Generative AI and Workforce Development in the Finance Sector

Policy Projections, Risk Mitigation, and Future Challenges in the U.S

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Foreword

The rapid evolution of Generative artificial intelligence is transforming financial risk management, regulatory frameworks, and decision-making processes. This book explores the intersection of Generative AI and Future of Workforce, presenting cutting-edge methodologies for enhancing financial models, optimizing risk assessment, and ensuring regulatory compliance in light of future workforce requirements.

This work is based on my Research Papers so if you want to read more technical stuff check out my papers.

Forward Looking Book

This book advances understanding and sensitize readers on Future of Workforce with Gen AI powered agents. This books helps you move ahead in the domain.

- ↪ Understand and Re-train the workforce Agentic World
- ↪ Understand Big Data, Models, other allied areas and how it impact the adoption of Agent Gen AI
- ↪ Get prepared to manage Gen AIied Agents

Yes, ChatGPT helped me a little (not a lot) to write this Book!

How did I write this book, yes AI helped me! This is what I asked CHATGPT:

I have a LaTeX chapter that I want expanded. The expansion should: Double the content while keeping it clear and simple. Use minisec instead of section for headings. Include a Chapter Objectives section at the beginning, listing 3–5 key objectives. Ensure the content aligns with the original chapter's topic, providing more depth without adding unnecessary complexity. Preserve consistency in tone and formatting. If I give you the PDF and the latex code can you do it.

Some References

The full code is uploaded on [1]. Also the videos of selected topic available on [5].

Next Version

In this edition I have no used any pictures, I will be releasing that in the next version!

1 The Transformative Role of Agentic GenAI in Shaping Workforce Development and Education in the U.S.

Chapter Objectives

- Analyze the impact of Generative AI on workforce development, education, and business management.
- Explore AI-driven reskilling initiatives and their role in transforming higher education and labor markets.
- Evaluate the ethical and societal implications of AI integration in workforce training and employment structures.
- Identify research gaps and propose future directions for AI adoption in workforce planning and educational systems.

This chapter presents a comprehensive review of Generative AI's (GenAI) role in reshaping workforce development and education in the United States. By examining recent studies, the analysis categorizes AI's influence on job markets, business intelligence, and institutional learning environments. The review further assesses measurable impacts and projections, addressing challenges such as skill displacement, ethical concerns, and

economic shifts.

Introduction

The rapid proliferation of Artificial Intelligence (AI) is driving transformative changes across workforce development, education, and industry. Generative AI, particularly Large Language Models (LLMs), has revolutionized training programs, automated routine tasks, and enhanced strategic decision-making in businesses. Understanding these shifts is essential for policymakers, educators, and industry leaders.

Recent literature highlights four core areas of AI influence: (1) workforce reskilling and labor market shifts, (2) AI-enhanced education and skills training, (3) business intelligence applications, and (4) ethical and societal implications. This chapter synthesizes key findings to offer insights into AI's evolving role in economic and professional landscapes.

AI-driven workforce development strategies are increasingly shaping employment trends. Studies suggest that AI enables personalized reskilling initiatives, optimizes hiring processes, and enhances labor productivity. Key contributions in this field include:

- **AI in HR and Training:** AI-driven tools facilitate customized employee training programs, bridging skill gaps and improving career adaptability.

- **Labor Market Shifts:** Automation is redefining job roles, with AI augmenting high-skilled positions while automating repetitive tasks.

- **Economic Productivity:** Research predicts a 20% increase in labor efficiency through AI integration by 2030.

Generative AI is transforming educational methodologies through adaptive learning, personalized tutoring, and curriculum enhancements. Key applications include:

- **Adaptive Learning Platforms:** AI-powered educational systems adjust to individual learning styles, improving student engagement and retention.

- **Curriculum Optimization:** AI assists in designing course content aligned with evolving industry demands.

- **AI-Driven Vocational Training:** Institutions leverage AI to equip students with job-relevant skills, fostering a future-ready workforce.

Businesses are harnessing AI for improved decision-making, risk management, and market analysis. Studies highlight the following advancements:

- **AI in Decision-Making:** AI-powered analytics enhance strategic planning and real-time business forecasting.

- **Workforce Optimization:** AI tools streamline recruitment, performance evaluation, and talent retention.

- **AI in Financial Markets:** Generative AI models assist in fraud detection, credit risk assessment, and market trend analysis.

Ethical and Societal Implications

The integration of AI into workforce and education systems raises ethical and societal concerns. Key issues include:

- **Bias and Fairness:** Ensuring AI-driven hiring and assessment models do not reinforce discriminatory biases.

- **Workforce Displacement:** Addressing the risk of job losses due to AI-driven automation through proactive reskilling initiatives.

- **Regulatory Compliance:** Establishing ethical AI governance frameworks to protect workers and students from algorithmic biases and privacy breaches.

To ensure a balanced transition into an AI-integrated workforce, future research should focus on:

- Developing robust AI-driven education policies to enhance workforce adaptability.

- Exploring AI-human collaboration strategies to optimize employment opportunities.

- Investigating long-term economic implications of AI-induced labor shifts.

Our analysis underscores AI's dual role as both a catalyst for innovation and a source of disruption in the labor market. While automation threatens to displace certain jobs, it simultaneously generates new career pathways and boosts overall productivity. The central challenge lies in ensuring that AI's advantages are equitably shared across different sectors and demographics.

Effective policy measures—such as industry-specific training programs and adaptive regulatory frameworks—are crucial for minimizing AI-related risks. However, these strategies must be grounded in data-driven insights and tailored to the unique demands of various industries and regions.

The widespread adoption of AI is unavoidable, yet its societal consequences can be actively shaped through forward-thinking policies and workforce readiness initiatives. Key interventions—including fiscal strategies, educational reforms, and targeted government actions—will be instrumental in harnessing AI for collective progress.

Building on our prior research, we have identified key areas for improvement, providing a foundation for further refinement and strategic implementation.

Artificial Intelligence (AI) is rapidly transforming various industries, including the legal and training sectors. The integration of AI in courts and training programs raises essential considerations regarding workforce displacement, ethical implications, and skill adaptation. This section reviews key literature sources addressing these challenges and outlines proposed topics for study.

Recent research highlights the impact of AI on employment and productivity. Studies discuss how AI can both disrupt and enhance workforce capabilities, with policymakers debating the necessity of new regulations to manage this shift. Furthermore, AI-driven automation and decision-making in legal systems are scrutinized for bias and fairness.

To address these concerns, several areas require further exploration in court and training programs.

The rapid advancement of Artificial Intelligence (AI), particularly generative AI, is poised to reshape the global economy and labor market. This literature review examines the projected impact of AI on employment, focusing on job displacement, transformation, and the associated economic implications.

Several studies suggest that AI will significantly alter the landscape of work, with estimates of job displacement varying. The World Economic Forum estimates that 85 million jobs could be replaced by AI by 2025, while Goldman Sachs projects a longer-term impact equivalent to 300 million full-time jobs. Low-wage workers face a disproportionate risk, being up to 14 times more likely to be displaced compared to high-wage earners. Specific sectors, such as visual effects and postproduction jobs in Hollywood, also face a significant threat. Other research emphasizes the transformative rather than purely destructive nature of AI's impact. It is suggested that AI will affect nearly 40% of jobs globally, with some being replaced and others complemented. AI could actually help rebuild the middle class by extending expertise to a wider range of workers. Similarly, several sources suggest that AI will reshape a much larger number of jobs than it eliminates, with estimates suggesting up to 90% of existing jobs could be affected. Some research notes a lack of dramatic trends in occupations considered vulnerable to AI and robotics according to BLS data.

Economic Implications and Policy Responses
The potential economic consequences of AI-driven job market changes are a subject of ongoing debate. The importance of fiscal policy is emphasized in broadening the gains of AI to humanity. The potential for increased inequality is discussed, with some arguing that careful policy interventions are needed to mitigate this risk. Unions are also seen as playing a role in protecting workers' rights and ensuring a voice in how AI is implemented in the workplace. The need for social safety nets to support workers during the transition is also highlighted.

Challenges and Future Directions
Several articles highlight the need for proactive strategies to navigate the changing job market. Workers should educate themselves about AI and assess its potential impact on their careers. The importance of education and training is also emphasized in preparing the workforce for the AI-driven economy. Furthermore, the ethical implications of AI in the workplace, including the potential for bias and discrimination, require careful consideration.

Policy and Mitigation Strategies
Given the potential for both disruption and benefit, proactive policy interventions are crucial. The need for companies to mitigate risks associated with AI misuse and skills gaps is highlighted. It is suggested that fiscal policy can help broaden the gains of AI

to humanity. The importance of building social safety nets to mitigate the impact on workers is emphasized. These strategies include investments in education and training, adjustments to social security programs, and regulatory frameworks that promote responsible AI adoption.

Future Projections and Anticipated Changes in the Labor Market

The integration of Artificial Intelligence (AI) and, more recently, generative AI, into various sectors of the economy is poised to induce substantial transformations in the labor market. While the precise nature and magnitude of these changes remain a subject of ongoing debate, a consensus is emerging that AI will reshape the employment landscape in significant ways. This section synthesizes projections from recent studies and reports, focusing on the anticipated impact of AI on job displacement, job creation, and the evolution of required skill sets.

Projected Job Displacement and Transformation

Several sources predict considerable job displacement due to AI-driven automation. Specific roles are identified as potentially at risk of obsolescence by 2030, while some research compiles statistics indicating the ongoing replacement of human tasks by AI. Furthermore, it is estimated that AI could affect approximately 40% of jobs globally, with some being replaced and others augmented. It is suggested that generative AI could impact a significant portion of existing jobs. Sectors like visual effects and post-production in Hollywood are already facing threats due to generative AI advancements. However, some data indicates a more gradual shift in vulnerable occupations.

Potential for Job Creation and Skill Evolution

Counterbalancing concerns about job displacement, some sources emphasize AI's potential to create new jobs and augment human capabilities. AI can extend expertise to a broader range of workers, potentially rebuilding the middle class. Generative AI can boost labor demand and productivity. The key lies in adapting to the changing demands and upskilling the workforce to work alongside AI. Individuals should educate themselves about AI and adapt to stay relevant in the evolving job market.

The Rise of Prompt Engineering and AI Agents

A critical skill emerging in the age of generative AI is prompt engineering. While not explicitly quantified in all sources, the ability to craft effective prompts to guide AI

models is becoming increasingly valuable. It is implicitly acknowledged that companies need to address skills gaps related to AI. The rise of AI agents, which automate tasks and workflows by leveraging generative AI, further underscores the importance of understanding how to interact with and manage these systems. There is currently not concrete data available that points to exact quantitative findings of a specific type of training materials or curriculums for Prompt engineering.

Skills for the AI-Enabled Workplace

Success in the AI-enabled workplace requires both technical and soft skills. Technical skills include programming and data analysis, while soft skills encompass critical thinking, problem-solving, and communication.

Conclusion

Generative AI is reshaping workforce development and education by enhancing skill training, improving business intelligence, and introducing new employment paradigms. While AI presents opportunities for efficiency and innovation, it also necessitates careful policy interventions to mitigate risks associated with job displacement and ethical concerns. Addressing these challenges will require collaborative efforts from governments, industries, and educational institutions to ensure an inclusive and equitable AI-driven future.

2 Advancing Innovation in Financial Stability: AI Agent Frameworks, Challenges, and Applications

- Explore AI agent frameworks and their impact on financial stability.

- Analyze key applications of AI agents in financial services.

- Discuss challenges, limitations, and ethical considerations in AI agent deployment.

- Identify future research directions and technological advancements in AI agent frameworks.

- Examine the transformative impact of Generative AI (GenAI) and Agentic AI in the financial services industry.

- Analyze AI-driven workforce training programs and their role in upskilling professionals.

- Assess the challenges and opportunities AI presents for workforce transformation.

- Explore policy interventions to support AI-driven workforce adaptation.

Artificial Intelligence (AI) agents are transforming financial services by enabling autonomous decision-making and task execution. These agents leverage machine learning (ML), natural language processing (NLP), and multi-agent collaboration to optimize trading, risk assessment, and investment analysis. This chapter provides an in-depth review of AI agent frameworks, highlighting their applications and challenges within financial markets. The rapid advancement of artificial intelligence (AI), particularly Generative AI (GenAI), is transforming industries, including financial services. AI-driven automation is reshaping how financial institutions operate, enhancing productivity, improving customer interactions, and streamlining risk management processes. However, this transition requires a well-trained workforce equipped with AI-related skills.

Studies indicate that by 2027, 80% of the engineering workforce will require AI-related upskilling. The financial sector, in particular, is experiencing significant productivity gains through AI adoption. This chapter explores the role of AI in workforce training, the challenges faced by employees and institutions, and strategies to bridge the AI skills gap in financial services.

Various frameworks support AI agent development, each with distinct features:

- **LangChain:** LLM integration with agent orchestration capabilities.

- **CrewAI:** Focuses on collaborative multi-agent environments.

- **AutoGen:** Designed for scalable multi-agent AI systems.

- **IBM Watsonx.ai:** Enterprise-grade AI framework tailored for financial applications.

- **Llama-Agents:** Optimized for knowledge retrieval in financial decision-making.

These frameworks facilitate AI-driven automation in finance, enhancing operational efficiency and decision-making.

AI agents play a crucial role in various financial applications:

- **Investment Analysis:** AI agents analyze market data to provide real-time insights and optimize portfolios.

- **Risk Management:** AI models predict financial risks by analyzing large datasets.

- **Fraud Detection:** AI-driven algorithms identify fraudulent transactions using pattern recognition techniques.

- **Algorithmic Trading:** Multi-agent models enhance trading strategies and execution efficiency.

Challenges and Future Directions

Despite their benefits, AI agents face challenges:

- **Regulatory Compliance:** Ensuring adherence to financial regulations and ethical guidelines.

- **Transparency and Explainability:** Addressing the "black-box" nature of AI models.

- **Computational Scalability:** Managing large-scale AI agent deployment.

Future research should focus on developing robust frameworks, improving agent interpretability, and integrating AI-human collaboration strategies.

Conclusion

AI agent frameworks are revolutionizing financial markets, offering innovative solutions for risk assessment, investment analysis, and fraud detection. While significant challenges remain, ongoing advancements in AI agent architectures and regulatory compliance will shape the future of AI-driven financial stability.

Chapter Objectives

This chapter reviews the role of Generative AI (GenAI) and Agentic AI in workforce training within the financial services sector. It evaluates the impact of AI on workforce

reskilling, the integration of AI tools in financial operations, and the economic implications of automation. Key trends in AI-driven training programs, workforce optimization, and industry readiness are explored.

Generative AI in Workforce Training

AI-powered workforce training programs are crucial for financial professionals to adapt to the evolving technological landscape. Key developments include:

- **AI-Powered Training Platforms:** Institutions are implementing AI-based learning systems to personalize employee training and improve retention.

- **Upskilling Initiatives:** AI is enabling targeted upskilling programs for professionals, ensuring they stay competitive in an AI-driven economy.

- **AI for Risk Management:** Advanced AI models assist in fraud detection, compliance monitoring, and credit risk assessment.

Despite its benefits, the integration of AI in workforce development presents several challenges:

- **Digital Divide:** The rapid adoption of AI may leave certain demographics behind, particularly older professionals lacking digital literacy.

- **Ethical Concerns:** AI-driven decision-making in hiring and performance evaluation raises fairness and transparency issues.

- **Policy and Regulation:** Governments and regulatory bodies must establish guidelines to ensure ethical AI deployment in workforce training.

AI's Impact on Financial Services

Financial institutions are leveraging AI to optimize various aspects of banking and investment services. Examples include:

- **AI in Banking:** Automated customer service, enhanced fraud detection, and AI-driven market analysis are becoming standard.

- **Retrieval-Augmented Generation (RAG) Models:** These AI models are improving compliance processes and financial decision-making.

- **AI-Powered Financial Advisors:** AI-driven analytics are transforming investment management and personalized financial planning.

Policy Recommendations for AI Workforce Development

To ensure a smooth AI-driven workforce transition, policymakers and institutions must consider the following strategies:

Investment in AI Education: Expanding AI-related curricula in universities and financial training programs. Public-Private Partnerships: Collaboration between financial institutions, academia, and policymakers to create robust AI workforce training initiatives. Regulatory Frameworks: Establishing AI ethics guidelines to ensure fairness in AI-driven hiring and training systems.

Conclusion

Generative AI is revolutionizing workforce training in financial services by enhancing skill development, optimizing banking operations, and improving customer interactions. However, challenges such as digital literacy gaps, ethical concerns, and regulatory considerations must be addressed. A collaborative approach between governments, businesses, and educators is essential to ensure equitable AI workforce adaptation and long-term sustainability. As AI continues to evolve, proactive workforce training initiatives will be crucial in bridging the AI skills gap and fostering economic resilience.

3 Quantitative Findings on Generative AIs Impact on Workforce and Economic Disruptions, with Proposals for Remediation

Chapter Objectives

- Examine the effects of Generative AI (GenAI) on job displacement, economic growth, and workplace productivity.
- Analyze policy interventions and workforce training initiatives aimed at mitigating AI-induced economic disruptions.
- Assess AI's role as both a disruptor and an enabler in reshaping employment structures.
- Explore future directions for AI workforce adaptation and ethical regulatory frameworks.

This chapter provides an in-depth analysis of how AI is transforming labor markets, presenting both risks and opportunities. We explore empirical data on job losses, workforce reskilling needs, and AI-driven economic shifts. Furthermore, we propose strategies for policymakers, businesses, and workers to ensure equitable AI adoption.

Introduction

The widespread adoption of AI is driving significant changes in the labor market. AI automation enhances efficiency while simultaneously disrupting traditional employment patterns. This chapter examines these trends by reviewing the latest findings on AI-driven job displacement and economic restructuring.

Recent studies indicate that generative AI could impact up to 90% of existing jobs while also generating new employment opportunities. Research suggests that low-wage workers face a 14-fold higher risk of job displacement than high-wage professionals. Consequently, targeted upskilling initiatives and social safety nets are crucial for navigating this transformation.

AI's integration into workplaces has produced mixed effects, acting as both a force for innovation and a disruptor. Key labor market transformations include:

- **Job Displacement:** AI is replacing routine-based roles, especially in low-wage sectors.

- **Workforce Reskilling:** Upskilling programs are necessary to help workers transition into AI-assisted roles.

- **Productivity Enhancements:** AI-driven tools boost efficiency, allowing employees to focus on higher-value tasks.

Challenges in AI Workforce Integration

Despite its potential benefits, AI adoption poses several risks and challenges:

- **Economic Inequality:** The automation of low-skill jobs could exacerbate wage disparities.

- **Algorithmic Bias:** AI-driven hiring and performance evaluation raise fairness concerns.

- **Regulatory Gaps:** Policies must evolve to ensure responsible AI deployment across industries.

To address workforce disruptions and maximize AI's benefits, we propose the following measures:

- **Targeted Reskilling Initiatives:** Training programs should focus on AI literacy and industry-specific applications.

- **AI-Ethics Regulations:** Establishing guidelines for fairness, transparency, and bias reduction in AI adoption.

- **Public-Private Collaboration:** Governments and businesses must work together to create adaptive workforce policies.

Future Projections and Workforce Adaptation

Looking ahead, AI is expected to play an even greater role in workforce transformation. Anticipated developments include:

- Expansion of AI-powered roles across multiple industries.

- Growing reliance on AI-human collaboration for decision-making.

- Increased regulatory oversight to ensure ethical AI practices.

Conclusion

Generative AI is reshaping workforce dynamics, creating both challenges and opportunities. While job displacement remains a concern, proactive workforce policies, reskilling programs, and ethical AI regulations can help mitigate negative impacts. A balanced approach—incorporating government intervention, corporate responsibility, and worker adaptability—is key to navigating the future AI-driven labor economy.

4 Comparison of Open Platform ChatGPT, Gemini, Perplexity, Copilot, Open Seek

Generative AI (GenAI) models are evolving rapidly, offering unique capabilities across different platforms. Among the most recognized AI assistants, ChatGPT, Gemini, Perplexity, Copilot, and Open Seek each provide specialized functionalities tailored to distinct user needs. This chapter explores the comparative strengths, weaknesses, and applications of these tools to help businesses, educators, and developers make informed decisions.

Each AI model has been developed with different objectives in mind. Below, we examine key differentiators:

- **ChatGPT:** Developed by OpenAI, it excels in conversational AI, creative writing, and problem-solving. It is widely used for content generation, customer support, and education.

- **Gemini:** Created by Google, Gemini is a multimodal AI system capable of processing text, images, and other media, making it a versatile tool for research and creative tasks .

- **Perplexity:** Known for its focus on high-accuracy, research-driven responses, Perplexity AI is optimized for answering complex queries with greater factual reliability.

- **Copilot:** A Microsoft-backed AI assistant, Copilot is integrated into software development environments, enhancing coding efficiency and automation .

- **Open Seek:** This emerging AI model focuses on open-source collaboration, allowing for flexible integration into various research and industry applications.

The effectiveness of each AI tool varies depending on use case requirements:

For tasks involving customer support, chatbot applications, and creative writing, ChatGPT and Gemini are the top performers. ChatGPT's ability to generate human-like text is ideal for engaging conversations, while Gemini's multimodal capabilities extend its applications to visual content creation.

Copilot leads in coding environments, offering real-time code suggestions, debugging support, and seamless integration with IDEs like Visual Studio Code. Developers benefit from its ability to enhance productivity and reduce repetitive coding tasks.

Perplexity AI is designed to optimize accuracy in research-driven responses. It is preferred by professionals seeking reliable, well-referenced information. Its accuracy and credibility surpass other models in the domain of academic and technical research.

Open Seek promotes transparency and customizability, making it an attractive choice for organizations looking to deploy AI within proprietary systems. Its open-source nature allows enterprises to tailor functionalities to specific business needs.

While these AI models offer significant advancements, ethical concerns remain regarding bias, misinformation, and data security. Research emphasizes the need for responsible AI deployment and continuous refinement of these technologies.

The comparison of ChatGPT, Gemini, Perplexity, Copilot, and Open Seek illustrates the diverse applications of Generative AI. Selecting the appropriate model depends on specific user requirements, whether it be for conversational AI, software development, research accuracy, or enterprise integration. Future advancements will likely focus on improving accuracy, reducing biases, and enhancing user experience across platforms.

5 AI Agent Frameworks: Architectures, Applications, and Challenges in Financial Stability

The financial landscape is undergoing a profound transformation driven by the rapid advancement of Artificial Intelligence (AI), particularly in the realm of AI agents. These autonomous entities, powered by sophisticated algorithms and large language models (LLMs), are capable of perceiving their environment, making decisions, and executing actions with minimal human intervention. This chapter provides a comprehensive exploration of AI agent frameworks, focusing on their architectures, applications, and the unique challenges they present in the context of financial stability. As financial institutions increasingly adopt AI agents to automate complex tasks, enhance decision-making, and improve overall efficiency, a deep understanding of these frameworks becomes crucial for researchers, practitioners, and policymakers alike. This chapter aims to provide that understanding, offering a detailed overview of the current state-of-the-art and future directions in AI agent development within the financial sector.

Before delving into specific frameworks, it is essential to establish a clear understanding of the core concepts. An *AI agent* can be defined as an autonomous entity that perceives its environment through sensors, processes information, and acts upon that environment through effectors to achieve specific goals. These agents can range from simple rule-based systems to complex LLM-powered entities capable of reasoning, planning, and learning.

An *AI agent framework*, on the other hand, provides the infrastructure, tools, and abstractions necessary to build, deploy, and manage AI agents. These frameworks typically include components for:

- **Agent Orchestration:** Managing the interactions and coordination of multiple agents within a system.

- **State Management:** Tracking the agent's internal state and its understanding of the external environment.

- **Tool Integration:** Connecting agents to external tools, APIs, and data sources to expand their capabilities.

- **Scalability and Deployment:** Facilitating the deployment of agents in real-world applications, ensuring they can handle increasing workloads and complex scenarios.

The choice of an appropriate framework depends on the specific requirements of the application, the complexity of the tasks, and the desired level of autonomy.

Several frameworks have emerged as leaders in the AI agent development space, each with its own strengths and weaknesses. This section provides a comparative analysis of some of the most prominent frameworks:

LangChain: The Versatile Toolkit for LLM-Powered Agents

LangChain is a comprehensive framework designed to simplify the development of applications powered by large language models (LLMs). It provides a wide range of tools and abstractions for building AI agents that can interact with various data sources, APIs, and other external resources. Key features of LangChain include:

- **Chains:** Composable sequences of calls to LLMs or other utilities. This allows developers to create complex workflows by chaining together different operations.

- **Agents:** Autonomous entities that use LLMs to decide which actions to take. LangChain provides various agent types and tools for agent orchestration.

- **Memory:** Mechanisms for agents to remember past interactions and use that information to inform future decisions.

- **Integrations:** A vast ecosystem of integrations with various data sources, APIs, and tools, making it easy to connect agents to real-world data.

LangChain is particularly well-suited for applications that require complex reasoning, planning, and interaction with external environments. It is a popular choice for building chatbots, virtual assistants, and other AI-powered applications.

CrewAI: Fostering Collaboration Among Autonomous Agents

CrewAI is a framework specifically designed for building collaborative AI agent systems. It focuses on enabling teams of agents to work together to solve complex problems, leveraging their individual strengths and expertise. Key features of CrewAI include:

- **Agent Roles:** The ability to define specific roles and responsibilities for each agent within a crew.

- **Task Delegation:** Mechanisms for delegating tasks to agents based on their skills and expertise.

- **Collaboration and Communication:** Tools for facilitating communication and collaboration between agents, allowing them to share information and coordinate their actions.

- **Dynamic Task Execution:** Support for dynamic task execution, where the tasks performed by agents can change based on the current state of the environment and the progress of the overall project.

CrewAI is ideal for applications that require complex problem-solving and collaboration, such as financial analysis, risk management, and fraud detection.

AutoGen: Enabling Multi-Agent Conversations and Workflows

AutoGen is a framework that focuses on enabling multi-agent conversations and workflows. It provides tools for defining agent roles, specifying interaction protocols, and managing the flow of information between agents. Key features of AutoGen include:

- **Conversational Agents:** Support for building agents that can engage in natural language conversations with each other and with humans.

- **Workflow Management:** Tools for defining and managing complex workflows involving multiple agents.

- **Role-Playing:** The ability to assign different roles and personalities to agents, influencing their behavior and interactions.

- **Code Generation and Execution:** Support for agents that can generate and execute code, allowing them to perform complex tasks and interact with external systems.

AutoGen is well-suited for applications that require complex interactions and coordination between agents, such as software development, scientific research, and financial modeling.

Semantic Kernel: Microsoft's Approach to AI Agent Integration

Semantic Kernel is a framework developed by Microsoft that aims to simplify the integration of AI agents into existing applications and workflows. It provides a set of tools and APIs for connecting agents to various services and data sources, as well as for defining agent skills and capabilities. Key features of Semantic Kernel include:

- **Skills Marketplace:** A collection of pre-built skills that can be easily integrated into AI agents.

- **Connector Architecture:** A flexible architecture for connecting agents to various services and data sources, including cloud services, databases, and APIs.

- **Planners:** Tools for enabling agents to plan and execute complex tasks by chaining together different skills.

- **Integration with Microsoft Ecosystem:** Seamless integration with other Microsoft technologies, such as Azure AI services and Power Platform.

Semantic Kernel is a good choice for organizations that are already heavily invested in the Microsoft ecosystem and want to leverage AI agents to enhance their existing applications.

AI agent frameworks are finding increasing applications in the financial sector, particularly in areas related to financial stability. These applications leverage the capabilities of AI agents to automate tasks, improve decision-making, and enhance risk management. Some key application areas include:

Risk Assessment and Management
AI agents can be used to analyze vast amounts of financial data, identify potential risks, and develop strategies for mitigating those risks. This includes:

- **Credit Risk Assessment:** Analyzing credit applications and predicting the likelihood of default.

- **Market Risk Management:** Monitoring market trends and identifying potential sources of instability.

- **Operational Risk Management:** Identifying and mitigating risks associated with internal processes and systems.

Fraud Detection and Prevention
AI agents can be used to detect and prevent fraudulent activities by analyzing transaction patterns, identifying suspicious behavior, and alerting authorities. This includes:

- **Transaction Monitoring:** Monitoring financial transactions in real-time to identify fraudulent activity.

- **Identity Verification:** Verifying the identity of customers to prevent identity theft and fraud.

- **Compliance Monitoring:** Ensuring compliance with anti-money laundering (AML) and other regulatory requirements.

Algorithmic Trading and Portfolio Optimization

AI agents can be used to automate trading strategies, optimize portfolios, and improve investment performance. This includes:

- **High-Frequency Trading:** Executing trades at very high speeds based on market data and algorithmic strategies.

- **Portfolio Rebalancing:** Automatically adjusting portfolio allocations to maintain desired risk and return profiles.

- **Investment Recommendation:** Providing personalized investment recommendations to clients based on their risk tolerance and financial goals.

Despite the significant potential of AI agent frameworks in financial stability, several challenges remain:

Data Quality and Availability

AI agents rely on high-quality, accurate, and complete data to make informed decisions. However, financial data is often noisy, inconsistent, and incomplete, which can affect the performance of AI agents. Ensuring data quality and availability is a critical challenge.

Explainability and Transparency

Financial institutions need to understand how AI agents are making decisions. This requires developing AI agents that are explainable and transparent, allowing users to understand the reasoning behind their actions. Black-box models are often difficult to trust in high-stakes financial applications.

Regulatory Compliance

The use of AI agents in finance is subject to regulatory scrutiny. Financial institutions need to ensure that their AI agents comply with relevant regulations and guidelines, such as those related to data privacy, consumer protection, and anti-money laundering.

Ethical Considerations

AI agents can perpetuate existing biases in data, leading to unfair or discriminatory outcomes. Ensuring that AI agents are fair, unbiased, and ethical is a critical concern.

Future Research Directions

Future research should focus on addressing these challenges and exploring new opportunities for AI agent development in financial stability. Key areas for future research include:

- **Developing more robust and explainable AI models.**

- **Improving data quality and availability.**

- **Addressing regulatory and ethical concerns.**

- **Exploring new applications of AI agents in financial stability.**

- **Investigating the use of multi-agent systems and federated learning to improve the performance and scalability of AI agents.**

AI agent frameworks are poised to play a transformative role in shaping the future of financial stability. By automating complex tasks, improving decision-making, and enhancing risk management, AI agents offer the potential to create a more efficient, resilient, and equitable financial system. However, realizing this potential requires addressing the challenges related to data quality, explainability, regulatory compliance, and ethical considerations. By fostering collaboration between researchers, practitioners, and policymakers, we can ensure that AI agent technologies are developed and deployed responsibly, paving the way for a more stable and prosperous financial future.

6 Emerging Frontiers in AI: Retraining the U.S. Workforce in the Age of Agentic Generative AI

Chapter Objectives

- Explore novel AI-driven employment paradigms beyond traditional automation.
- Investigate the intersection of AI and entrepreneurship, focusing on new business models.
- Examine the psychological and social impacts of AI integration in the workplace.
- Assess the role of AI in shaping future leadership and corporate decision-making.

Introduction

As AI technology evolves, its influence extends beyond conventional automation, creating entirely new paradigms in employment, business innovation, and workforce dynamics. This chapter investigates these emerging trends and their implications for future work structures. The rapid integration of Generative AI (GenAI) into business operations is reshaping job roles, requiring continuous workforce upskilling to maintain productivity and competitiveness. In the U.S., industries ranging from finance to healthcare are experiencing shifts in labor demand, with AI-driven automation both augmenting existing jobs and displacing routine tasks. Training initiatives focused on AI literacy, prompt engineering, and adaptive learning have become essential in ensuring workforce resilience. This chapter examines the strategies and programs aimed at equipping employees with GenAI-related competencies, emphasizing the role of education, government

policies, and industry-driven initiatives.

To bridge the skills gap and prepare workers for an AI-centric economy, targeted training approaches are needed:

Many sectors are investing in AI education tailored to job-specific needs:

- **Finance:** AI-powered risk assessment and fraud detection require specialized training programs [**?**]

- **Healthcare:** Generative AI enhances diagnostics, necessitating training for medical professionals in AI-assisted decision-making .

- **Legal and Compliance:** AI-driven contract analysis and legal research call for new skill development .

As AI systems rely on well-structured inputs to function optimally, mastering prompt engineering has emerged as a crucial skill. Training programs focusing on:

- Crafting precise prompts to optimize AI-generated responses.

- Understanding AI model biases and limitations.

- Applying AI-generated insights for data-driven decision-making.

Governments and corporations are increasingly collaborating to build AI training ecosystems:

- **Federal AI Upskilling Initiatives:** Programs designed to provide free or subsidized AI training to workers .

- **Corporate AI Academies:** Tech giants such as Microsoft and Google are investing in workforce development to create AI-proficient employees.

- **University-Led AI Certifications:** Higher education institutions are introducing AI literacy programs to bridge the skills gap.

AI is not only transforming existing jobs but also generating unprecedented entrepreneurial opportunities. Key trends include:

- **AI-Powered Startups:** The rise of AI-driven businesses leveraging machine learning to provide automated solutions in finance, healthcare, and customer service.

- **On-Demand AI Services:** Freelance AI consultants and developers are reshaping the gig economy, providing expertise on AI deployment and strategy.

- **Decentralized AI Innovation:** Blockchain and AI integration is enabling secure, decentralized business models that challenge traditional corporate structures.

Psychological and Social Impact of AI in the Workplace

The integration of AI into professional environments raises critical psychological and social considerations:

- **Workplace Identity Shifts:** Employees increasingly transition from executional roles to AI-supervised decision-making positions.

- **Mental Health Considerations:** Automation-related job insecurity contributes to stress and anxiety, requiring proactive mental health strategies.

- **Collaborative AI Dynamics:** Organizations are fostering human-AI partnerships, requiring new frameworks for trust and transparency.

AI in Leadership and Corporate Decision-Making

Future leadership will be profoundly shaped by AI-driven insights. Notable developments include:

- **AI-Augmented Decision Making:** Executives increasingly rely on AI analytics to enhance strategic choices.

- **Adaptive Leadership Models:** AI-driven performance tracking influences leadership approaches to talent management.

- **Ethical AI Governance:** Leaders must navigate AI ethics, ensuring responsible corporate AI deployment.

Despite the potential of AI training programs, several challenges remain:

- **Accessibility and Inclusion:** Ensuring that AI education reaches diverse socio-economic groups.

- **Job Transition Support:** Helping displaced workers shift to AI-augmented roles.

- **Ethical and Regulatory Concerns:** Addressing biases and ensuring AI is deployed responsibly.

Conclusion

AI's impact on employment extends beyond job automation, ushering in new economic opportunities, social dynamics, and leadership paradigms. Organizations and individuals must adapt to these evolving trends to harness AI's full potential responsibly and effectively. As AI reshapes industries, workforce retraining efforts are critical for economic sustainability. By implementing robust training programs, fostering public-private collaborations, and prioritizing AI literacy, the U.S. can build a resilient workforce equipped to thrive in an AI-driven future. Future research should explore adaptive learning models and continuous education strategies to keep pace with AI advancements.

7 Prompt Engineering: Retraining the US Workforce in the Age of Generative AI

Chapter Objectives

- Understand the impact of Generative AI (GenAI) on workforce transformation.
- Explore the role of prompt engineering in upskilling employees.
- Discuss strategies for workforce retention through AI-driven training programs.
- Examine best practices for prompt engineering across different industries.
- Identify key challenges and future directions in prompt engineering for workforce training.
- Define the role of Agentic Generative AI in reshaping workforce skills and employment landscapes.
- Explore the necessity of retraining and upskilling initiatives to maintain a competitive labor market.
- Analyze the impact of prompt engineering as a critical competency for AI-driven industries.
- Propose strategies for integrating AI-focused education into traditional and vocational training programs.

The rapid integration of artificial intelligence (AI) across industries is reshaping the job market, raising concerns about job displacement and workforce adaptability. However, strategic upskilling—particularly through prompt engineering and AI literacy—presents a viable solution for equipping employees with future-ready skills. Organizations must invest in training initiatives that enable workers to collaborate effectively with AI systems rather than be replaced by them.

The rise of Agentic Generative AI is rapidly altering workforce dynamics, demanding new skill sets and adaptive learning methodologies. Traditional job roles are evolving, requiring a shift in training paradigms to accommodate AI-augmented workflows. This chapter investigates the transformation of workforce education, emphasizing the importance of retraining and upskilling initiatives tailored to AI integration.

Prompt engineering has emerged as a fundamental skill in leveraging AI's capabilities across various industries. It involves crafting precise inputs to optimize AI-generated outputs, influencing productivity and decision-making processes. Key aspects include:

- **Technical Mastery:** Understanding AI model behaviors and prompt structuring.

- **Application Diversity:** Utilization in finance, healthcare, customer service, and software development.

- **Continuous Learning:** Adapting to evolving AI capabilities and prompt optimization techniques.

Upskilling and Retraining Strategies for the AI Era

A successful workforce transition requires targeted education initiatives. Recommended strategies include:

- **Industry-Specific AI Training:** Customized programs for different sectors to integrate AI effectively.

- **Public-Private Partnerships:** Collaborative efforts between governments, academic institutions, and corporations.

- **Micro-Credentialing and Certifications:** Offering specialized short-term training programs for AI literacy.

To ensure long-term workforce resilience, AI-focused curricula should be embedded into:

- **Higher Education Institutions:** Universities incorporating AI literacy as a core component.

- **Technical and Vocational Schools:** Hands-on training in AI-assisted roles and digital tools.

- **Corporate Learning Platforms:** Continuous professional development programs for employees.

Prompt engineering has emerged as a key skill in the GenAI era, allowing professionals to optimize interactions with large language models (LLMs) for various applications. By mastering prompt construction, employees can enhance productivity, automate repetitive tasks, and improve decision-making processes. Industries such as finance, healthcare, and education are actively integrating prompt engineering into their operational frameworks.

Prompt engineering involves crafting precise and structured inputs to elicit desired responses from AI models. This skill enables professionals to:

- Improve AI model accuracy and reliability.

- Customize AI-generated content for industry-specific needs.

- Reduce errors and mitigate biases in AI outputs.

- Enhance automation and workflow efficiencies.

Mastering these fundamentals ensures that AI tools are leveraged effectively across different job roles.

Numerous educational institutions and corporate training programs have begun offering specialized courses in AI and prompt engineering. These programs range from self-paced online courses to structured executive education programs. The growing demand for these skills underscores their importance in maintaining a competitive workforce. Key topics covered in these training programs include:

- Basics of large language models and their applications.

- Advanced prompting techniques such as few-shot learning and chain-of-thought prompting.

- Domain-specific prompt engineering strategies for industries like finance and healthcare.

- Ethical considerations in prompt engineering.

Different industries are leveraging prompt engineering in unique ways:

- **Finance:** Automated risk analysis, fraud detection, and enhanced customer interactions.

- **Healthcare:** Assisting in diagnosis, summarizing medical records, and improving patient communication.

- **Legal Sector:** Streamlining legal document review, contract analysis, and compliance automation.

- **Education:** Personalized learning experiences, AI-driven tutoring, and content generation for coursework.

- **Customer Service:** Chatbot optimization, sentiment analysis, and real-time query resolution.

To maximize the effectiveness of AI-driven workforce training, the following best practices should be adopted:

1. **Precision and Clarity:** Prompts should be specific and clearly define the expected outcome.

2. **Contextual Awareness:** Providing relevant background information improves response accuracy.

3. **Iterative Refinement:** Adjusting prompts based on model responses ensures continuous improvement.

4. **Bias Mitigation:** Designing prompts to reduce unintended biases in AI-generated content.

5. **Industry-Specific Customization:** Tailoring prompts to fit the unique requirements of different fields.

Ethical and Societal Implications

The rise of AI-driven automation presents ethical challenges, particularly regarding job displacement and bias in AI models. Ensuring fair and inclusive AI training programs is essential for minimizing workforce disruption. Moreover, transparency in AI decision-making processes must be prioritized to maintain trust between humans and AI systems.

Future of Prompt Engineering in Workforce Training

As AI technology advances, prompt engineering will play an even more crucial role in workforce training and development. Future trends in prompt engineering include:

- **Automated Prompt Generation:** AI-driven tools to refine and optimize prompts with minimal human intervention.

- **Multimodal Prompting:** Combining text, image, and voice inputs to enhance AI capabilities.

- **Real-time Adaptive Learning:** AI systems that adjust training content dynamically based on user interactions.

- **Enhanced Collaboration Between AI and Human Workers:** Creating hybrid workflows where AI augments human decision-making.

Conclusion

As AI continues to transform industries, proactive workforce development is imperative. Upskilling initiatives, particularly in prompt engineering and AI literacy, will equip professionals with the tools needed to thrive in an AI-driven economy. A collaborative approach, incorporating academia, industry, and policymakers, is essential to ensure an adaptive and competitive labor market.

As AI continues to evolve, workforce retraining and upskilling will be critical in ensuring job security and economic resilience. By embracing AI education and prompt engineering, businesses can empower employees to harness AI's potential rather than be displaced by it. Organizations that invest in continuous learning and adaptation will be best positioned to thrive in the GenAI era. The ability to craft effective prompts will become a defining skill for professionals across all industries, solidifying prompt engineering as an indispensable component of modern workforce development.

Afterword

The full code is uploaded on [1]. Also the videos of selected topic availabel on [5].

Key Contributions of Generative AI
Below are summaries of my papers.

1. **Predictive Analytics:** Joshi (2025) highlights the effectiveness of Generative AI in predicting market disruptions and credit defaults with higher accuracy [2].

2. **Fraud Detection:** Variational Autoencoders (VAEs) and Generative Adversarial Networks (GANs) have proven highly effective in identifying anomalous patterns and fraudulent activities in financial systems [4].

3. **Synthetic Data Generation:** The ability to generate high-quality synthetic datasets has been instrumental in stress testing and scenario analysis, as described by Joshi (2025) [3].

4. **Regulatory Alignment:** Generative AI models automate compliance processes and adapt dynamically to new regulatory requirements [3].

5. **Big Data Utilization:** The vast scale of financial data is processed more efficiently using Generative AI, making it possible to extract actionable insights [3].

Case Studies and Practical Applications
Generative AI has been successfully applied in several financial scenarios:

- Joshi (2025) examines how synthetic data generated by Generative AI is used for risk simulations and testing in his study on the synergy of Generative AI and Big Data [2].

- Another study explores the robustness of Generative AI in addressing vulnerabilities in the U.S. financial regulatory system, ensuring resilience against market shocks [3].

- Joshi (2025) also reviews state-of-the-art Generative AI models, such as GANs and VAEs, and their application in financial forecasting [4].

- His GitHub repository [1] provides practical implementation examples for these models, enabling researchers and practitioners to replicate experiments.

- The YouTube channel [5] complements these studies by offering accessible tutorials on financial applications of Generative AI.

The role of Generative AI in financial risk management has been explored extensively in recent studies. Joshi [2] highlights the synergy between Generative AI and big data, emphasizing its potential in financial risk assessment. Similarly, research in [3] examines how AI-driven frameworks can enhance the robustness of the U.S. financial and regulatory system.

A detailed review of generative AI models in financial risk management is provided in [4], where various deep learning techniques, including Variational Autoencoders (VAEs) and Generative Adversarial Networks (GANs), are analyzed for their effectiveness. Further applications in financial risk prediction are demonstrated in [7], showcasing the integration of AI in improving forecasting accuracy.

Beyond financial applications, generative AI is also transforming broader economic and technological domains. In [6], Joshi discusses the development of new AI-driven financial models that can predict market fluctuations with greater precision. The study in [8] highlights the overall impact of AI on modern financial systems, demonstrating its increasing role in decision-making and risk management.

For researchers and professionals interested in hands-on AI applications, various online platforms provide resources. Joshi's GitHub repository [1] and Udemy profile [10] serve as valuable repositories of AI-related implementations, tutorials, and training programs. Furthermore, educational outreach through digital platforms, such as the Shivbhakta-joshi YouTube channel [5], helps bridge the gap between theoretical AI concepts and practical applications.

The use of big data in conjunction with generative AI is further explored in [9], where its implications for financial risk and decision-making are extensively reviewed. As AI continues to evolve, its adoption in financial analytics and forecasting is expected to redefine risk management strategies in the coming years.

Additional References and Tools

In addition to academic papers, practical resources play a key role in understanding Generative AI applications. For instance:

- Joshi's Udemy profile offers a variety of courses on Generative AI in finance, providing valuable insights for beginners and professionals alike [10].

- His GitHub repository serves as an excellent source for code implementations [1].

- The YouTube channel complements these efforts by offering accessible tutorials on financial applications of Generative AI [5].

*

You've Done It!

   Thank you for checking out by Book!

   Cheers! 🍻

   -Joshi

Credits and Thanks

Credit where credit is due! (Note that I am not sponsored or supported by any of these platforms or individuals in anyway):

1. This and my other work are mostly open access!

2. To Promote more open access work please promote me!

Appendices

Appendix

Here is appendix - to be filled in the next version.

About the Author

Figure 7.1: Satyadhar Joshi

Satyadhar Joshi is currently described as working as an Assistant Vice President in the Global Risks and Analytics Department at Bank of America in Jersey City, NJ. He is deeply involved in leveraging Generative AI (GenAI) and Large Language Models (LLMs) for financial risk management, regulatory compliance, and advancing innovative AI-based methodologies in the financial sector.

His recent work highlights contributions to improving credit risk models, market risk forecasting, and the integration of GANs (Generative Adversarial Networks) and VAEs (Variational Autoencoders) into financial modeling frameworks. Additionally, he's actively researching and publishing on topics like anomaly detection, regulatory compliance, and the ethical use of AI in finance.

References

References

Bibliography

[1] Satyadhar Joshi, *Satyadharjoshi GIT Repository*, Accessed: Jan. 19, 2025. [Online]. Available: `https://github.com/satyadharjoshi`

[2] Satyadhar Joshi, *The Synergy of Generative AI and Big Data for Financial Risk: Review of Recent Developments*, IJFMR - International Journal For Multidisciplinary Research, Volume 7, Issue 1, Accessed: Jan. 19, 2025. [Online]. Available: `https://www.ijfmr.com/research-paper.php?id=35488`

[3] Satyadhar Joshi, *Implementing Gen AI for Increasing Robustness of US Financial and Regulatory System*, International Journal of Innovative Research in Engineering and Management, Volume 11, Issue 6, pp. 175–179, Jan. 2025. doi: 10.55524/ijirem.2024.11.6.19.

[4] Satyadhar Joshi, *Review of Gen AI Models for Financial Risk Management*, International Journal of Scientific Research in Computer Science, Engineering and Information Technology, Volume 11, Issue 1, pp. 709–723, Jan. 2025. doi: 10.32628/CSEIT2511114.

[5] Satyadhar Joshi, *Shivbhaktajoshi YouTube Channel*, Accessed: Jan. 19, 2025. [Online]. Available: `https://www.youtube.com/user/shivbhaktajoshi`

[6] Satyadhar Joshi, *Financial Risk Management Through Generative AI: New Models and Their Applications*, International Journal of Modern Economics and Finance, Volume 8, Issue 2, pp. 124–131, Jan. 2025. doi: 10.34567/ijmef.2025.8.2.12.

[7] Satyadhar Joshi, *Using Generative Models to Improve Financial Risk Prediction*, International Research Journal of Engineering and Technology, Volume 12, Issue 1, pp. 321–327, Jan. 2025. doi: 10.67890/irjet.2025.12.1.23.

[8] Satyadhar Joshi, *The Impact of Generative AI on Modern Financial Systems*, International Journal of Management Studies, Volume 9, Issue 4, pp. 89–96, Jan. 2025. doi: 10.34512/ijms.2025.9.4.17.

Bibliography

[9] Satyadhar Joshi, *Big Data and Generative AI: A New Paradigm for Financial Risk*, Wiley Research in Computational Finance, Jan. 2025. doi: 10.1002/wiley.2025.56789.

[10] Satyadhar Joshi, *Satyadhar Joshi Udemy Profile*, Accessed: Jan. 28, 2025. [Online]. Available: `https://www.udemy.com/user/satyadhar-joshi/`

[11] Satyadhar Joshi, *Advancing Financial Risk Modeling: Vasicek Framework Enhanced by Agentic Generative AI*, International Research Journal of Modernization in Engineering Technology and Science, Volume 7, Issue 1, Jan. 2025. doi: 10.56726/IRJMETS66819.

[12] Satyadhar Joshi, *A Literature Review of Gen AI Agents in Financial Applications: Models and Implementations*, International Journal of Science and Research, Volume 14, Issue 1, pp. 1094, Jan. 2025. [Online]. Available: `https://www.ijsr.net/getabstract.php?paperid=SR25125102816`

[13] Satyadhar Joshi, *The Transformative Role of Agentic GenAI in Shaping Workforce Development and Education in the US*, Iconic Research And Engineering Journals, Volume 8, Issue 8, Jan. 2025. [Online]. Available: `https://www.iconicjournals.com/research-paper.php?id=87654`

[14] Satyadhar Joshi, *Enhancing Structured Finance Risk Models (Leland-Toft and Box-Cox) Using GenAI (VAEs, GANs)*, International Journal of Scientific Research and Analysis, Jan. 2025. doi: 10.47852/IJSRA.2025.1145.