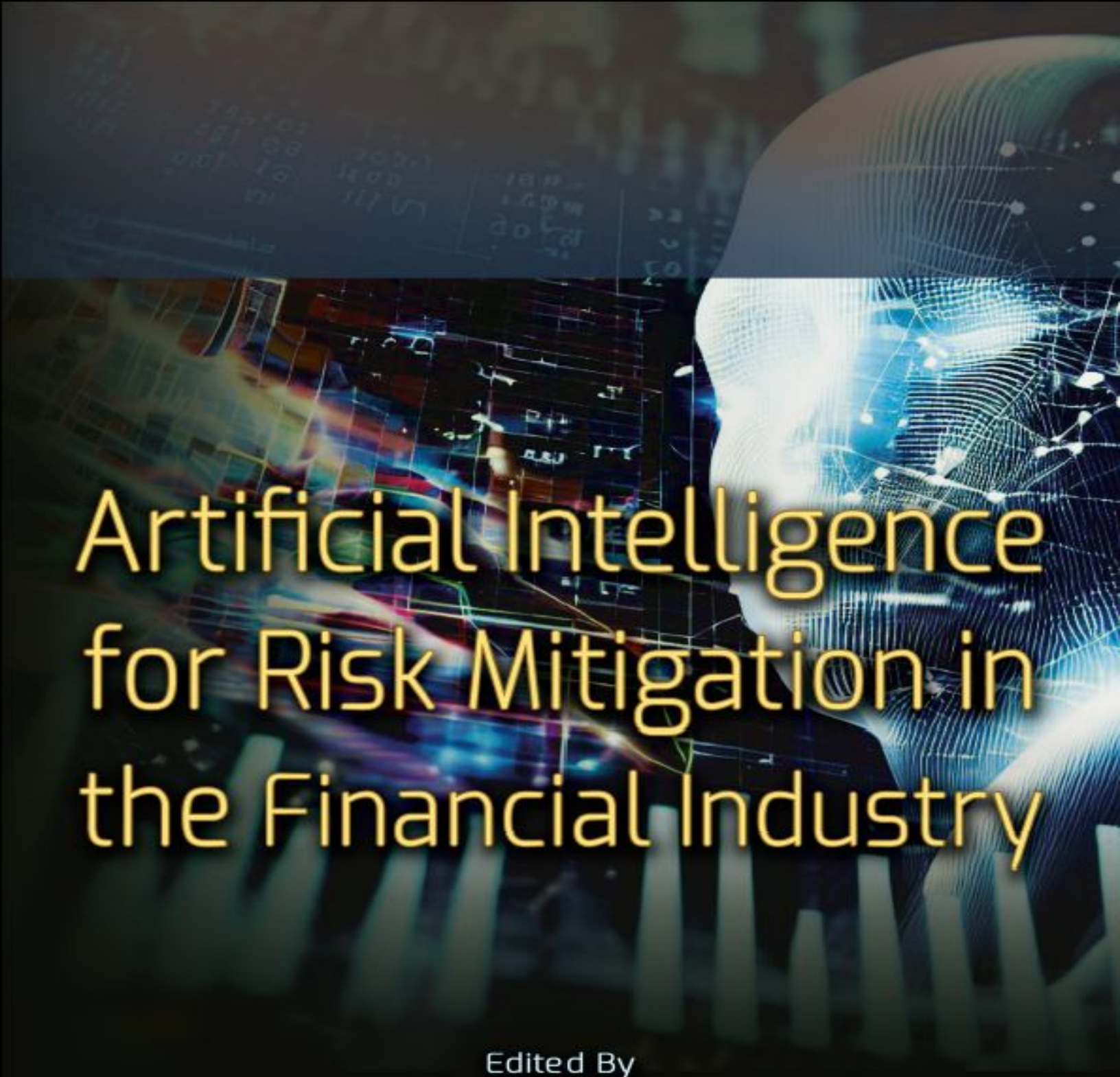

Artificial Intelligence for Risk Mitigation in the Financial Industry

Edited By
Ambrish Kumar Mishra, Shweta Anand,
Narayan C. Debnath, Purvi Pokhariyal, and Archana Patel

Scrivener Publishing

WILEY

Table of Contents

List of Tables

Chapter 13

List of Illustrations

Chapter 2

Chapter 3

Chapter 4

Chapter 13

Scrivener Publishing
100 Cummings Center, Suite 541J
Beverly, MA 01915-6106

Publishers at Scrivener
Martin Scrivener (martin@scrivenerpublishing.com)
Phillip Carmical (pcarmical@scrivenerpublishing.com)

Artificial Intelligence for Risk Mitigation in the Financial Industry

Edited by

Ambrish Kumar Mishra

School of Management, Gautam Buddha University, Greater Noida, Uttar Pradesh, India

Shweta Anand

School of Management, Gautam Buddha University, Greater Noida, Uttar Pradesh, India

Narayan C. Debnath

Department of Software Engineering, Eastern International University, Vietnam

Purvi Pokhariyal

National Forensic Sciences University, Delhi

and

Archana Patel

National Forensic Sciences University, Gujarat, India

WILEY

This edition first published 2024 by John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, USA and Scrivener Publishing LLC, 100 Cummings Center, Suite 541J, Beverly, MA 01915, USA

For more information about Scrivener publications please visit www.scrivenerpublishing.com.

Wiley Global Headquarters
111 River Street, Hoboken, NJ 07030, USA

For details of our global editorial offices, customer services, and more information about Wiley products visit us at www.wiley.com.

Library of Congress Cataloging-in-Publication Data

ISBN 978-1-394-17471-3

Cover image: Pixabay.Com
Cover design by Russell Richardson

Preface

The financial industry plays a vital role in the social and economic development of any country. Economic growth lends complexity to operations, and the leveraging of technology-based decision tools is becoming prominent in today's world. Consequently, risk mitigation in the financial industry is tuning into this change with the integration of artificial intelligence (AI) systems. The audit process recognizes associated risks and suggests possible transformations to mitigate them. The idea of using AI technology in risk mitigation is not entirely new, because it has been used as a decisionsupport model for the auditors in past. Since the 1950s, researchers have tried to find opportunities to make machines act with human intelligence, and this started to happen at the beginning of the 21st century when machines became able to work on advanced algorithms and perform the analysis and decision-making more intelligently. Due to continuous advancement in technology, availability of enormous big data, and processing capacity, there is reason to believe that it will continue to make a significant impact in risk mitigation in the financial industry.

The applications of the financial industry incorporate vast volumes of structured and unstructured data to gain insight into the financial and non-financial performance of companies. As a result of exponentially increasing data, auditors and management professionals need to enhance processing capabilities while maintaining the effectiveness and reliability of the risk mitigation process. The risk mitigation and audit procedures are processes involving the progression of activities to "transform inputs into output." As AI systems continue to grow mainstream, it is

difficult to imagine an aspect of risk mitigation in the financial industry that will not require AI-related assurance or AI-assisted advisory services. AI can be used as a strong tool in many ways, like the prevention of fraud, money laundering, and cybercrime, detection of risks and probability of NPAs at early stages, sound lending, etc. There is no closely related study, or a smaller number of studies, being published to help mitigate the risk in the financial industry with AI. Hence, there is a gap that inspires researchers to develop a strong foundation for prospective research that will benefit industries across the globe.

This is an introductory book that provides insights on the advantages of risk mitigation by the adoption of AI in the financial industry. The subject is not only restricted to individuals like researchers, auditors, and management professionals, but also includes decision-making authorities like government. By extensively exploring the implementation of AI in the risk mitigation process enhances the effectiveness and reliability of the process. This book is a valuable guide to the utilization of AI for risk mitigation and will serve as an important standalone reference for years to come.

We are deeply grateful to everyone who helped with this book and greatly appreciate the dedicated support and valuable assistance rendered by Martin Scrivener and the Scrivener Publishing team during its publication.

The Editors

1
Artificial Intelligence in Risk Management

Pankaj Yadav, Priya Gupta, Rajeev Sijariya and Yogesh Sharma*

Atal Bihari Vajpayee School of Management and Entrepreneurship, Jawaharlal Nehru University, New Delhi, India

Abstract

The financial industry is well known for a high level of complexity in addition to a rapid rate of change; hence, it is important that effective risk management practices should be put into place. Traditional methods of risk management have many limitations, such as their inability to manage huge amounts of data, their inability to react quickly to swings in the market, and their inability to give real-time monitoring of market trends. Artificial intelligence (AI) can enhance the efficiency and effectiveness of risk management in the financial sector using deep learning, machine learning algorithms, and natural language processing. These methods can be used to ascertain the existence of potential threats, unearth fraudulent activities, and provide predictive analytics that are helpful in making decisions. The application of artificial intelligence to risk management has the potential to significantly improve decision-making and to reduce risks and raise overall financial stability. These benefits could be achieved through the use of artificial intelligence. The chapter presents an in-depth review of the potential ways in which AI could improve risk management methods in the financial industry. The chapter includes types of risks in the financial

industry with the light on the various advantages that artificial intelligence could bring to mitigate this risk. These advantages include the capacity to analyze huge volumes of data and the flexibility to respond to altering market conditions. The chapter will also discuss real-time monitoring of market trends as well as alerts for potential risks, different tools of artificial intelligence make it possible for businesses to proactively manage the risks to which they are exposed. This chapter will provide an insight into the opportunities and limitations and ethical challenges of this technology by providing the tools and methodologies that are used in AI-based risk management.

***Keywords*:** Artificial intelligence, machine learning, risk management, sentiment analysis, predictive analysis

1.1 Introduction

The financial industry operates within a dynamic and intricate environment that is characterized by complicated transactions, volatile markets, and regulatory limits. This environment is necessary for the sector to function effectively. In recent years, there have been significant shifts in the global economy as a result of technology upheavals, economic uncertainties, and evolving geopolitical landscapes. These factors have shaped these changes. It is essential to be aware that the financial sector makes a considerable contribution to the economy of the entire world, accounting for approximately 7%–8% of the total gross domestic product (GDP) of the entire world[1]. The contribution of India's financial sector to the country's GDP has been gradually expanding in recent years, reaching approximately 7.5% of the total[2].

The overall market capitalization of the global financial markets is measured in the trillions of dollars. These

markets are enormous. For illustration, the New York Stock Exchange alone had a market capitalization of more than $19 trillion[3]. On the other hand, throughout the course of the past few years, the stock market in India has experienced a substantial amount of expansion. The overall market capitalization of the Bombay Stock Exchange (BSE) was close to $3 trillion [1].

The global banking industry is controlled by significant businesses based in a variety of geographic locations. To give just one illustration, the 10 largest banks in the world collectively have assets that are worth trillions of dollars. According to S&P Global Market Intelligence, the banking industry in India is made up of a combination of public sector, private sector, and international banks. The State Bank of India (SBI), which is India's most prominent financial institution, has assets worth more than 600 billion dollars in total (Information obtained from the State Bank of India).

When the economy of India is compared to the economy of the world as a whole, it becomes abundantly evident that both must contend with the presence of a unique set of challenges. Following the global economic crisis of 2008, governments and financial institutions in every region of the world came to the realization that they needed to do a better job of risk management.

As a direct consequence of this, artificial intelligence (AI) is being applied in an increasing number of risk assessment methodologies, leading to the creation of risk models that are more accurate. The major global financial centers of New York, London, and Hong Kong have been at the forefront of the use of artificial intelligence for risk management. These major global financial centers have been utilizing AI's capabilities to minimize systemic risks, handle credit and market risks, and combat financial crime.

The way risk management is carried out in these spheres has been revolutionized by AI, which has enabled financial institutions to better keep up with the rapid shifts that are occurring in the market and in the rules.

It has become essential for financial institutions all over the world to include AI into their risk management processes. This gives these institutions the ability to negotiate the intricacies and difficulties connected with modern banking. Real-time monitoring, predictive analytics, and the ability to automate decision-making are just a few of the benefits offered by risk management systems that are powered by artificial intelligence. These technologies give financial institutions the ability to recognize possible hazards, spot irregularities, and react quickly to newly emerging dangers, thereby boosting their capacity to protect investments and keep operations steady.

1.1.1 Context and the Driving Force Behind It

For the purpose of guaranteeing financial stability, protecting investments, and defending the interests of stakeholders, effective risk management is an absolute necessity. Traditional techniques of risk management, on the other hand, have a difficult time keeping up with the volumes of data that need to be managed, responding quickly to fluctuations in the market, and providing real-time monitoring of market trends. In this chapter, these constraints are discussed, and an investigation of the potential of artificial intelligence to improve risk management in the financial sector is conducted.

1.1.2 Aim of This Chapter

To provide an in-depth understanding of how AI can improve risk management practices in the financial

industry is the primary purpose of this chapter. The goals of this chapter are to:

a. Explain what artificial intelligence is and how it relates to risk management.
b. Engage in a discussion on the shortcomings of conventional approaches to risk management.
c. Investigate the potential applications of a variety of AI-based methodologies, including deep learning, machine learning algorithms, and natural language processing, in the context of risk management.
d. Discuss the difficulties and factors to consider when putting artificial intelligence into risk management systems.
e. Explain the benefits of artificial intelligence, such as its capacity to process large amounts of data and adapt quickly to shifting market conditions.
f. Give some background information on the approaches and tools that are utilized in AI-based risk management.
g. Discuss the restrictions, obstacles, and ethical concerns that are involved with the use of AI in risk management.
h. As a last step, provide a high-level summary of the potential effects that AI could have on decision-making, risk reduction, and overall financial stability.

1.1.3 Outline of This Chapter

This chapter is structured as follows: Section 1.2 provides an overview of risk management in the financial sector. Section 1.3 discusses the role of artificial intelligence in risk management. Section 1.4 addresses the issues that

arise when implementing AI-based risk management systems. Section 1.5 highlights the advantages of utilizing artificial intelligence in risk management. Section 1.6 delves into the methodologies and tools available for AI-based risk management. Section 1.7 examines the limitations and key considerations associated with AI-based risk management. Finally, Section 1.8 concludes the chapter, summarizing the main points discussed throughout.

1.2 The Role of AI in Risk Management

1.2.1 The Significance of Risk Management

Risk management is very important in the financial industry, which is subject to numerous different sorts of risks, such as market risk, credit risk, liquidity risk, operational risk, and regulatory compliance risk [2]. Institutions in this industry are susceptible to all of these types of risks. It is possible for financial institutions to identify, evaluate, and mitigate risks through effective risk management, which in turn ensures the stability and resilience of the institutions' operational processes. It entails the formulation and execution of plans, policies, and procedures with the purpose of proactively managing risks while simultaneously optimizing returns on investments [3].

In a nutshell, risk management is important because it enables businesses to foresee the occurrence of prospective risks and take preventative measures before the dangers actually materialize. It secures an organization's reputation, prevents financial losses, helps with decision-making, guarantees compliance, provides operational continuity, and cultivates confidence and trust among stakeholders. In today's increasingly volatile

economic climate, businesses can improve their resiliency, adaptability, and long-term success by putting in place effective risk management practices.

1.2.2 Deficiencies in Conventional Methods of Risk Management

Methods of risk management that have been around for a long time have a number of drawbacks that reduce their efficiency in today's fast shifting financial world. These restrictions include the following:

a. An inability to manage big quantities of data: Financial organizations produce enormous volumes of data from a variety of sources, including trading operations, customer information, market data, and regulatory reports. These institutions face a challenge when it comes to managing these data. When dealing with datasets of this size, traditional approaches frequently struggle to perform an effective processing and analysis [4].

b. An absence of real-time monitoring: Conventional risk management systems often rely on monthly reports and assessments, which may not provide real-time insights into newly developing risks and market trends. This lag in knowledge makes it more difficult to make decisions in a timely manner and raises exposure to the possibility of risks [5].

c. A limited capacity to adjust to changes in market conditions: The financial markets are notorious for their volatility and their constantly shifting conditions. Traditional techniques of risk management may be unable to respond rapidly enough to these market movements, which may result in delayed risk mitigation steps and possible financial losses [6].