RADemics

Intelligent Financial Systems: IoT, Cloud Computing, and Predictive Market Intelligence

Saravanan V, S. Ramasamy
Nehru Institute of Technology, Hindusthan Institute of Technology

Intelligent Financial Systems: IoT, Cloud Computing, and Predictive Market Intelligence

[1]Saravanan V, Professor & Head, Department of Aeronautical Engineering, Nehru Institute of Technology, Coimbatore, Tamil Nadu, India. saravana1712@gmail.com

[2]S. Ramasamy, Associate Professor, Department of Computer Science and Engineering, Hindusthan Institute of Technology, Othakkalmandapam, Coimbatore. ramasany.s@hit.edu.in

Abstract

The rapid digital transformation of global financial ecosystems has accelerated the convergence of Internet of Things (IoT), cloud computing, and artificial intelligence into unified intelligent financial systems capable of real-time analytics and autonomous decision-making. Contemporary financial infrastructures increasingly depend on interconnected sensing devices, scalable cloud-native architectures, and advanced predictive models to manage high-velocity transactional streams, mitigate systemic risk, and enhance market responsiveness. This chapter presents a comprehensive architectural and analytical framework that integrates IoT-enabled data acquisition, serverless and distributed cloud computing environments, ensemble machine learning–based risk modeling, and latency-optimized edge intelligence to support next-generation financial operations.

Special emphasis is placed on predictive market intelligence, including advanced ensemble learning techniques for credit risk assessment, fraud detection, portfolio optimization, and high-frequency trading architectures. The discussion further addresses adversarial resilience, AI robustness, privacy-preserving computation, and Regulatory Technology (RegTech) mechanisms designed to ensure automated compliance within complex regulatory landscapes. By synthesizing edge–cloud–AI integration strategies with secure and explainable analytical models, the chapter establishes a scalable, adaptive, and governance-aligned blueprint for intelligent financial infrastructures. The proposed perspective contributes to ongoing research by identifying architectural gaps, security challenges, and performance optimization requirements necessary for sustainable and trustworthy financial digitalization within globally interconnected markets.

Keywords: Intelligent Financial Systems; Internet of Things (IoT); Cloud Computing; Predictive Market Intelligence; Ensemble Machine Learning; Regulatory Technology (RegTech).

Introduction

The financial services sector has entered a transformative phase characterized by pervasive digitization, hyper-connectivity, and data-centric intelligence [1]. Rapid expansion of digital payment ecosystems, algorithmic trading platforms, online lending systems, and decentralized financial networks has fundamentally redefined operational and strategic paradigms across global markets. Traditional financial infrastructures, historically dependent on centralized processing and periodic reporting cycles, face increasing pressure to accommodate real-time transaction volumes, dynamic risk environments, and stringent regulatory expectations [2]. Intelligent Financial

Systems emerge within this context as an integrated technological evolution that combines Internet of Things (IoT) infrastructures, cloud-native computing environments, and predictive analytics engines to enable adaptive and autonomous financial operations [3]. Continuous data streams generated from smart devices, digital banking interfaces, and interconnected financial endpoints contribute to a multidimensional ecosystem where decision-making processes extend beyond historical analysis toward anticipatory intelligence [4]. Financial institutions increasingly deploy advanced computational models capable of identifying latent patterns within high-frequency datasets, enhancing operational agility and strategic foresight. This paradigm shift reflects not merely technological adoption but structural reengineering of financial architecture, emphasizing scalability, resilience, transparency, and analytical depth in response to intensifying global competition and economic volatility [5].

IoT integration within financial ecosystems expands the scope of data acquisition and contextual intelligence available for analysis [6]. Smart payment terminals, biometric authentication mechanisms, connected ATMs, wearable transaction devices, and embedded sensors within supply chain finance networks continuously generate granular behavioral and transactional information [7]. Such device-level intelligence enriches financial datasets with spatial, temporal, and contextual attributes that support real-time fraud detection, dynamic credit profiling, and behavioral risk analytics [8]. Edge-enabled processing capabilities embedded in IoT infrastructures facilitate localized feature extraction and rapid anomaly detection, strengthening responsiveness in latency-sensitive environments. High-frequency event streams require distributed processing architectures capable of sustaining accuracy without compromising performance [9]. IoT-driven financial frameworks therefore demand seamless interoperability between edge nodes and centralized cloud platforms to ensure synchronized intelligence across operational layers. This integration supports adaptive authentication protocols, transaction validation mechanisms, and predictive monitoring systems that contribute to enhanced trust and security across digital finance channels [10].