories, there are various industries where new jobs are emerging. Here are some examples of why those industries might need more people with knowledge of AI. All these examples below highlight how AI and robotics can create various job opportunities across different fields and industries. As technology continues to advance, new job roles will continue to emerge, and existing roles will evolve to incorporate AI and automation. (Mendes, 2023)

Software Engineering. Software Developers play a crucial role in designing and creating AI-driven solutions, such as machine learning algorithms and applications, contributing to automation across various industries. Simultaneously, DevOps Engineers are essential for deploying and maintaining AI systems, ensuring their smooth operation and continuous improvement.

Automotive Manufacturing. Robotics Engineers, for instance, design and develop robots for manufacturing processes, enhancing precision and efficiency. AI Integration Specialists play a vital role in ensuring the quality control and automation of manufacturing systems, thereby boosting productivity and product quality.

Banking and Finance. AI Risk Analysts assess financial risks using AI algorithms, aiding institutions in informed decision-making and risk management. Quantitative Analysts leverage AI for data-driven financial modeling, leading to accurate predictions and more effective investment strategies. The intersection of Blockchain and AI is a burgeoning field. Developers in this domain not only engage with blockchain technology but also apply AI to enhance the speed, security, and efficiency of cryptocurrency transactions, fortifying the financial ecosystem.

Healthcare. Medical AI Developers focus on creating AI applications for medical diagnosis, treatment planning, and drug discovery, contributing to more accurate and efficient healthcare solutions. Simultaneously, Telemedicine Support Staff assist in providing remote patient care using AI technologies, thereby expanding access to medical services.

Education. AI Educational Content Developers design adaptive learning materials that cater to individual student needs and learning styles, thereby enhancing the overall educational experience. EdTech Support Specialists are crucial for implementing and maintaining AI-based educational tools, contributing to improved accessibility and quality of education.

Marketing. Marketing analysts and data scientists leverage AI to analyze customer data, personalize campaigns, and improve targeting. Simultaneously, experts are essential for managing and optimizing AI-driven advertising platforms.

Agriculture. This sector is witnessing the integration of AI for enhanced efficiency. Precision Agriculture Technicians optimize crop yields with AI, while Agricultural Drone Operators monitor farms using AI-powered drones.

Retail. In this sector, AI is transforming operational and customer-facing roles. E-commerce AI Managers oversee recommendation systems, and Robotic Warehouse Operators manage logistics with AI-driven robots.

Energy and Utilities. Energy Grid AI Analysts optimize energy distribution and consumption using AI, and Robotics Maintenance Technicians ensure that AI-powered equipment functions properly.

Entertainment. In this field, AI is contributing to personalized and creative content. Data scientists and machine learning experts personalize the entertainment experience through content recommendations. Additionally, generative AI experts create tailored creative content, such as personalized music playlists, movie recommendations, and interactive storytelling, contributing to enhanced customer engagement.

Transportation. AI is optimizing networks and logistics, leading to the emergence of specialized roles such as Transportation Analysts and Autonomous Vehicle Technology Specialists who are crucial for the development and deployment of self-driving vehicles.

Environmental Sciences. This sector increasingly relies on AI for monitoring and conservation efforts, requiring the expertise of AI specialists. Supply Chain and Logistics are witnessing increased optimization through AI, necessitating roles such as Supply Chain Analysts and AI Logistics Experts.

Real Estate. This area is incorporating AI for property valuation and market analysis, leading to roles for Real Estate Data Analysts leveraging AI for accurate property assessments.

Hospitality. The adoption of AI-driven technologies such as chatbots and room booking systems necessitates the expertise of specialists for their implementation and management.

The AI Workforce Framework

Computing has influenced our lives since it was developed in the 1940s. Initially, its high speed and accuracy have boosted our processing power. Then, software development and adoption have improved our job task process refactoring. With the introduction of computer networking along with the invention of the Internet, it has expedited human and machine communication automation with online collective intelligence, aka Web 2.0. AI is driving the next wave in computing which will transform our current job framework. With the reviews from the previous sections, we are proposing the AI Workforce Framework in three categories; AI-driven skill set, AI-enabled jobs, and AI-supported business.

AI-Driven Skill Sets: Skills that could be in demand with AI

In an AI-generated future, where artificial intelligence and automation play an increasingly prominent role, several skills will be precious for individuals to thrive and remain competitive. These skills span a wide range of domains, including technical, interpersonal, and adaptability skills which will ensure landing a successful job along with job security.

In the evolving landscape of AI, individuals are expected to have a diverse set of skills which are identified below ([Goh Chiew Tong, 2023](#)). These skills will help individuals adapt to the changing landscape through AI and automation, ensuring that they can leverage technology to their advantage and remain competitive in the job market.

- Data literacy, encompassing the ability to collect, analyze, and interpret data, is foundational.
- Familiarity with AI and machine learning fundamentals is valuable across industries, even for those outside data science roles.
- Critical thinking and problem-solving skills remain crucial, especially when collaborating with AI systems.
- Adaptability and learning agility are vital in the face of rapid technological change.

- Emotional intelligence is essential, particularly in roles involving human-AI collaboration or customer service.
- Creativity, innovation, and effective communication skills are highly prized, as is the ability to understand and navigate ethical considerations in AI-driven contexts.
- Interdisciplinary knowledge and cultural competence are valuable for creating inclusive AI solutions.
- Skills in robotics, automation, legal understanding, healthcare, sustainability, personal branding, and entrepreneurship contribute to a well-rounded skill set for success in the AI-driven future.

AI-Enabled Jobs: Key Impacts of AI and Robots on Human Labor/Jobs

The integration of AI and robots into the labor force is a complex and evolving topic. While it can displace certain jobs, it also has the potential to create new opportunities and increase overall efficiency. Preparing the workforce with the right skills and addressing ethical and societal challenges are essential aspects of managing this transformation. The integration of AI and robots into various industries has implications for the workforce. While automation can displace workers from repetitive tasks, it enhances efficiency and productivity.

The shift creates new job opportunities, particularly in the development and management of AI systems. Workers need to adapt by acquiring skills in technology, data analysis, and problem-solving to remain competitive. Collaborative robots (cobots) are becoming prominent in industries like manufacturing, working alongside humans to enhance capabilities and safety. Automation affects routine jobs more than non-routine ones, emphasizing the importance of skills involving creativity and critical thinking.

The impact varies across industries, with healthcare benefiting from AI in diagnostics and manufacturing seeing automation in certain tasks. Ethical considerations such as job displacement, data privacy, and algorithmic bias require attention. There are societal concerns, including depopulation in areas heavily reliant on automatable industries.

Globally, countries differ in their approach to automation, with some investing in competitiveness and others concerned about job loss and economic inequality. Economic consequences include improved business efficiency but potential reductions in consumer purchasing power. Governments and organizations are developing policies and regulations to manage the workforce impact, support displaced workers, and ensure responsible AI deployment. The ongoing debate underscores the need for a balanced approach to harness the benefits of automation while addressing its societal challenges.

AI-Supported Business: What can Businesses do better with AI?

Businesses can prepare for the impact of AI on human jobs by making strategic decisions. To navigate the transformative impact of AI on the workforce, businesses are advised to take proactive measures. This includes prioritizing investment in reskilling and upskilling programs to equip employees with the skills demanded by the AI-driven economy, facilitating their adaptation to evolving roles. Furthermore, businesses should ensure the responsible deployment of AI, emphasizing transparency, explainability, and unbiased practices to build trust with employees and customers and mitigate potential negative societal impacts. Here are the recommendations for AI-supported businesses (Stanford HAI, 2020).

- Integrating collaborative robots (cobots) into the workforce is recommended, enhancing human capabilities, improving efficiency, and sustaining employment.
- Fostering a culture of innovation, encouraging experimentation, risk-taking, and continuous learning, enables businesses to stay competitive and adaptable.

- Collaboration with policymakers, labor unions, and other stakeholders is crucial to ensure the equitable distribution of AI benefits across society, minimizing the risk of job displacement.
- Businesses should also focus on roles that require distinctly human skills, such as judgment, creativity, physical dexterity, and emotional intelligence, which are less susceptible to full automation.
- Offering comprehensive job transition support programs, addressing data privacy and security concerns, and implementing employee retention strategies are vital components of a holistic approach.
- Engaging in long-term workforce planning to anticipate future skills requirements and challenges allows companies to proactively adapt to evolving demands, ensuring a resilient and future-ready workforce.

Conclusions

In conclusion, the evolving landscape of artificial intelligence (AI) and automation brings about a dual impact on employment – potential displacement of jobs and the creation of new opportunities. The positive societal benefits of AI, such as increased productivity, improved healthcare, and enhanced educational access, coexist with uncertainties about its effects on the workforce.

While ongoing debates surround AI's influence on employment, it is undeniable that AI will significantly shape the future of work. Furthermore, the nuanced nature of AI's impact becomes apparent when considering that it may not entirely replace certain jobs but rather augment them by automating specific tasks or providing new tools for professionals. It is expected that AI is unlikely to replace jobs requiring distinctly human skills, such as judgment, creativity, physical dexterity, and emotional intelligence (The World Economic Forum, 2023). The need for distinct human intervention in certain roles emphasizes the importance of developing skills that AI cannot replicate, fostering adaptability and ethical awareness. In essence, the increasing influence of AI and automation transforms the way we work and live, necessitating a combination of technical expertise and interpersonal skills.

Predictions are prevalent that roles in industries like agriculture, transportation, and education will experience significant growth. To successfully navigate the challenges and opportunities presented by AI, both businesses and individuals need to adopt responsible AI deployment. This involves cultivating a culture of innovation, prioritizing continuous learning, and investing in reskilling and upskilling initiatives. Therefore, collaboration with policymakers and stakeholders is essential to ensure a comprehensive approach to managing the impact of AI on employment.

This study emphasizes the significance of durable human skills, including complex communication and critical thinking, which are crucial for the future job market. To thrive in this AI-driven era, individuals should embrace lifelong learning, viewing AI as a complement to human capabilities rather than a replacement. By doing so, not only can individuals flourish in the evolving job market, but they can also contribute to the responsible and ethical development of AI technologies, ultimately benefiting society. The study's optimistic outlook underscores the transformative potential of AI and emphasizes the importance of effective skill development in this dynamic and evolving landscape. (Teigland, R., van der Zande, J., Teigland, K., & Siri, S, 2018)

References

Ai and cryptocurrency: A match made in heaven?. Can Artificial Intelligence Enhance the Crypto Market? (n.d.). <https://www.datacenters.com/news/ai-and-cryptocurrency-a-match-made-in->

World Economic Forum. (2023, May). Jobs AI can't replace.

<https://www.weforum.org/agenda/2023/05/jobs-ai-cant-replace/>

World Economic Forum. (2023, May). These are the jobs most likely to be lost – and created – because of

ai. <https://www.weforum.org/agenda/2023/05/jobs-lost-created-ai-gpt/>