Bhabani Shankar Nayak · Nigel Walton

Political Economy of Artificial Intelligence

Critical Reflections on Big Data Market, Economic Development and Data Society

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ISBN 978-3-031-62307-3 ISBN 978-3-031-62308-0 (eBook)
https://doi.org/10.1007/978-3-031-62308-0

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This book is dedicated to the myriad technological workers who shape our everyday lives, enriching them with the luxury of interpersonal connections in our digital world, while also enduring the challenges of intimate capitalism and its techno feudalism.

Preface

The world is currently experiencing an unprecedented technological revolution that is fundamentally altering the dynamics of individual, familial and societal interactions within a digital framework. The rapid advancement of data-driven technology has seamlessly integrated itself into every facet of social and human activities, driven by the prevalence of "big data". This widespread adoption of "big data" goes beyond a mere shift in knowledge paradigms; it has effectively transformed society into a "data-driven society", where "data" serves as the primary currency governing social communication, decision-making, innovation and interpersonal interactions.

This book investigates into the evolution, implications and limitations of the "data society", shedding light on its transformative trajectory. Additionally, it emphasises the importance of the knowledge traditions intricately intertwined with the "data society". Through a comprehensive exploration, this chapter seeks to offer insights into the multifaceted dimensions of this contemporary phenomenon, navigating the intricate interplay between technology, societal structures and the boundaries of the "data society" led by AI.

AI, platform economy and big data are not ideologically neutral scientific knowledge that drives economic development and social change today. AI is a tool of capitalism which transforms our societies within an environment of technological singularity that helps in the expansion of a monolithic model of alienating development, where corporate monopoly threatens democracy and citizenship rights. Such a development process

ensures the precarity of environment and labour in a data-driven society without any forms of social engagements.

AI and big data are not impartial scientific tools driving economic progress and societal evolution. Instead, AI serves as a capitalist instrument, reshaping our communities within the framework of technological advancement, ultimately facilitating the expansion of capitalist economic models. This transformative process perpetuates labour instability. It underscores the constraints of conventional Marxist views on labour, value, property and production dynamics. It advocates for a reconsideration of Marxist perspectives on AI-driven economic progress, emphasising a novel interpretation of the bourgeois and proletariat within an information-centric, data-driven society.

It is important to examine various debates and challenges surrounding AI-driven big data and its theoretical ramifications confronting the labour theory of value and its socio-economic consequences from a critical standpoint. Additionally, it presents alternative approaches by scrutinising forthcoming trends and advancements for the sustainable integration of AI. The argument is for the formulation of policies governing AI and big data utilisation to safeguard labour rights, promote human development and bolster social welfare by mitigating risks.

The traditional Marxist framework for understanding capitalist accumulation falls short in comprehending emerging forms of capitalism and their accumulation mechanisms driven by “platforms” and “big data”. Big data platforms exert significant influence over production processes, labour dynamics, product pricing and market conditions. “Digital platforms” and “big data” have seamlessly integrated into the fabric of production, distribution and exchange networks, emerging as essential components of capitalist accumulation. The chapter posits that the conventional Marxist theory of capitalist accumulation lacks the capacity to fully grasp the intricacies of these new capitalist forms and their reliance on “platforms” and “big data”.

A burgeoning market is rapidly emerging, where big data holds considerable value as a trading commodity. This novel market paradigm is reshaping the landscape of traditional markets, impacting production, distribution, supply chains, pricing mechanisms and overall transaction dynamics. It is crucial to conceptualise this burgeoning market, dubbed the “Big Data Market”, propelled by platform companies that permeate various aspects of our daily lives. From ubiquitous social media platforms to sophisticated online trading hubs, these entities amass, store and

leverage vast quantities of data, wielding it to influence established markets and cultivate what we define as the "data market". It is important to locate, theorise and delineate the "data market" as a compelling concept, an intricate process and a transformative institution by focusing on its positive contribution to the lives of people and the planet.

The *Political Economy of Artificial Intelligence* highlights the limits of classical understanding and conceptualising different issues in social sciences and humanities. The book attempts to critically outline different debates and challenges around AI-driven big data and its implications. It particularly focuses on the theoretical challenges. It also offers alternatives by analysing future trends and developments for the sustainable use of AI. It argues for developing policies on the use of AI and big data to protect labour, advance human development and enhance social welfare by reducing risks to environment and ensure citizenship rights.

These developments have significant impact for governments, economies and societies globally, resulting in a race for digital supremacy between major superpowers such as China and the US. The book comprises seven chapters. It analyses the historical rise of artificial intelligence and how the leadership race for AI supremacy has unfolded. It will explore the likely implications of technological singularity for society and its divisive and disruptive impact.

The book also investigates how artificial intelligence undermines various forms of democracy, capitalism and other forms of governance including key Marxist principles relating to capital accumulation. It also considers how data and information have become the new factors of production—replacing land, labour and capital—and how this has changed the principle of valorisation. The book analyses the current trajectory of artificial intelligence and how it has commercialised from an economic perspective using different business models and the implications for the competitive landscape. Finally, the book considers the legal and human rights implications of artificial general intelligence (AGI) and the ultimate role of the state and commercial organisations and the likely changes in the nature and distribution of employment and wealth.

The purpose of the book is to analyse what is destined to become the next general-purpose technology (GPT)—and possibly the last—to impact upon the global economy; artificial intelligence (AI). Technological breakthroughs by leading platform companies and technology firms including neural networks, foundation modelling and machine learning have made the goal of artificial general intelligence (AGI) an achievable goal with

many experts predicting singularity and sentience by 2045. The technological and social resilience might define the future of digital revolution and its associated culture.

The future trajectory of the ongoing digital revolution and its accompanying culture may very well hinge upon the resilience of both technological infrastructures and social systems. In an era characterised by rapid technological advancement and interconnectedness, the ability of societies and technologies to withstand and adapt to various challenges will be crucial in shaping the course of digital evolution.

Technological resilience encompasses the robustness and adaptability of digital systems, networks and platforms. This includes factors such as cybersecurity measures, data privacy protocols and the ability to withstand disruptions such as cyberattacks, system failures or natural disasters. As reliance on digital technologies continues to grow, ensuring the resilience of these systems becomes paramount to maintaining stability and continuity in an increasingly interconnected world.

Equally important is social resilience, which pertains to the capacity of communities and societies to cope with and recover from adversity. In the context of the digital revolution, social resilience encompasses aspects such as digital literacy, equitable access to technology and the ability to address social challenges exacerbated by technology, such as digital divides and misinformation.

The intertwined nature of technological and social resilience underscores the need for holistic approaches to navigating the complexities of the digital age. This entails not only fortifying technological infrastructures but also fostering inclusive, informed and empowered societies capable of harnessing the potential of digital innovation while mitigating its risks. Ultimately, the future of the digital revolution and its associated culture will be shaped by the collective efforts to cultivate both technological and social resilience to navigate the challenges and opportunities that lie ahead in a data-driven society shaped by AI.

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About the Book

This book on *Political Economy of Artificial Intelligence* highlights the limits of classical understanding and conceptualising different issues in social sciences and humanities. The book attempts to critically outline different debates and challenges around AI-driven big data and its implications for social and economic development. It particularly focuses on the theoretical challenges. It also offers alternatives by analysing future trends and developments for the sustainable use of AI. It argues for developing policies on the use of AI and big data to protect labour, advance human development and enhance social welfare by reducing risks to environment and ensure citizenship rights by understanding the limits of data society.

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CHAPTER 1

History and Rise of Artificial Intelligence

Introduction

The history of the rise of Artificial Intelligence (AI) serves as a crucial lens through which we can understand the profound nature, trajectory and scope of the ongoing technological and digital revolution that is intricately shaping our everyday lives. Delving into this history enables us to analyse and explicate the complex problems people face, while also discerning patterns within the technological upheaval accelerated by AI and its transformative values, which are reshaping societies, states and individuals alike.

However, exploring the trajectory of AI development aids in comprehending the unpredictability inherent in technological evolution and its implications for the future. The systems and processes of AI strive to emulate and enhance human intelligence and problem-solving capabilities through the utilisation of computerised machines and programs. By harnessing data and various programming languages, AI endeavours to elevate the quality of human existence through technological innovations. This multifaceted approach not only enhances efficiency but also offers novel solutions to complex challenges, thereby enriching the human experience in different spheres of life.

The purpose this chapter is to analyse the history and rise of artificial intelligence (AI) and set the scene for a further in-depth analysis of this important and fast-moving technological innovation throughout the remainder of the book. The chapter provides definition of artificial

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B. S. Nayak, N. Walton, *Political Economy of Artificial Intelligence*,
https://doi.org/10.1007/978-3-031-62308-0_1

intelligence (AI) before considering the different life stages of its evolution. This commences in the 1950s with Alan Turing's realisation that a machine could be trained to undertake many of the tasks and activities of a human being. This was followed by the Dartmouth Conference in 1956 where John McCarthy and the other founding fathers of artificial intelligence gathered to develop a road map for this new academic discipline. The chapter then analyses a range of technological breakthroughs which are still being developed today.

The obstacles to the growth of artificial intelligence are also explored and how these were overcome through the development of five generations of computing technology and advanced AI microprocessor chips. This is followed by an overview of the different types of artificial intelligence—including narrow, general and super AI—as well as the four key functionalities. These are reactive AI, limited memory AI, theory of mind AI and self-aware AI. The chapter also briefly considers the role being played by platform companies in AI development plus the processes, tools and branches of artificial intelligence. This includes machine learning, natural language processing (NLP), artificial neural networks, deep learning and expert systems.

What Is Artificial Intelligence?

Artificial intelligence (AI) has been defined as:

> *…..a system's ability to interpret external data correctly, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation.* (Haenlein & Kaplan, 2019)

Artificial intelligence uses computers to undertake tasks that normally use human intelligence. With powerful modern computer technology, artificial intelligence can now process large amounts of data in ways that are beyond the capabilities of human beings. The goals of artificial intelligence are to recognise patterns, make decisions and perform human-like judgements (Agrawal et al., 2017).

Artificial intelligence was established as an academic discipline in the 1950s. It was during this period that a group of scientists, mathematicians and philosophers formulated the concept of artificial intelligence. One of the leading influencers in this field was Alan Turing. Turing believed that machines were just as capable as humans when it came to using information to solve problems and make decisions and he published a seminar paper titled *Computing Machinery and Intelligence* (Turing, 1950). This

was followed a few years later in 1956 by an eight-week-long *Dartmouth Summer Research Project on Artificial Intelligence* (*DSRPAI*) at Dartmouth College where the computer scientist, John McCarthy, coined the term artificial intelligence (Sutton, 2020).

The next stage is to undertake a detailed analysis of the various life stages of artificial intelligence starting with its birth and early routes.

Rise of AI as a Discipline

The origins of modern AI can probably be traced back to Alan Turing's code breaking machine called *The Bombe*. This deciphered the Enigma Code used by the German forces in World War 2. *The Bombe* is considered to be the first working electro-mechanical computer. Since breaking the Enigma Code was impossible using human intelligence, this led to the publication of Turing's paper (mentioned earlier) titled "Computing Machinery and Intelligence". This explored the potential of intelligent machines and how to test their intelligence using the Turing Test. The Turing Test, which is still used today, is a benchmarking activity where if a human who interacts with another human and a machine cannot tell the difference, then the machine is considered to be intelligent (Marcus et al., 2016). **Further work was carried out in the field of AI by** Allen Newell and Herbert Simon who in 1955 created the first artificial intelligence program which was named ***Logic Theorist*** (Simon, 1965).

Meanwhile, the eight-week-long *Dartmouth Summer Research Project on Artificial Intelligence* (*DSRPAI*) at Dartmouth College in 1956 brought together a team of leading AI protagonists including computer scientists Marvin Minsky, John McCarthy and Nathaniel Rochester plus mathematician Claude Shannon (the founder of information theory). Not only was the term artificial intelligence coined during the research project—by John McCarthy—but these researchers became known as the "founding fathers" of AI.

New technological breakthroughs occurred in artificial intelligence over a twenty-year period following the Dartmouth Conference. Between 1964–1966, Joseph Weizenbaum at MIT created the ELIZA computer programme (Weizenbaum, 1966). This was a natural language processing tool (an early chatbot) that could simulate a conversation with a human being and thereby pass the Turing Test. Another important AI breakthrough was the General Problem Solver programme developed by Herbert Simon and Allen Newell (Newell & Simon, 1972). This programme could automatically solve simple problems such as the Towers of