

Application Analysis of Artificial Intelligence in Financial Risk Assessment: A Case Study of Ant Group

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Abstract:

The rapid advancement of artificial intelligence (AI) technology has introduced novel methodologies and practical tools for financial risk assessment. This study focuses on Ant Group to explore the technical architecture, application scenarios, and practical outcomes of AI in financial risk evaluation. By analyzing Ant Group's intelligent risk control system, which integrates big data and AI technologies, the research reveals that its approach—synthesizing multi-source heterogeneous data, enabling real-time dynamic monitoring, and optimizing deep learning models—significantly enhances the accuracy of credit assessments and anti-fraud capabilities while scaling inclusive financial services. However, challenges persist during implementation, including algorithmic opacity, data privacy concerns, and regulatory misalignment. To address these issues, this paper proposes optimization strategies such as improving model interpretability, refining data governance frameworks, and establishing adaptive regulatory mechanisms, offering theoretical and practical insights for the intelligent transformation of the financial industry.

Keywords: Artificial Intelligence, Financial Risk Assessment, Ant Group; Intelligent Risk Control, Machine Learning, Data Privacy

1. Introduction

1.1 Research Objectives

This study aims to methodically examine the fundamental application frameworks and implementation trajectories of artificial intelligence (AI) technologies within financial risk evaluation contexts, centering on

Ant Group as a paradigmatic case study to dissect the technical architecture, data-driven methodologies, and innovative outcomes of its intelligent risk control system. By focusing on specific application scenarios, the research addresses three pivotal questions: (1) How does AI enhance the precision and real-time capabilities of financial risk assessment through multi-source data integration and algorithmic optimization?

(2) What replicable paradigms have emerged from fintech enterprises like Ant Group in operationalizing AI-driven solutions? (3) How can challenges such as data privacy, algorithmic transparency, and regulatory alignment be effectively mitigated in AI applications? Through integrating theoretical insights with practical evidence, this investigation seeks to unravel the intrinsic mechanisms by which AI empowers risk assessment, distill critical strategies for technological deployment and risk mitigation, and provide actionable methodologies to support the intelligent transformation of financial institutions. Additionally, it offers policy recommendations for refining governance frameworks and regulatory protocols.

1.2 Research Background

1.2.1 Convergence of AI and the Financial Sector

The accelerating global digital transformation has positioned AI as a transformative force reshaping the financial ecosystem. Technological breakthroughs in machine learning (ML), deep learning (DL), and natural language processing (NLP) have not only automated and optimized financial workflows but also revolutionized risk management practices.[1] By efficiently processing vast heterogeneous datasets, uncovering non-linear correlations, and dynamically forecasting market trends, AI significantly elevates the accuracy and responsiveness of risk assessment.[2] Fintech enterprises, particularly Ant Group, have emerged as pivotal innovators in this domain. Leveraging its extensive user base, multidimensional data resources, and cutting-edge technical infrastructure, Ant Group exemplifies the integration of AI into financial risk evaluation, serving as a benchmark for industry.[3]

1.2.2 Significance of Financial Risk Assessment and Limitations of Traditional Approaches

Financial risk assessment is a cornerstone of institutional stability, directly influencing market integrity and investor protection. However, traditional methodologies—reliant on financial statement analysis, expert judgment, and linear statistical models—face critical limitations in today's interconnected and digitized economic landscape. These include: (1) inadequate capacity to parse unstructured data (e.g., user behavior, social interactions); (2) model latency incompatible with high-frequency, dynamic markets; and (3) inefficiencies and subjective biases stemming from manual interventions. For instance, conventional credit evaluation systems overemphasize historical financial metrics while neglecting real-time behavioral indicators, resulting in narrow risk coverage and elevated misjudgment rates.

1.2.3 Ant Group's Strategic Position and Risk Assess-

ment Imperatives

As a global fintech leader, Ant Group has established a comprehensive ecosystem spanning payment services (Alipay), credit solutions (Huabei), and wealth management (Yu'eobao), serving over 1 billion users. Its complex and scaled operations impose stringent risk management demands: real-time credit risk evaluation for hundreds of millions of consumers to mitigate defaults, dynamic asset allocation balancing market volatility in wealth management, and compliance risk mitigation in cross-border transactions. Furthermore, its commitment to inclusive finance necessitates innovative AI-driven approaches to assess creditworthiness among underserved populations (e.g., individuals lacking traditional credit histories), transcending conventional risk management boundaries.

1.2.4 AI Applications in Ant Group's Risk Assessment and Research Implications

Ant Group's intelligent risk control framework, structured around the triad of "data-algorithm-scenario," exemplifies industry-leading innovation. For example, its DL-powered *Sesame Credit* model integrates over 3,000 dimensions of user data, including consumption patterns, social networks, and device fingerprints—to dynamically update credit scores and predict risks. NLP-driven sentiment analysis of real-time public opinion data enables proactive market risk alerts, while federated learning frameworks facilitate cross-institutional risk data sharing without compromising privacy. These practices have reduced non-performing loan ratios to below 1%, demonstrating AI's scalability in advancing inclusive finance.[1]

This study's focus on Ant Group's AI risk management practices aims to deliver threefold contributions:

- **Theoretical:** Articulate the technical logic of AI-driven risk assessment and construct a "data fusion–algorithm optimization–real-time response" framework.
- **Practical:** Synthesize replicable technical solutions and governance insights to guide institutional digital transformation.
- **Regulatory:** Analyze emerging risks such as algorithmic opacity and data privacy breaches, informing the design of adaptive regulatory mechanisms.

Through interdisciplinary case analysis, this research seeks to foster deeper integration of AI and financial risk management, ultimately contributing to a safer, more inclusive, and efficient financial ecosystem.

2. Research Methodology

This study adopts a hybrid research framework integrating **literature review** and **case analysis** to systematically

investigate the application pathways, core technologies, and regulatory challenges of artificial intelligence (AI) in financial risk assessment. By synthesizing academic insights and industry practices, alongside an in-depth examination of Ant Group's case, the methodology is structured as follows:

2.1 Literature Review

2.1.1 Theoretical Literature Synthesis

A systematic review of global academic literature on AI in financial risk assessment was conducted, with emphasis on:

- Regulatory frameworks for high-risk AI models under the EU Artificial Intelligence Act (AIA);
- Applications of Explainable AI (XAI) techniques (e.g., SHAP value analysis) in credit risk evaluation;
- Critical theoretical issues, including algorithmic fairness and model bias.

For instance, drawing on Fritz-Morgenthal et al. (2022)'s model risk governance framework, this study aligns theoretical constructs—such as technical layers (e.g., machine learning algorithms, real-time monitoring systems), institutional layers (e.g., risk control protocols, regulatory compliance frameworks), and application layers (e.g., customer segmentation, risk-based product pricing)—with Ant Group's data security and compliance practices.[4]

2.1.2 Industry Reports and Case Synthesis

Publicly available documents were analyzed to construct a multidimensional analytical framework, including:

- Ant Group's financial disclosures, regulatory filings (e.g., compliance mandates under China's *Interim Measures for Online Micro-Lending Business*), and technical whitepapers (e.g., the *Ant Shield* risk control system blueprint);
- Academic categorizations of internet finance risks (e.g., IT risks, liquidity risks, market interest rate risks).

Comparative analyses of fintech enterprises' risk assessment strategies were conducted to evaluate the efficacy of divergent technical approaches, such as traditional statistical models versus deep learning architectures in credit evaluation.

2.2 Case Analysis

Focusing on **Ant Group's Ant Financial Services Intelligent System**, the analysis unfolds across four stages:

1. Business Decomposition: Dissecting Ant Group's financial operations to identify core risk-bearing components.
2. Risk Identification: Mapping multi-dimensional risks (e.g., credit defaults, market volatility) through AI-driven anomaly detection.
3. Technological Application: Evaluating the integration

of AI tools (e.g., machine learning, federated learning) into risk mitigation workflows.

4. Regulatory Response: Assessing compliance adaptations to evolving policies (e.g., data localization mandates, algorithmic transparency requirements).

2.3 Introduction of Ant Group

2.3.1 Current Business Status

Ant Consumer Finance (ACF) has served over 400 million consumers, with more than 60% of these users having no prior credit card usage history. For this demographic, Huabei (Ant Group's consumer credit product) often serves as their first exposure to formal financial services. This underscores Huabei's role as an innovative financial tool increasingly adopted by a broad consumer base. Demographically, 82.95% of Alipay users fall within the 18–35 age bracket, and 47.95% of Huabei users belong to this cohort, highlighting its popularity among younger generations.

2.3.2 Methodological Framework:

Machine Learning-Driven Credit Scoring Models

- **Logistic Regression:** Analyzes historical data to establish linear relationships between feature variables (e.g., income stability, repayment history) and default probabilities, enabling baseline credit risk prediction.

- **Ensemble Decision Trees (e.g., Random Forest):** Handles nonlinear interactions among variables (e.g., spending frequency, repayment punctuality) by aggregating predictions from multiple decision trees, thereby enhancing credit classification accuracy.

Dynamic Credit Limit Adjustment and Risk Monitoring

- Initial credit limits are assigned based on algorithmic scoring.
- Real-time monitoring of user behavior (e.g., transaction patterns, repayment delays) triggers dynamic risk reassessments. Abnormal activities or missed payments prompt immediate credit limit adjustments to mitigate default risks.

2.3.3 Competitive Advantages:

Credit Assessment Accuracy

- **Traditional Methods:** Rely on manual reviews and limited financial data, achieving accuracy rates of 70%–80%.

- **AI-Driven Approach:** Leverages multidimensional data (e.g., behavioral analytics, social signals) and deep learning algorithms to elevate accuracy to over 90%.

Market Risk Response Efficiency

- **Conventional Practices:** Dependent on manual analysis and periodic reporting, with response times ranging from hours to days.

- **AI-Powered Systems:** Enable real-time monitoring and alerts, reducing response times to minutes. For instance, anomalies in transaction volumes or liquidity shifts trigger instant warnings, allowing proactive risk mitigation.

3. Analytical Review

3.1 Core AI Technologies in Ant Group's Financial Risk Assessment

Ant Group employs diverse AI technologies to enhance its risk management capabilities across domains such as credit scoring and fraud detection. The primary AI-driven methodologies include[5]:

3.1.1 Machine Learning Algorithms

- **Supervised and Unsupervised Learning:** Supervised learning algorithms (e.g., decision trees, support vector machines) process structured data—such as loan histories, repayment capacities, and socioeconomic profiles—to evaluate creditworthiness. Unsupervised learning techniques are extensively utilized to detect latent anomalies in fraud detection, anti-money laundering (AML), and market risk assessment, identifying complex risk patterns overlooked by conventional models.

- **Deep Learning:** Deep neural networks (DNNs) analyze unstructured data (e.g., customer behavior logs, transaction records) to autonomously extract features and predict risks. These models excel in tasks such as default prediction and fraud identification, demonstrating superior accuracy in dynamic scenarios.

3.1.2 Natural Language Processing (NLP)

NLP enables Ant Group to derive actionable insights from unstructured textual data (e.g., social media interactions, customer feedback, loan applications). Through sentiment analysis and intent recognition, the system captures nuanced shifts in user sentiment and credit intent, refining risk prediction models.

3.1.3 Reinforcement Learning (RL)

RL algorithms optimize risk management decisions, particularly in credit approval and fraud detection. By iteratively learning from historical outcomes, RL models autonomously adjust risk control strategies, enhancing adaptability in fluctuating environments.

3.1.4 Ensemble Learning

Techniques like gradient-boosted decision trees (GBDT) combine multiple base learners to improve model stability and accuracy. This approach mitigates single-model biases, ensuring robust performance in credit scoring and

fraud detection.

3.2 Data Collection and Utilization

Ant Group's risk assessment framework relies on diversified data acquisition strategies to ensure comprehensive and precise inputs for AI models.

3.2.1 Structured Data

Collaborations with banks, financial institutions, and third-party data providers enable real-time access to traditional financial metrics—credit scores, transaction histories, income levels, and consumption patterns—forming the foundation for loan approvals and credit evaluations.

3.2.2 Unstructured Data

- **Social Media and Textual Data:** NLP-driven analysis of social media posts and user reviews supplements risk assessments by identifying behavioral trends and emotional cues.

- **Behavioral Data:** Real-time monitoring of online purchasing habits, financial product usage, and transaction frequency supports dynamic credit scoring and risk surveillance, offering multidimensional insights into user reliability.

3.3 AI Applications in Financial Risk Assessment

Ant Group's AI implementations have yielded transformative outcomes in key risk domains:

3.3.1 Credit Risk Evaluation

- **Traditional vs. AI-Driven Models:** Unlike static models (e.g., FICO scores), Ant Group integrates multidimensional structured and unstructured data via DL and ML to generate dynamic, personalized credit scores. This approach enables real-time adjustments aligned with market fluctuations.[6]

- **Dynamic Credit Profiling:** Machine learning continuously updates credit scores and risk profiles, enhancing accuracy and responsiveness to economic shifts.

3.3.2 Fraud Detection and Prevention

- **Real-Time Transaction Monitoring:** AI models cross-reference historical behavior, live transaction data, and market signals to detect subtle fraud patterns, significantly improving detection rates and response speeds.[7]

- **AML Solutions:** Graph neural networks (GNNs) and spatiotemporal graph convolutional networks (ST-GCNs) trace anomalous fund flows across payment networks, identifying potential money laundering activities.[8]

3.3.3 Market Risk Forecasting

- **Sentiment-Driven Market Analysis:** NLP-powered

sentiment analysis of news, policy changes, and social media trends predicts market volatility, informing asset pricing and investment strategies.[9]

- **Scenario Stress Testing:** Simulation of extreme economic scenarios (e.g., interest rate shocks, pandemic disruptions) evaluates systemic risks, enabling preemptive mitigation measures.[10]

3.4 Compliance and Regulatory Challenges

Despite its successes, Ant Group confronts critical challenges in aligning AI systems with evolving regulatory standards:

3.4.1 Data Privacy and Security

While privacy-preserving techniques (e.g., multi-party computation (MPC), trusted execution environments (TEEs)) safeguard data during cross-institutional sharing, scaling these solutions amid expanding collaborations remains a technical and operational hurdle.

3.4.2 Regulatory Adaptation

Global regulations such as the EU AI Act demand heightened algorithmic transparency and compliance. Ant Group addresses these requirements by enhancing model explainability (e.g., SHAP values) and adopting adaptive governance frameworks to meet international data protection norms.

4. Case Analysis

The advent of the digital era has ushered in unprecedented transformations across the financial industry. Rapid advancements in artificial intelligence (AI) have driven profound changes in risk assessment, customer service, and investment decision-making. As a pioneer in fintech, Ant Group (Ant Financial) has successfully leveraged intelligent agent technologies to enhance efficiency, precision, and security of financial services. This section delves into the application of Ant Group's intelligent agents in financial risk assessment, examining their role in risk identification, technological implementation, and regulatory compliance, while summarizing their value propositions and challenges.

4.1 Application Scenarios of Ant Group's Intelligent Agents

Ant Group deploys intelligent agents across multiple financial domains, including risk assessment, customer engagement, and investment management.

4.1.1 . Risk Assessment and Management

- **Credit Risk Evaluation:**

Intelligent agents analyze multidimensional data—such as

consumption patterns, social networks, and credit histories—in real time to predict borrowers' repayment capabilities. Leveraging deep learning algorithms, these agents integrate data from Ant Group's platforms (e.g., Alipay) and external partners to form a holistic credit evaluation framework.[11]

- **Market Risk Monitoring:**

Agents process historical and real-time financial data to identify market risks and issue early warnings. By forecasting market trends, they assist institutions in adjusting investment strategies to mitigate volatility.

4.1.2 . Customer Service and Targeted Marketing

- **AI-Powered Customer Support:**

Natural language processing (NLP) enables intelligent agents to interpret user queries, deliver instant responses, and offer personalized financial advice. For instance, during wealth management consultations, agents recommend products aligned with users' risk appetites.[12]

- **Precision Marketing:**

By analyzing user behavior (e.g., spending habits, investment activities), agents identify unmet financial needs and deliver tailored product recommendations. Marketing strategies are dynamically adjusted based on real-time market trends to optimize conversion rates.

4.1.3 . Investment Decision-Making and Asset Management

- **Intelligent Investment Advisory:**

Agents design customized portfolios by evaluating users' risk tolerance, financial goals, and economic conditions. They continuously recalibrate asset allocations in response to market shifts, maximizing returns while minimizing risks.

- **Asset Allocation Optimization:**

Big data analytics and algorithmic models enable agents to balance risk-return profiles dynamically, enhancing the efficiency of institutional asset management.

4.2 Technological Implementation

Ant Group's intelligent agents rely on advanced AI, big data, and cloud computing technologies to ensure operational efficiency.

4.2.1 Artificial Intelligence

- **Machine Learning (ML):** ML algorithms analyze financial data to refine credit risk models and predict repayment probabilities.

- **Natural Language Processing (NLP):** NLP powers conversational interfaces in customer service and sentiment analysis for market predictions.

- **Deep Learning (DL):** DL processes multimodal data (e.g., facial recognition for identity verification) to bolster

security and fraud detection.

4.2.2 Big Data Infrastructure

- **Data Acquisition and Storage:** Multi-channel data collection and real-time processing underpin agents' decision-making capabilities.
- **Data Analytics:** Techniques such as data cleansing and feature extraction transform raw data into actionable insights, enabling predictive market risk assessments.[13]

4.2.3 . Cloud Computing

- **Elastic Computing:** Cloud-based architectures ensure scalability and stability during high-traffic scenarios.
- **Distributed Systems:** Fault-tolerant frameworks guarantee uninterrupted service delivery, even during system failures.

4.3 Value Creation

Ant Group's intelligent agents generate multifaceted value:

1. **Operational Efficiency:** Automation reduces manual intervention, accelerating processes like customer query resolution and portfolio management.
2. **Cost Reduction:** AI-driven solutions lower operational expenses—e.g., replacing human agents with chatbots cuts labor costs.
3. **Risk Mitigation:** Real-time monitoring and predictive analytics minimize credit defaults and fraudulent activities.
4. **Enhanced User Experience:** Personalized services, such as tailored investment advice and instant support, improve customer satisfaction.

4.4 Case Study: Implementation of Ant Group's Intelligent Agents

4.4.1 Business Decomposition

Intelligent agents are embedded across Ant Group's financial ecosystem, spanning credit evaluation, market surveillance, and customer engagement. Each application involves data collection, processing, model training, and deployment, ensuring adaptability in complex environments.

4.4.2 Risk Identification

Agents employ DL and NLP to detect risks such as market volatility and credit defaults. Machine learning models are iteratively refined to align with evolving market conditions and user behaviors.

4.4.3 Technological Application

Algorithm Optimization: Techniques like ensemble learning and reinforcement learning enhance model accu-

racy and decision robustness.

Real-Time Monitoring: AI-driven systems track transaction anomalies and market sentiment shifts, enabling proactive risk management.[14]

4.4.4 Regulatory Compliance

To address evolving regulations (e.g., GDPR, EU AI Act), Ant Group integrates explainable AI (XAI) tools (e.g., SHAP values) to enhance decision transparency. Privacy-preserving technologies, such as federated learning, ensure compliance with data protection mandates while enabling cross-institutional collaboration. [15]

5. Conclusion and Future Perspectives

5.1 Conclusion

This study systematically investigates the technical architecture, application scenarios, and practical outcomes of artificial intelligence (AI) in financial risk assessment through a focused analysis of Ant Group. [16] The findings reveal that Ant Group's intelligent risk control system, integrating core technologies such as machine learning (ML), deep learning (DL), and natural language processing (NLP), has established a comprehensive framework spanning credit evaluation, fraud detection, and market risk forecasting.[17] Key innovations include:

1. **Data Integration and Real-Time Processing:** The fusion of multi-source heterogeneous data (e.g., structured transaction records, unstructured social media data) overcomes the static limitations of traditional risk models, enabling dynamic risk evaluation.
 2. **Algorithm-Driven Precision:** DL and ensemble learning algorithms facilitate real-time credit score updates and anomaly detection, reducing non-performing loan ratios to below 1%.
 3. **Privacy-Preserving Collaboration:** Federated learning and multi-party computation (MPC) technologies ensure secure cross-institutional data sharing, supporting the scalability of inclusive financial services.
- Nevertheless, challenges persist, including insufficient algorithmic transparency due to "black box" models, complexities in data privacy protection, and regulatory frameworks lagging technological advancements.[18]

5.2 Future Perspectives

To advance AI's role in financial risk assessment, future efforts should focus on three dimensions: technological refinement, institutional innovation, and ecosystem collaboration.[19]

1. Technological Advancements

· **Explainable AI (XAI):** Techniques such as SHAP value analysis and Local Interpretable Model-agnostic Explanations (LIME) should be prioritized to enhance model transparency and foster trust among regulators and users. [20]

· **Quantum Computing Integration:** Exploring synergies between quantum computing and AI could accelerate complex model computations and improve predictive accuracy.

· **Standardization of Privacy Technologies:** Cross-platform compatibility of federated learning frameworks must be optimized to harmonize data sharing with privacy preservation.[21]

2. Institutional Innovations

· **Adaptive Regulatory Mechanisms:** Implementing “regulatory sandboxes” would allow controlled testing of emerging technologies, balancing innovation with risk containment.

· **Data Governance Frameworks:** Legal clarity on data ownership, usage boundaries, and international rules for cross-border data flows is critical.

· **Ethical AI Audits:** Establishing algorithmic fairness audits and ethical guidelines can mitigate biases and systemic risks propagated by AI models.

3. Ecosystem Synergy

· **Cross-Sector Collaboration:** Joint R&D initiatives between financial institutions and tech firms could yield transparent, adaptable risk assessment tools.[22]

· **Global Standardization:** International cooperation to harmonize AI risk control standards and mutual recognition protocols is essential for managing risks in globalized financial services.[23]

Emerging Opportunities:

The advent of generative AI and causal inference technologies opens new frontiers for simulating extreme risks (e.g., black swan events) and conducting counterfactual risk assessments, thereby enhancing financial system resilience. Ant Group’s practices demonstrate that the deep integration of AI and risk management will redefine industry paradigms. However, sustainable progress hinges on dual drivers—technological innovation and institutional safeguards—to achieve intelligent, inclusive, and secure financial services, ultimately contributing to global financial stability and equitable development.

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