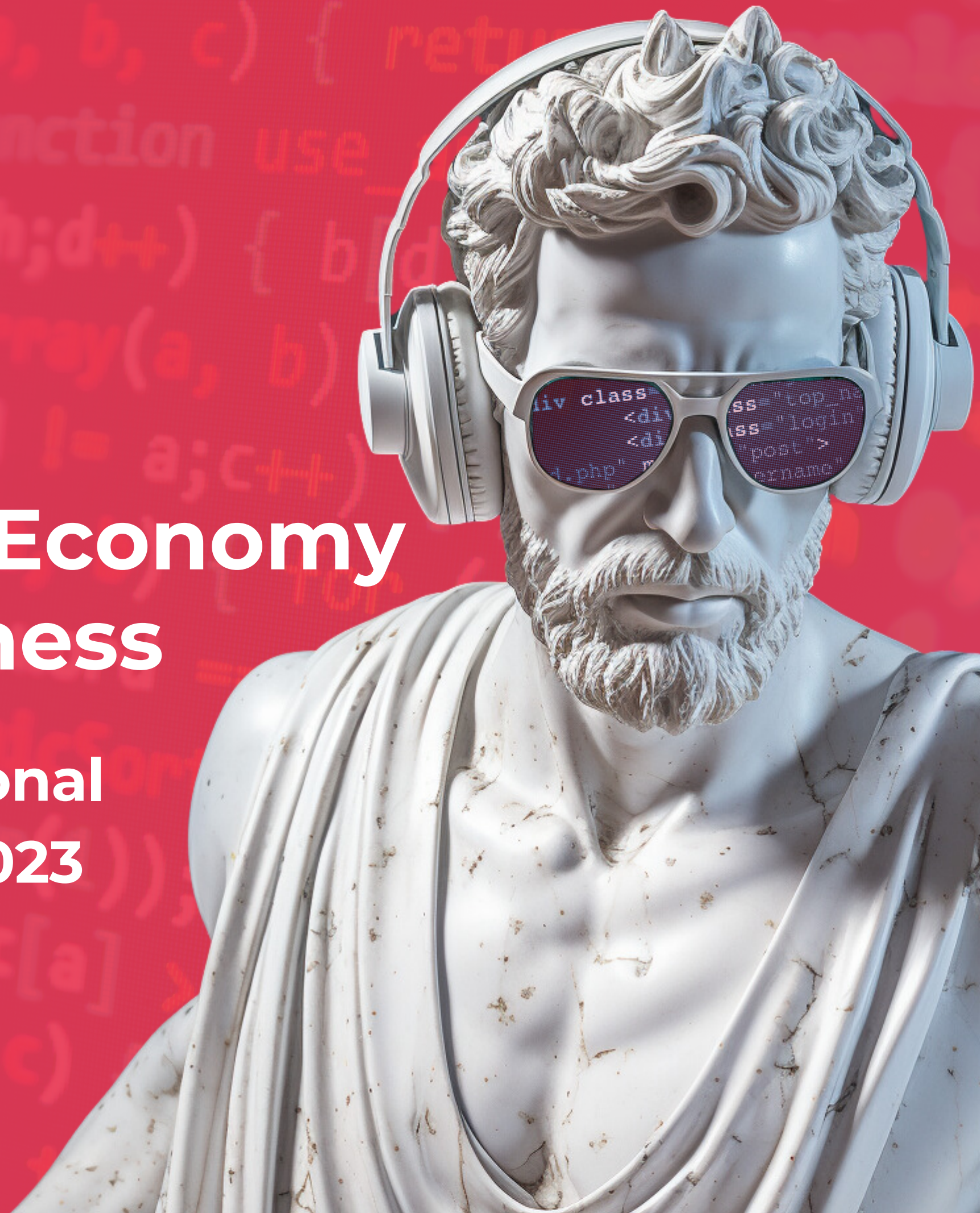# AI in The Economy and Business

A Cross-Sectional Analysis for 2023

Introduction to Analysis

Throughout the history of computing, human-computer interactions were often limited by the rigid formats and specific topics that machines could understand. Early rule-based expert systems and keyword-driven search engines constrained our interactions with technology. **However, in the year 2022, a significant milestone was achieved in AI.**

Today, Artificial Intelligence, with generative AI at the forefront, is revolutionizing the global economy. In this comprehensive analysis, we will delve into the far-reaching impact of AI, especially generative AI, across various dimensions of business, the economy, and the workforce**. Our exploration will encompass trillions of dollars in economic potential, industry-wide implications, and the evolving landscape of AI adoption and investment.**

01

AI's Trillion-Dollar Impact

The Real Changes to the Global Economy

The impact of Artificial Intelligence (AI) on the global economy is profound and multifaceted, with generative AI emerging as a key driver of transformation. When analyzing and comparing data from various reports on AI and forward-looking technology trends, we have observed that AI's pivotal role in shaping the global economy is a prevailing theme. Presented below is the data we have collected and meticulously analyzed. Through this examination, we aim to elucidate how generative AI stands poised to contribute trillions of dollars to the global economy, its far-reaching impact across diverse industries, its transformative effect on the workforce, and the discernible trends in AI adoption and investment.

Key Insights and Conclusions

Generative AI's Economic Impact: The data reveals that generative AI has the potential to add an astounding $2.6 trillion to $4.4 trillion annually to the global economy across 63 analyzed use cases. To put this in perspective, it is equivalent to a substantial portion of the United Kingdom's entire GDP in 2021, emphasizing the massive value it can create.

Industry Impact: Generative AI's influence transcends industries, with banking, high tech, and life sciences standing out as sectors that could experience significant gains. For instance, the banking industry could benefit from an additional $200 billion to $340 billion annually if generative AI use cases were fully implemented.

Value Distribution: Around 75% of the value generative AI offers is concentrated in four areas: customer operations, marketing and sales, software engineering, and R&D. This highlights the breadth of applications, from enhancing customer interactions to automating code generation.

AI Adoption Trends: The data indicates a substantial increase in AI adoption, with organizations embracing AI capabilities like natural-language generation and computer vision. Companies that have already adopted AI have nearly doubled the number of capabilities they use, reflecting a deepening integration of AI into business operations.

AI Investment: Despite a slight dip in AI investments in 2022 compared to the previous year, investment levels remain well above pre-2021 levels. AI investments continue to drive advancements, such as reduced training costs and improved training times for AI models.

Open Source Dominance: Open source AI products have gained prominence, with eight out of the top ten most widely adopted data and AI products based on open source. This reflects a preference for flexibility, data sharing, and avoiding proprietary constraints in data strategies.

Summary

In summary, our analysis unveils a promising outlook for businesses that consider integrating generative AI, potentially unlocking significant economic value across diverse industries. Open source AI products are emerging as influential tools, promoting adaptability and collaboration within organizations.

Looking ahead, the horizon holds potential. Generative AI's economic impact is expected to increase, possibly exceeding the noteworthy estimates we've explored. As this technology continues to advance, businesses can anticipate enhanced innovation, cost-efficiency, and operational effectiveness.

The appeal of generative AI lies in its potential to reshape industries, offering businesses the opportunity not only to navigate challenges but to excel in their respective fields. It's not solely about adopting AI; it's about exploring its potential, igniting creativity, and augmenting productivity.

Generative AI's Economic Impact

How generative AI could add trillions of dollars to the global economy, surpassing the UK's GDP
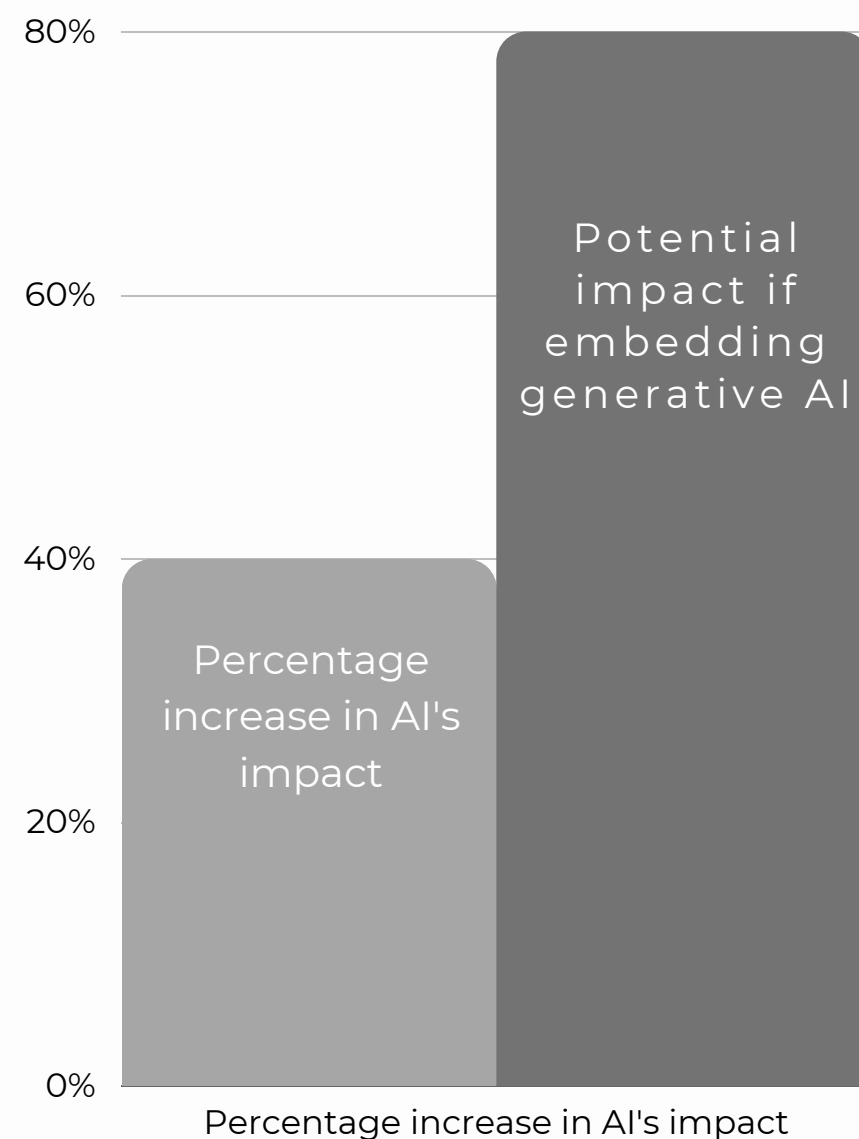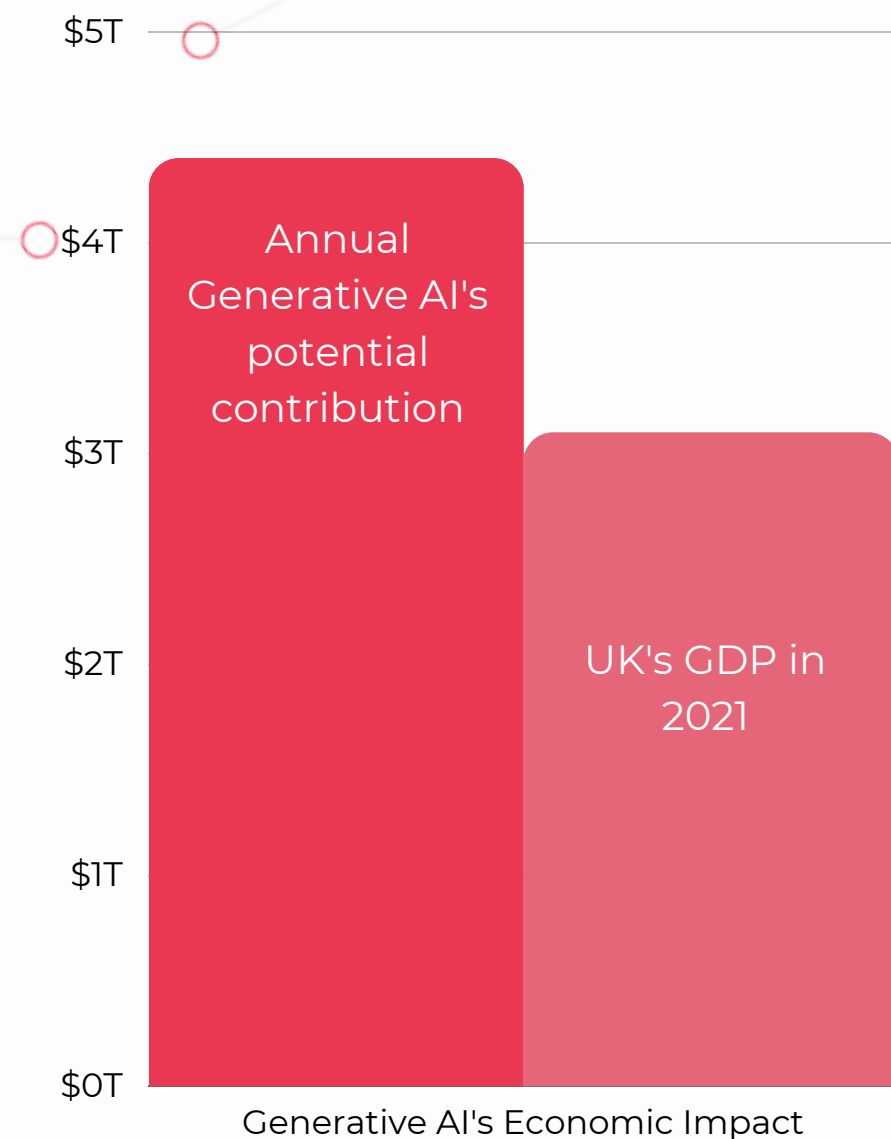
Data sources for this section:

McKinsey & Company - Technology Trends Outlook 2023
Databricks Lakehouse - 2023 State of Data + AI

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02

The Technology

Behind Generative AI

Generative AI is driving innovation across industries, but what powers this transformative technology? In this analysis, we explore the tech stack, software solutions, and key technologies that underpin generative AI. We delve into the data to unveil the crucial components and their impact on businesses, providing insights into the future of this game-changing field.

The Tech Stack:

Generative AI is powered by a multi-layered tech stack. At its core are **Foundation Models** — deep-learning models trained on vast datasets, adaptable for various tasks. These models are complemented by the **Application Layer**, where users interact with AI systems. Sitting between these layers, the **Integration/Tooling Layer** connects systems, filters responses, and enables new features. All of this relies on specialized **Hardware**, like GPUs and TPUs, for efficient model training and inference.

Software Solutions for AI Workflow:

The AI development workflow encompasses several stages, with software solutions playing a crucial role:

- **Data Management:** Automated tools enhance data quality and control, ensuring accurate inputs for AI systems.
- **Model Development:** Software tools build and optimize ML models, streamlining feature engineering and standardizing processes.
- **Model Deployment:** Provisioning tools validate and bring ML models into production, ensuring seamless integration.
- **Live-Model Operations:** Ongoing software support maintains and enhances model performance.
- **Additional Hardware Tools:** Technologies like cloud computing and domain-specific architectures provide high-capacity compute for ML workflows.

At xBerry, when creating our Future Prompters offer, we are guided by process guidelines that organize and structure our work. **Our tech experts specialize in seamlessly integrating AI into your company, creating customized solutions to meet your needs and effectively address your challenges through a simplified process**. At the same time, we focus on ensuring that the processes we follow during our work are as uncomplicated and simplified as possible. This approach allows us to maximize efficiency, ensuring that we deliver projects quickly and effectively.
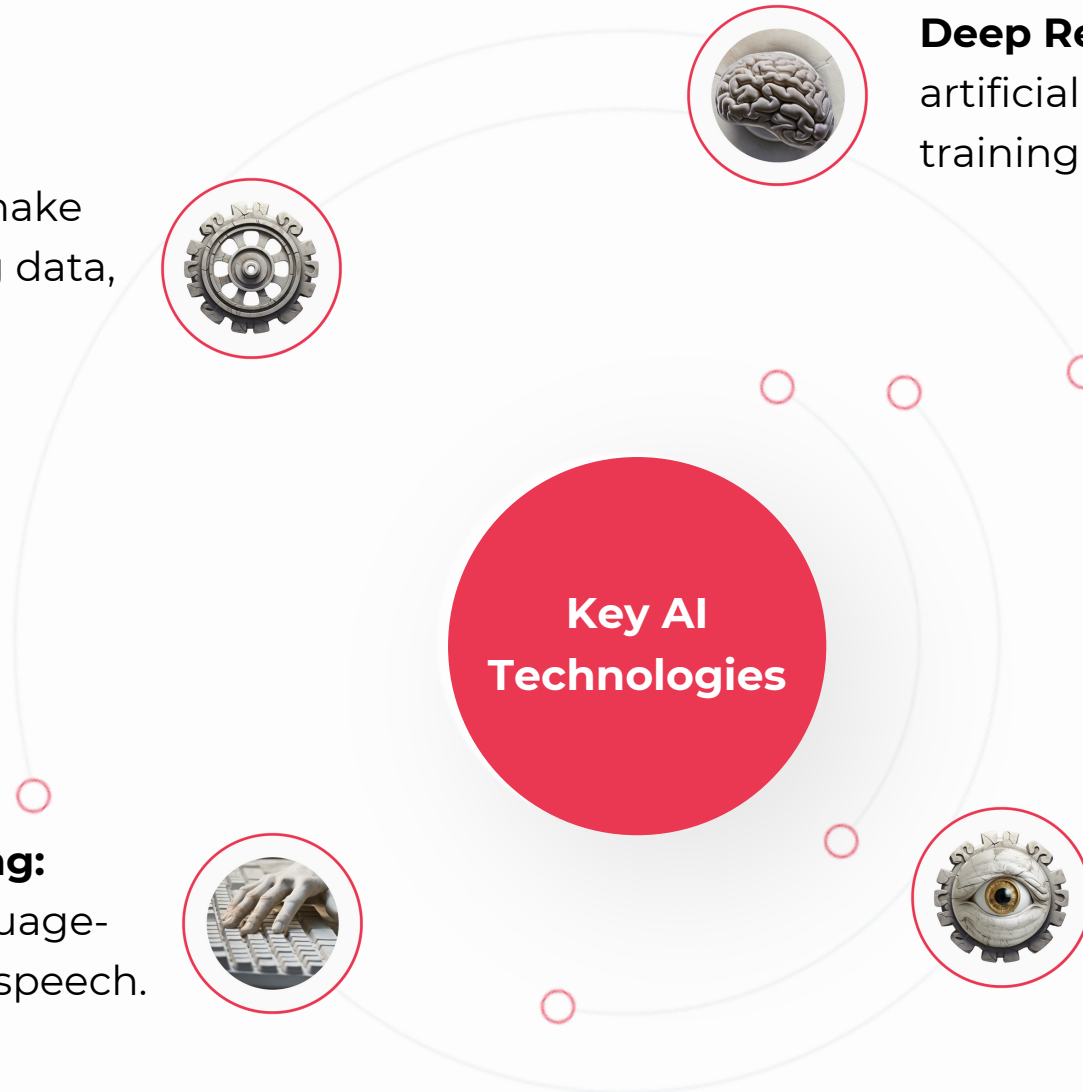
Key AI Technologies:

Generative AI relies on various cognitive technologies:

Deep Reinforcement Learning: Utilizes artificial neural networks and trial-and-error training for predictions.

Machine Learning: Models make predictions based on training data, not predefined rules.

Key AI Technologies

Natural Language Processing: Analyzes and generates language-based data, such as text and speech.

Computer Vision: ML for visual data, including images, videos, and 3-D signals.

Summary

Generative AI's foundation, software ecosystem, and key technologies are shaping its transformative impact on businesses. As technology advances, we can anticipate even more efficient, accessible, and innovative AI solutions across industries.

Companies have the option to harness the capabilities of Large Language Models (LLMs) through SaaS LLM APIs, granting access to services like ChatGPT provided by OpenAI. Alternatively, they can opt to create their own LLMs internally. Constructing a contemporary LLM application might encompass the utilization of dedicated Python libraries designed for transformer-based models during the training phase, along with LLM tools such as LangChain for creating interfaces and integrating with various systems.

At xBerry, with our Future Prompters offering, we can assist you in navigating this evolving landscape. The future is now, and embracing AI-based tools will open doors to increased profits and empower you to stay ahead in the competitive market.

Data sources for this section:

McKinsey & Company - Technology Trends Outlook 2023
Databricks Lakehouse - 2023 State of Data + AI

Vocabulary of Technical Terms

(for Business-minded Individuals)

- **Foundation Models:** Deep-learning models trained on vast data, adaptable for various tasks.

- **Application Layer**: The user-facing interface of AI systems.

- **Integration/Tooling Layer:** Connects systems, filters responses, and enables new features.

- **Hardware:** Specialized accelerator hardware like GPUs and TPUs for efficient AI processing.

- **Data Management:** Automated tools enhancing data quality and control.

- **Model Development:** Building and optimizing ML models.

- **Model Deployment:** Bringing ML models into production.

- **Live-Model Operations**: Ongoing support for maintaining and improving model performance.

- **ML Workflow**: The process of developing and deploying machine learning models.

- **Computer Vision:** ML applied to visual data.

- **NLP:** Analyzing and generating language-based data.

- **Deep Reinforcement Learning:** Using neural networks for predictions.

- **LLMs:** Large Language Models, the core of generative AI.

- **SaaS LLM APIs:** Libraries to access LLMs as a service.

- **LLM Tools**: Toolchains for working with and building proprietary LLMs.

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03

AI in the Workforce

Numbers and Trends

The year 2022 marked a significant turning point in the relationship between American workers and Artificial Intelligence (AI). With 19% of American workers in jobs highly exposed to AI, where key activities could be either replaced or augmented by AI, and 23% in jobs least exposed to AI, it becomes evident that AI is becoming an integral part of the workforce. This analysis will explore the implications of this AI exposure on workers, including their earnings, perceptions, and the potential for job displacement. Additionally, it will delve into the growing demand for talent in applied AI and generative AI, shedding light on the changing landscape of employment.

Key Insights and Conclusions:

AI Exposure and Worker Perceptions: Despite the high exposure of certain job sectors to AI, a significant proportion of workers in these industries do not feel that their jobs are at risk. For instance, in the information and technology sector, 32% of workers believe that AI will help them more than hurt them personally, compared to only 11% who anticipate negative impacts. This suggests that AI is viewed as a tool for enhancement rather than a threat by many workers.

Earnings Disparities: The earnings gap between workers in high AI-exposure jobs and those in low-exposure jobs is substantial. In 2022, workers in high-exposure jobs earned an average hourly wage of $33, compared to $20 for those in low-exposure roles. Men in high-exposure jobs earned $39 per hour, significantly more than their counterparts in low-exposure roles. Women in high-exposure jobs also outearned women in low-exposure positions, with an hourly wage of $28.

AI and Productivity: AI has the potential to substantially increase labor productivity across the economy. Depending on technology adoption and worker redeployment, generative AI alone could drive labor productivity growth of 0.1 to 0.6 percent annually through 2040. When combined with other technologies, work automation could contribute 0.2 to 3.3 percentage points annually to productivity growth. This underscores the transformative potential of AI in reshaping work activities.

Impact on Knowledge Work: Generative AI is expected to have the most significant impact on knowledge work, particularly in activities involving decision-making and collaboration. These were previously considered to have the lowest potential for automation. Tasks such as communication, supervision, documentation, and interaction with people are all poised for automation, which will accelerate the transformation of work, especially in fields like education and technology.

Educational Divide: Unlike traditional automation technologies that tend to affect workers with lower educational attainment, generative AI shows the opposite pattern. It is likely to have the most substantial impact by automating activities carried out by more-educated workers. This indicates that education and upskilling are crucial for individuals to thrive in an AI-augmented workforce.

Demand for AI Talent: The demand for talent in applied AI and generative AI has been on the rise. Job postings in these fields more than tripled since 2018. In 2022, there was significant growth in demand for data scientists and software engineers. Moreover, generative AI saw strong and accelerating growth in talent demand. The trend is expected to continue, with higher demand in 2024, particularly for directors and managers in these fields.

How will AI reshape the workforce in the upcoming years?

AI Augmentation: While AI can automate certain tasks, it is more likely to augment human capabilities rather than completely replace workers. AI can assist professionals in making better decisions, analyzing data, and increasing productivity. This could lead to more collaborative working environments and a shift in job roles and responsibilities.

Reskilling and Upskilling: As AI becomes more prevalent, workers in AI-exposed jobs and others will need to acquire new skills to remain competitive. This will likely lead to a surge in demand for educational programs and training in AI-related fields, potentially creating opportunities for educational institutions and online learning platforms.

AI Shapes Earnings: The data suggests that workers in AI-exposed roles earn significantly more than those in less-exposed roles. This earnings gap may persist or even widen as the demand for AI-related skills grows. Also, the demand for AI talent, including data scientists, software engineers, and AI specialists, is expected to grow significantly. Companies will compete for talent with expertise in AI, potentially driving up salaries and benefits for individuals with these skills.

04

AI Reshaping Industries

A Journey Across Sectors

Beyond the buzz, Artificial Intelligence (AI) is rewriting the rules of business. In this examination, we voyage through diverse industries, dissecting the transformative influence of AI, with a special focus on generative AI. Our mission: to uncover the seismic shifts AI has triggered across sectors, from finance to healthcare and beyond.

Key Insights and Conclusions

Banking Transformed: Generative AI has the potential to revolutionize banking by boosting productivity. It could add an impressive 2.8% to 4.7% of annual revenues, potentially equating to an additional $200 billion to $340 billion. Moreover, AI enhances customer satisfaction, decision-making, and risk management.

Pharmaceutical Breakthroughs: The pharmaceutical industry is on the cusp of major breakthroughs, thanks to generative AI. It could generate an annual impact ranging from $60 billion to $110 billion. AI accelerates drug discovery, reducing development timelines and costs, potentially saving lives.

Retail Revolution: In the retail and consumer packaged goods sector, generative AI could automate crucial functions, increasing productivity by 1.2% to 2.0%. This translates to a staggering $400 billion to $660 billion boost. From customer service to supply chain management, AI transforms the retail landscape.

Empowering Knowledge Workers: Generative AI empowers knowledge workers by revolutionizing internal knowledge management systems. Employees can now retrieve critical information naturally, saving valuable time. Imagine the possibilities when AI handles information retrieval tasks, enhancing efficiency across industries.

Customer-Centric Approach: AI is enhancing customer operations by offering digital self-service and augmenting agent skills. In customer service, generative AI has already increased issue resolution rates by 14% an hour, reduced handling time by 9%, and improved agent productivity and service quality.

Marketing and Sales Transformation: Generative AI is a marketing powerhouse. It crafts personalized messages, generates creative content, and drives personalization at scale. This level of automation and personalization is a game-changer in marketing and sales, optimizing customer engagement.

Innovation in Software Engineering: Software engineers are embracing generative AI in pair programming and augmented coding. It reduces time spent on coding-related tasks, potentially saving 20% to 45% of annual software engineering costs. Faster development cycles are a competitive advantage.

Accelerating R&D: In research and development, generative AI accelerates innovation. From designing new drugs to developing products and electrical circuits, AI's potential is limitless. It could reduce R&D costs by 10% to 15%, pushing industries toward groundbreaking discoveries.

Summary:

The future outlook suggests a growing influence of generative AI, surpassing current estimates as its applications mature. Organizations are expected to invest in workforce education and training to harness the full potential of AI. Open source AI solutions will continue to drive innovation, collaboration, and cost-effective solutions. Overall, generative AI is poised to be a transformative force, propelling businesses toward enhanced productivity, customer satisfaction, and innovation without explicitly stating it.

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Summary
Of The Analysis

In our Cross-Sectional Analysis of AI in 2023, we embark on a journey through the evolving landscape of technology, witnessing how generative AI, at the forefront of the AI revolution, is reshaping the global economy, business practices, and the workforce. Throughout history, human-computer interactions were confined by rigid formats, but in 2022, generative AI broke those barriers, revolutionizing our engagement with technology. This transformative technology has the **potential to contribute trillions of dollars to the global economy, impacting industries ranging from banking to pharmaceuticals, ushering in unprecedented productivity gains, and altering the nature of work itself.**

Open-source AI solutions are on the rise, fostering collaboration and innovation, while generative AI finds applications in areas like retail, software engineering, and research and development. Amidst this AI-powered transformation, we introduce Future Prompters by xBerry - your real-life AI partners. Our tech experts specialize in seamlessly integrating AI into your company, creating customized solutions to meet your needs and effectively address your challenges through a simplified process. **We know that AI can transform any business into a more profitable one, and we would be delighted to help you utilize the full potential of AI solutions by boosting efficiency, reducing costs, and accelerating growth in your company.**

If you want to shape the future with AI, Machine Learning, and LLMs, while prioritizing privacy and ethics - <u>contact us</u> and meet the offering of <u>Future Prompters.</u>