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The Effects of Artificial Intelligence on the Global Economy – A Review

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Abstract

Artificial Intelligence is a term used to describe machines performing human-like cognitive processes such as learning, understanding, reasoning and interacting. It can take many forms, including technical infrastructure, a part of a process, or an end-user product. AI looks increasingly likely to deeply transform the way in which modern society lives. The objective of this study is to explore the effect of AI on the economy, examining its influence on productivity, employment, industry dynamics, and economic growth. Through case studies, specific industries have been studied to understand how AI adoption has transformed their operations, workforce and overall economic outcomes. Five research papers have been reviewed and a summary of those have been shared in this paper. Current influence of AI technology and future potential have been studied. The use of AI in healthcare, Finance, social media, E-commerce, manufacturing, Global productivity has been extensively studied and some future predictions have been stated.

Keywords: Artificial Intelligence, Machine Learning, Global Economy

Introduction

Artificial Intelligence is a tool developed since the 1980's to mimic human behaviour in machines, it has been improving in its capabilities since then, AI is a revolution of a technology which many people have yet to fully comprehend, the wheel was considered a revolution in human innovation, AI is the next big revolution after the wheel as stated by Sundar Pichai, CEO of Google, AI has revolutionized the IT industry, from Chatgpt to Google Bard, all are modern state of the art AI technology helping people with any sort of search queries, thus AI not only has the potential to do routine tasks but also efficiently do non routine high skill tasks which till now only high skill workers were able to do. This is the reason AI can have good and bad consequences, in this paper all things AI have been discussed.

Machine learning has been the heart of AI development since 1980's. In the earlier years Machine learning development was limited due to primitive computational power, decades later due to the growth of computational power, machine learning tools have advanced enough to incorporate lot of data to analyse. Machine learning is a subfield of artificial intelligence that gives computers the ability to learn without explicitly being programmed[1]. Scientists have used machine learning to imitate human behaviour so that AI is smart enough to detect content of an image, type of language, be a personal assistant etc.

Literature Review

Economic Impact of Artificial Intelligence (2019)

Artificial Intelligence (AI) refers to the development of computer systems that can perform tasks that typically require human intelligence. These tasks include learning, reasoning, problem-solving, perception, language understanding and decision-making. AI can be broadly categorized into narrow AI and general AI.[1]

AI research has grown at a pace of 12.9 % annually over the last five years, as per Alice Bonasio, a technology journalist. China is expected to overtake the United States as the world's leading source of AI technology Research in the next 4 years. In the area of Artificial Intelligence development, Europe is the largest and most diverse continent, with significant levels of international collaboration. India is the third largest country in AI research output, behind China and the USA.[1]

Applications of Artificial Intelligence

Healthcare:

Many businesses and medical care institutions are turning to Artificial Intelligence to save lives. There are numerous examples of how Artificial Intelligence in healthcare has benefited patients around the world. Here are a few examples:

- **Administration**:

To reduce human errors and increase productivity, AI systems are assisting with normal, day-to-day administrative activities like scheduling meetings, and maintaining organized file systems. Natural Language Processing (NLP) is used to transcribe medical notes and to help organize patient information so that doctors can read it easily.

- **Assisted Diagnosis:**

AI can now interpret MRI scans to check harmful signs at a much faster rate than radiologists can, with a much narrower margin of error, thanks to computer vision and convolutional neural networks.

- **Robotic Surgery:**

Robotic operations have a very small margin of error and can operate 24 hours a day, seven days a week without becoming weary. They are less intrusive than conventional method, thereby reducing the amount of time patients spend in the hospital recovering.

- **Health Monitoring:**

A person's state of health can be determined by some vital signs. Generally, heart rate, blood pressure, Oxygen level, calories consumed/burnt are all parameters that can be assessed by wearable devices, with the help of AI and Machine learning, algorithms are able to detect potential health risks even before it becomes dangerous to the customer.

E-Commerce:

AI is becoming a sort after tool by ecommerce companies, Shoppers use AI to find related products in their preferred size, colour, or brand. Let's understand some applications of AI in E-commerce:

- **Personalized Shopping:**

AI is used to construct recommendation engines that help businesses engage with end customers more effectively. These suggestions are based on their previous browsing behaviour, preferences, and interests. It aids in the improvement of consumer interaction as well as brand loyalty.

- **AI-powered assistants:**

Virtual shopping assistants and chatbots aid in the enhancement of the online buying experience. Natural Language Processing (NLP) is used to make the dialogue sound more human and personal. Furthermore, these assistants can interact with your consumers in real time.

- **Fraud Detection and Prevention:**

Two of the most serious difficulties that E-Commerce businesses face are credit card fraud and fraudulent reviews. By taking into account usage trends, AI can help to lower the risk of credit card fraud.

Robotics:

Artificial intelligence is currently assisting robotics in developing more efficient robots. AI-enabled robots have found use in variety of industries, particularly in the manufacturing and packaging industries. Artificial Intelligence provides robots with a computer vision that allows them to navigate, sense, and react appropriately. Using Machine Learning, humanoid robots are being developed, they mimic human behaviour in terms of physical as well as emotional.

Finance:

Artificial Intelligence is assisting the financial industry in a substantial way. Artificial Intelligence provides features like risk assessment, fraud detection, and management, financial advisory services, and Automated trading in Finance. Here are a few Finance AI Examples:

- AI in Personal Finance
- AI in Consumer Finance
- AI in Corporate Finance

Marketing:

The use of AI in marketing is automated as it helps with analysing customer behaviour and spending habits, thus allowing organizations to target specific audience to increase profit. AI is frequently utilized in marketing campaigns where speed is critical.

- In 2022 over a third of organizations in the US stated that they have used AI for some automation processes.
- Over half of the organizations were in favour of using AI to increase profits.
- This shift to AI creates more job opportunities and over all economic growth.

Social Media:

A study found that over 90% of retailers in USA have opened up at least social media profiles which lets them increase the traffic content online. Using AI in social media helps to automate updates about the company. AI automatically updates users on new products featured by the company so they can pre order it at a discounted rate thus it is a win-win situation for both the parties involved.

AI and the Economy (2019)

Automation and Labor Market Disruption

Automation refers to the use of technology, such as AI and robotics, to perform tasks that do not necessarily require humans. Automation has the potential to significantly impact the labor market, leading to labor market disruption. Here's a brief explanation of automation's effects on the labor market:

Job Displacement:

A study by Frey and Osborne (2017) estimated that around 47% of total US employment is at risk of being automated. Similarly, a report by the World Economic Forum (2020) projected that automation could displace 85 million jobs globally by 2025.[2]

Changing Skill Requirements:

Due to AI disrupting the jobs scene, new high-tech jobs are in demand now which require high level technical skills, thus workers whose jobs have been taken away by AI should learn new high tech skills which will help them earn better and also ensure job security. The World Economic Forum's Future of Jobs Report (2020) highlighted that automation is leading to the emergence of new job roles in areas such as data analysis, AI development, and digital content creation. These roles require a combination of technical and social skills.[2]

Income Inequality:

A study by Acemoglu and Restrepo (2019) found that automation in the United States has contributed to increasing income inequality. The study showed that industries employing automation had a significant negative effect on wages of workers without a college degree. This confirms that automation is directly linked to income inequality. While Automation leads to more productivity for an organization, the financial benefits are not distributed equally among the employees.

Job Transformation and Augmentation:

Research by Brynjolfsson and McAfee (2014) explored the concept of "skill-based technological change." They found evidence that automation and AI technology can complement human work by doing laborious tasks without fatigue thus substantially increasing work productivity of an individual.

Research was conducted by Accenture covering 12 developed countries. These are the highlights of their research findings:

- By 2035 AI can double global economic growth rates.
- Global GDP may increase by up to 14% by 2030 due incorporation of AI.
- AI will help the labour work force be more effective by helping with repetitive tasks hence increasing productivity by up to 40%
- The benefits will be felt globally, North America and China are expected to gain the most from AI technology.
- AI will revolutionize the transport industry with fully autonomous self-driving vehicles.

The report by Mckinsey Global Institute also focuses on the benefits of AI, the following are the key points in the research findings:

- At least 70% of the U.S companies would adopt AI technology by 2030 increasing global GDP by about 1.2% annually.
- Despite progress brought by AI, some areas of the economy would remain essential yet hard to improve, retaining human labour that would be well renumerated.[2]

AI in manufacturing industry (2022)

Research done by OECD has made some findings as stated below:

- AI can help substantially in sensors, 3D printing and robotics
- AI solutions would be fundamental in linking the machines, interfaces, and components which would optimize the production process.
- Manufacturers would be able to access new markets, since their products would be more customised, varied and of higher quality.
- Industry 4.0 may not be realised before the middle of the next decade, as it demands a combination of various technologies, which, according to some, will take 20-30 years to mainstream.
- Most of the effect of AI will be seen in developed countries which have high labor wages, AI will replace those workers first. Developing countries will have an advantage because of already low wages thus no incentive to replace jobs with AI.[3]

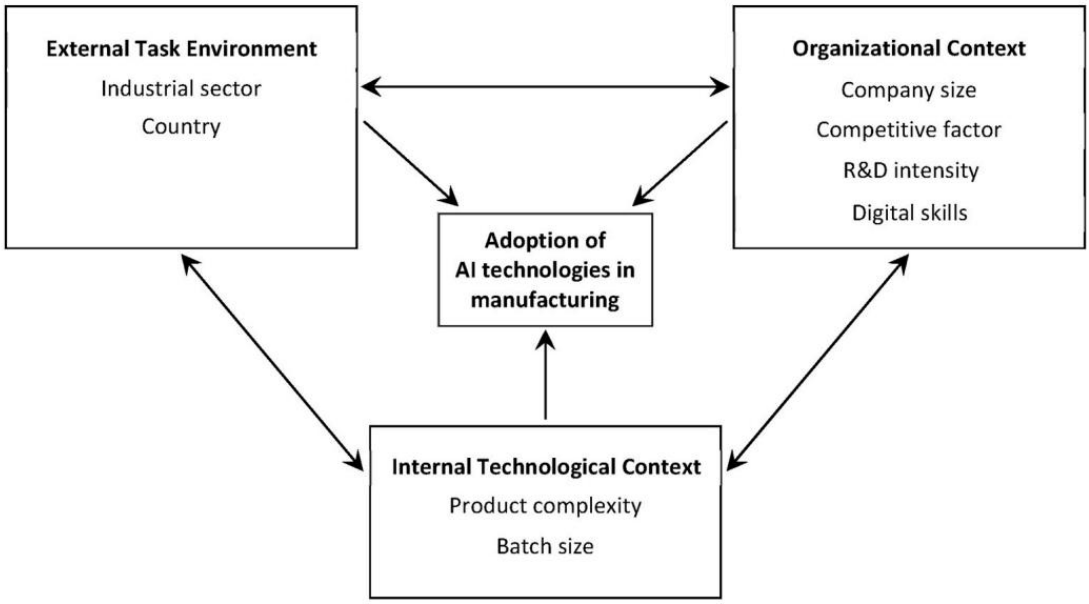

Figure 1. Research Framework carried out by OECD[3]

Survey of AI in Finance (2022)

One notable case study on the impact of AI in financial services is the use of AI-driven algorithmic trading in the stock market. Algorithmic trading, also known as high-frequency trading, involves the use of computer algorithms to make trading decisions at high speeds. Here's an examination of how AI in financial services has affected the economy, focusing on algorithmic trading, along with supporting evidence [4]:

Increased Trading Efficiency:

AI-driven algorithmic trading has significantly improved trading efficiency by automating the decision-making process and executing trades at high speeds. This has reduced transaction costs and improved liquidity in financial markets. A study by Brogaard, Hendershott, and Riordan (2014) analysed the impact of algorithmic trading on market quality. They found that algorithmic trading increased liquidity, reduced bid-ask spreads, and improved price efficiency in equity markets, leading to more efficient allocation of capital.[4]

Enhanced Market Liquidity:

AI-based trading algorithms contribute to increase market liquidity by providing continuous buy and sell orders, thereby facilitating smoother and faster trade executions. This increased liquidity benefits market participants, as it improves price discovery and reduces trading costs. Research conducted by the Federal Reserve Bank of New York (2014) analysed the impact of high-frequency trading on liquidity in equity markets. The study found that high-frequency trading has a positive effect on liquidity, with increased trading volumes and reduced bid-ask spreads.[4]

Volatility and Risk Management:

AI algorithms can quickly analyse large volumes of data and react to market events, contributing to improved volatility and risk management in financial markets. AI-driven models can identify patterns, correlations, and anomalies in real-time, enabling more effective risk assessment and mitigation. A report by the International Monetary Fund (IMF) in 2019 examined the impact of AI on financial stability. It highlighted that AI techniques, including machine learning and natural language processing, have the potential to enhance risk management by better predicting market movements and identifying systemic risks.

Concerns of Market Instability:

While AI-driven algorithmic trading has brought many benefits, concerns have been raised regarding potential market instability and systemic risks. The complex interplay of algorithms and the speed at which trades are executed can amplify market volatility and contribute to sudden price fluctuations. The "Flash Crash" of May 6, 2010, serves as an example of market instability attributed to algorithmic trading. During this event, automated trading algorithms led to a rapid and severe stock market decline, followed by a quick recovery. This incident raised concerns about the risks associated with algorithmic trading and the need for proper risk controls and oversight.[4]

AI in Healthcare Applications (2020)

AI has shown promise in improving diagnostic accuracy, reducing medical errors, and enhancing overall patient care. Here's a case study that highlights the economic impact of AI in healthcare:

AI in Diagnostic Imaging

A study published in the journal Nature in 2020 investigated the economic impact of AI in diagnostic imaging, specifically in the field of radiology. The researchers analysed the potential cost savings and productivity gains associated with implementing AI algorithms for detecting breast cancer in mammograms.[5]

The study found that using AI algorithms to assist radiologists in interpreting mammograms could lead to substantial economic benefits. The researchers estimated that the implementation of AI in breast cancer screening could result in cost savings of up to $3.2 billion annually in the United States alone. These savings would primarily come from reduced diagnostic errors, earlier detection, and more efficient use of healthcare resources.

Furthermore, the study projected that AI-enabled mammography screening could lead to significant improvements in patient outcomes, including decreased breast cancer mortality rates. By identifying potential cancerous lesions with greater accuracy, AI could enable earlier interventions and treatments, ultimately saving lives and reducing long-term healthcare costs.

The economic impact extends beyond cost savings and improved patient outcomes. The study also highlighted potential productivity gains for radiologists. With AI assisting in the initial interpretation of mammograms, radiologists could potentially handle larger caseloads, leading to increased efficiency and capacity within healthcare systems.

This case study demonstrates the potential economic benefits of integrating AI into healthcare, specifically in diagnostic imaging. By leveraging AI algorithms to enhance accuracy, efficiency, and patient outcomes, healthcare systems can experience significant cost savings, increased productivity, and improved resource allocation.[5]

Conclusion

In conclusion, the effect of Artificial Intelligence (AI) on the economy is profound and multifaceted. AI has the potential to revolutionize industries, enhance productivity, transform job roles, and stimulate economic growth. Through the case studies presented in this project, it has been examined the impact of AI in manufacturing, financial services, and healthcare, shedding light on the diverse applications and economic outcomes.

In the manufacturing industry, AI has improved production processes, optimized resource allocation, and transformed the workforce. While concerns about job displacement exist, AI has also created new job opportunities and increased overall productivity. Similarly, in the financial services sector, AI has enhanced risk management, fraud detection, and customer experiences. The impact on employment varies across roles, with the emergence of new jobs driven by AI technology.

In healthcare, AI has demonstrated significant potential in diagnostics, treatment, and personalized medicine. It has improved accuracy, efficiency, and patient outcomes. The role of healthcare professionals is evolving, with AI supporting decision-making and facilitating remote healthcare services. The economic and social impact of AI in healthcare includes cost savings, improved accessibility, and better health outcomes.

However, the widespread adoption of AI also raises ethical and societal considerations. Issues such as bias, privacy, and the distribution of wealth require careful attention. Governments and policymakers play a crucial role in addressing these concerns through AI governance frameworks, promoting innovation, and balancing economic growth with social impact. Collaboration between governments, industries, and academia is essential for knowledge exchange and responsible AI adoption.

Looking ahead, the future of AI holds tremendous potential. Emerging technologies and trends, such as reinforcement learning and natural language processing, will continue to shape the economy. It is crucial to invest in education and reskilling programs to equip individuals with the necessary skills for an AI-powered economy. Collaboration and partnerships between stakeholders will drive responsible AI adoption and ensure its benefits are maximized while minimizing potential risks.

In conclusion, AI is a transformative force with far-reaching implications for the economy. It is vital to navigate the challenges and opportunities presented by AI to foster inclusive economic growth and a more equitable society.

Authors Bio:

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