Research on an Integrated System for Intelligent Monitoring and Early Warning of Financial Security Risks

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Abstract:

This paper addresses the core challenges of the current financial landscape, including increasingly complex and intertwined risks, outdated monitoring methods, and inadequate technological support for risk prevention and control, by proposing an intelligent monitoring system that aligns with the national financial security strategy. Guided by the objectives of "early detection, clear visualization, precise measurement, and agile coordination," the system establishes a three-dimensional theoretical framework that integrates multimodal recognition, network topology modeling, and global measure analysis. This framework establishes a closed-loop system that encompasses the perception of multi-source, heterogeneous data, the construction of dynamic risk maps, and policy simulation. At the perception layer, the system integrates structured and unstructured financial market data and proactively captures early warning signals through multimodal feature alignment and fusion techniques. At the modeling layer, the system constructs dynamic financial network topologies based on entity relationships. This process precisely maps inter-institutional connections and risk transmission pathways. These maps support cascade effect simulations and structural vulnerability identification. The simulation layer introduces a hybrid evaluation mechanism that combines global risk indicators with localized anomaly detection. Together with scenario analysis and stress testing, this allows for the early quantitative detection of systemic risks and the simulation of the effects of policy interventions. The system integrates unstructured and structured data, including text, images, and time series, using complex network graph models to map risk transmission pathways. When combined with intelligent algorithms, the system achieves precise risk quantification and real-time early warning. At the engineering level, a highly cohesive, scalable, layered architecture supports customized applications for multiple stakeholders, including regulators, financial institutions, and investors. This system provides scientific decision support for macroprudential management and localized risk resolution, and it establishes a practical technical paradigm for building a proactive, forward-looking financial security governance framework.