Chapter 9

Contribution of Disruptive Technologies in Computational Finance

Arvind Kumar Bhatt

https://orcid.org/0000-0002-2521-1942
G.L. Bajaj Institute of Management and Research, India

Anand Kumar Rai
G.L. Bajaj Institute of Management and Research, India

Rajesh Tiwari

https://orcid.org/0000-0002-5345-2508
Graphic Era University (Deemed), India

ABSTRACT

Disruptive technologies have ignited a profound transformation in the landscape of computational finance. As the realms of finance integrate cutting-edge technologies like quantum computing, artificial intelligence, blockchain, and big data analytics, the limits of financial possibilities are continually being pushed further. As artificial intelligence, blockchain, big data analytics, and quantum computing find their place in the financial realm, the boundaries of what is possible in finance are constantly expanding. This chapter explores the impact of these disruptive technologies on computational finance, dissecting their applications, benefits, challenges, and ethical considerations. By navigating this ever-evolving intersection of technology and finance, the authors gain insights into a future where financial services are more efficient, accessible, and adaptable than ever before. The chapter analyzes the tools for better understanding of the technology in finance domain and provide the trends of research in computational finance space using bibliometric analysis.

1. INTRODUCTION

The world of finance has always been an arena where innovation and technology collide. From the advent of double-entry bookkeeping in Renaissance Italy to the rise of electronic trading platforms in the late 20th century, each era has witnessed financial revolutions driven by technological advancements. In the 21st century, a new wave of disruptive technologies is sweeping through the realm of finance, fundamentally altering the way we approach and interact with financial systems. These technologies have the potential to reshape the landscape of computational finance, a field that has long been at the forefront of financial innovation.

Computational finance, also known as financial engineering, marries the principles of finance with mathematical modeling, statistical analysis, and computer science. It has traditionally been the engine driving risk management, asset pricing, portfolio optimization, and trading strategies. However, the introduction of disruptive technologies is redefining the boundaries of computational finance, enabling new frontiers in efficiency, accessibility, and innovation (Reepu et al., 2023; Singh et al., 2023; Taneja et al., 2023; Yadav et al., 2023).

In this chapter, we embark on a journey through the world of disruptive technologies in computational finance. We will delve into the key technologies that are reshaping the financial industry, exploring their applications and implications. Machine learning as well as Artificial intelligence are revolutionizing the way decisions are made, relying on data-driven insights. They're also transforming the landscape of automated trading, allowing transactions to occur at speeds that were once thought to be impossible just a few decades back. Block chain technology and cryptocurrencies are challenging traditional financial institutions with the promise of decentralized finance and smart contracts. Big data analytics is uncovering hidden insights in massive datasets, empowering better risk assessment and customer service. Quantum computing, while still in its infancy, holds the potential to revolutionize complex financial calculations.

However, as we navigate this brave new world, we must also confront challenges and ethical considerations. Data privacy, regulatory compliance and algorithm bias have been the issues putting the challenges before the entire world. Balancing innovation with accountability becomes paramount in this dynamic environment.

Through this exploration of disruptive technologies in computational finance, we tried to put a detailed overview of the current scenario and which will offer key insights for the future of finance. As we journey through the various facets of this transformation, we will gain a deeper understanding of how these technologies are not only disrupting but also enhancing the world of finance, ultimately shaping a more efficient, accessible, and adaptive financial ecosystem. However, this rapid transformation raises ethical concerns regarding data privacy, algorithmic bias, and

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