RADemics

Applied AI for Banking and Stock Market Prediction with Cloud-Based Architectures

S. Naga Padma, Gayathri N M
Ramachandra College of Engineering, CMR University

Applied AI for Banking and Stock Market Prediction with Cloud-Based Architectures

[1]S. Naga Padma, Associate Professor, Department of Management Studies, Ramachandra College of Engineering, Eluru, Andhra Pradesh, India. Dr.nagapadmasuravarapu@gmail.com

[2]Gayathri N M, Associate Professor, CMR University, School of Legal Studies, Bangalore, Karnataka, India. Gayathri.n@cmr.edu.in

Abstract

The rapid evolution of digital banking and capital markets has intensified the demand for intelligent, scalable, and resilient analytical frameworks capable of processing high-velocity financial data. Applied Artificial Intelligence (AI) has emerged as a transformative force in banking operations and stock market prediction by enabling advanced credit risk modeling, fraud detection, portfolio optimization, algorithmic trading, and real-time decision support. Yet, the computational intensity and dynamic nature of financial environments require robust cloud-based infrastructures that support distributed training, elastic scalability, low-latency inference, and secure data governance.This chapter presents a comprehensive exploration of AI-driven financial analytics integrated with cloud-native architectures. It examines machine learning, deep learning, and reinforcement learning techniques tailored for banking risk management and market forecasting while addressing model interpretability, bias mitigation, regulatory compliance, and data governance challenges. Emphasis is placed on MLOps pipelines, serverless deployment models, and scalable cloud frameworks that enable continuous integration, automated monitoring, lifecycle governance, and performance optimization. Architectural design patterns, real-time analytics workflows, and resilience strategies are analyzed to demonstrate how cloud-enabled AI systems enhance operational efficiency and predictive accuracy across financial ecosystems.By synthesizing methodological foundations with deployment strategies, this chapter provides a structured framework for designing secure, transparent, and high-performance AI solutions for modern financial institutions. The presented insights contribute to advancing scalable financial intelligence systems aligned with regulatory standards and emerging digital transformation trends in global banking and capital markets.

Keywords: Applied Artificial Intelligence, Banking Analytics, Stock Market Prediction, Cloud-Based Architecture, MLOps, Portfolio Optimization.

Introduction

The contemporary financial ecosystem has undergone a profound transformation driven by digitization, globalization, and the exponential growth of data generated across banking networks and capital markets [1]. Financial institutions process vast streams of transactional records, high-frequency trading data, customer interaction logs, macroeconomic indicators, and alternative data sources such as social media sentiment and geopolitical signals [2]. This surge in data volume and velocity has exceeded the analytical capabilities of conventional statistical and rule-based

frameworks traditionally employed in finance. Increasing market volatility, interconnected global economies, and complex regulatory mandates further intensify the need for predictive intelligence systems capable of real-time analysis and adaptive decision-making [3]. In such an environment, computational models must capture nonlinear relationships, temporal dependencies, and hidden correlations embedded within heterogeneous datasets [4]. The convergence of advanced analytics and scalable computing infrastructures has therefore become central to the modernization of financial services. Artificial intelligence technologies, supported by high-performance cloud ecosystems, provide the computational depth and elasticity required to manage data-intensive financial operations while maintaining reliability, transparency, and institutional governance standards [5].

Applied Artificial Intelligence has emerged as a transformative paradigm in banking operations, redefining approaches to credit evaluation, fraud detection, liquidity forecasting, and customer engagement [6]. Machine learning algorithms analyze multidimensional borrower attributes, transactional behaviors, and credit histories to generate refined risk scores that enhance lending precision and reduce non-performing assets [7]. Pattern recognition models identify anomalous transaction sequences indicative of fraudulent behavior, strengthening institutional resilience against financial crime [8]. Natural language processing techniques interpret unstructured financial documents, regulatory filings, and customer communications, enabling automated compliance screening and sentiment-driven insights. Deep learning architectures further enhance predictive performance by modeling hierarchical feature interactions within large-scale datasets [9]. These technological advancements enable financial institutions to transition from reactive risk management toward anticipatory and intelligence-driven operational frameworks. Through integration with digital banking platforms and enterprise data systems, AI-driven analytics facilitate efficient resource allocation, informed policy formulation, and enhanced customer-centric service delivery across increasingly competitive financial landscapes [10].