Chapter 4
Financial Modelling 2.0: The Machine Learning Transformation

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ABSTRACT

Traditional financial modeling involves the use of historic data with preset formulae. However, the rising complexity of financial markets calls for more advanced tools. This chapter discusses how machine learning and its algorithms will revolutionize financial modeling by moving into a new realm of Financial Modeling 2.0. We will discuss how ML algorithms can analyze large amounts of data and discover hidden patterns and relationships that may elude classic techniques. This will yield more accurate and adaptive financial models, which will be built to predict future performance and, with time, to improve on their predictions. The chapter thus focuses on specific ML applications to financial modeling, underscoring their potential use for tasks and their advantages. The chapter concludes by asserting that machine learning is revolutionizing financial modeling to give one an edge in today's dynamic financial landscape.

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INTRODUCTION

In the shifting sands of world finance, old models stood foursquare as immovable sentinels to fiscal prudence. However, times are changing as globalization and technological advancement surge forward, and these hoary methods now struggle to keep pace, showing them cracks in the once-reliable facades. Visualize an older mariner navigating well-known waters, suddenly amidst a tempest of data: social media trends, economic upheavals, and unforeseen crises. The old maps, drawn from historic patterns, do not chart a course through this chaos.

Machine Learning is the new skipper on this vessel, arriving fully armed with algorithms that can interpret the hidden currents of financial data. With the ability for real-time learning and adaptation, these better models promise to reveal the complex relationships that their more traditional counterparts often miss. As we embark on this journey into the world of Machine Learning, get ready for a show-and-tell on how it reworks the traditional process of making sense of and predicting the capricious tide of finance.

The Limitations of Traditional Financial Modeling

The three-statement model, discounted cash flow model, merger model (M&A), initial public offering model, and many others make for a long list of traditional financial modeling ways that have been great servants in their time. However, the increased complexity and dynamics of the present world are eating into the core of traditionally great models, rendering them pace-challenged for modern markets (Nazareth & Ramana Reddy, 2023). These models have numerous limitations in relying on formulas, capacity, handling complex markets, and narrow predictive power. Let us expand a little upon these three critical deficiencies:

Reliance on Historical Data and Pre-defined Formulas

Traditional methods operate under the assumption that past trends will persist into the future. This reliance on historical data and pre-defined formulas leaves these models vulnerable to unexpected events, such as the 2008 financial crisis or the COVID-19 pandemic, which can drastically alter market behavior and render past data useless in predicting future disruptive technological advancements like artificial intelligence, blockchain, or the Internet of Things (Bhatore et al., 2020). These events reshape markets and change consumer preferences and behaviors, making the traditional approach incomplete in its future vision and leading to highly inaccurate results and poor risk assessments.