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Artificial Intelligence Empowers Risk Management in Asset Appraisal

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Abstract: Against the backdrop of the accelerating penetration of the digital economy, artificial intelligence (AI) technology is profoundly reshaping the development pattern of the asset appraisal industry. As the core guarantee of appraisal business, risk management has long faced pain points, such as lack of independence, inadequate verification, and deviations in profit prediction. Based on the core connotation and current problems of risk management in the asset appraisal industry, this paper systematically analyzes the core logic and key technical support of AI technology empowering risk management, elaborates on the specific application paths of AI in combination with the entire business process, examines the multi-dimensional challenges in the integration process, and proposes targeted optimization countermeasures. Authoritative references are cited to support the core viewpoints, aiming to promote the construction of an intelligent risk management system in the asset appraisal industry and enhance the industry's professional service capabilities and compliance levels.

Keywords: Artificial intelligence; Asset appraisal; Risk management; Human-machine collaboration; Data governance

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1. Introduction

Currently, AI technology has moved from laboratories to large-scale industrial applications, becoming the core engine driving the transformation and upgrading of various industries [1]. China has continued to make efforts in policy support, technological research and development, and industrial implementation in the field of AI, successively issuing policy documents such as the "New Generation Artificial Intelligence Development Plan" and building a complete ecosystem from basic research to commercial application. As an important professional service force in the market economy, the asset appraisal industry undertakes the key functions of discovering asset value, ensuring fair transactions, and maintaining market order, with services covering core scenarios such as state-owned asset operation, capital market mergers and acquisitions, and enterprise value management.

With the continuous improvement of laws and regulations such as the "Asset Appraisal Law" and "Asset Appraisal Standards", regulatory authorities have imposed increasingly strict practice requirements on appraisal institutions and appraisers, and "due diligence and compliant practice" have become the basic bottom line for the

industry's development. However, in actual practice, the industry still faces many risk management pain points. Some institutions have been severely punished for irregular behaviors such as inadequate verification and lack of independence, which not only damages the industry's reputation but also affects the credibility of appraisal conclusions [2–5]. In this context, using AI technology to solve traditional risk management problems and promote the transformation of risk management from "experience-driven" to "data-driven" has become an inevitable choice for the high-quality development of the asset appraisal industry [6]. This paper deeply explores the internal logic and practical paths of AI empowering risk management in asset appraisal, and provides references for the innovative development of the industry combined with authoritative research results.

2. Core connotation and current pain points of risk management in asset appraisal

2.1. Definition of core connotation

Risk management in asset appraisal refers to a series of activities carried out by appraisal institutions to build a closed-loop system of risk identification, assessment, control, monitoring, and improvement around the entire business process to prevent and resolve practice risks [7,8]. Its core goal is to ensure the independence, procedural compliance, sufficient verification, and fairness of conclusions in appraisal work, and reduce potential risks such as legal liability, regulatory penalties, and reputation loss. Combined with regulatory requirements and industry practices, the core dimensions of risk management include four aspects:

(1) Independence risk management, avoiding interest interference and ensuring the objectivity and impartiality of professional judgments;
(2) Verification risk management, ensuring the authenticity, completeness, and traceability of appraisal data;
(3) Profit prediction risk management, ensuring the scientificity and rationality of parameter settings, which are in line with industry and enterprise realities;
(4) Procedural compliance risk management, strictly following standards and regulations, and standardizing process and file management.

2.2. Industry status and main pain points

In recent years, the awareness of risk management in the asset appraisal industry has gradually improved, but due to constraints such as the industry ecosystem and technical conditions, there are still many prominent pain points, specifically manifested as follows.

2.2.1. Difficulties in preventing independence risks

According to the requirements of standards, appraisal institutions and appraisers must maintain independence and objectivity. However, in practice, they are vulnerable to improper pressure from entrusting parties, and some projects have implicit interest connections. The boundary of independence judgment is vague, and problems such as moral hazards and subjective biases are prominent, making it difficult to balance professional services and the bottom line of independence.

2.2.2. Information barriers in verification

Traditional verification relies on on-site investigations, confirmations, and other methods, which are prone to problems such as outdated and incomplete data, low response rates of confirmations, and obstacles to on-site visits, making it difficult to trace the source of key data [9]. At the same time, some appraisers over-rely on audit

conclusions without conducting independent verification. In addition, the efficiency of processing massive data is low, making it easy to miss abnormal information.

2.2.3. Strong subjectivity in profit prediction

In enterprise value appraisal, there is a lack of comparable data in emerging industries, and management's predicted data is highly subjective. Appraisers have insufficient sensitivity analysis on key indicators such as growth rate and gross profit margin, and parameter settings are prone to deviate from industry and historical trends, leading to valuation deviations and regulatory questioning [10].

2.2.4. Prone to omissions in procedural compliance

When projects are rushed, problems such as "procedural inversion" and "perfunctory file filing" occur frequently, including missing records of parameter calculations, lack of traces of communication, and formalistic three-level review, which are difficult to meet regulatory traceability requirements.

2.2.5. Overall control relying on manual work

Traditional risk management is centered on individual appraisers' experience, which is highly subjective and slow to respond. Faced with complex asset types, massive data, and strict regulation, it is difficult to achieve real-time identification and dynamic monitoring of risks.

3. Core logic and technical support of AI empowering risk management in asset appraisal

3.1. Core logic: Transformation from experience-driven to data-driven

The core logic of AI empowering risk management in asset appraisal is to solve the pain points of traditional models through technical means and realize the digital and intelligent upgrading of risk management [11]. The traditional model relies on personal experience, which has problems such as narrow coverage and insufficient accuracy; relying on massive data and advanced algorithms, AI can realize automatic risk identification, accurate assessment, and real-time early warning. At the same time, it can free appraisers from tedious and repetitive labor, focus on core professional judgment links, and form a new management model of "human-machine collaboration".

Its empowering value is reflected in three levels:

(1) Efficiency empowerment, improving risk management efficiency through automated processing and shortening project cycles;

(2) Precision empowerment, reducing human errors and improving the comprehensiveness of risk identification relying on algorithm models;

(3) Compliance empowerment, strengthening full-process compliance control through real-time verification and automatic traceability [12].

It should be clarified that AI is an auxiliary tool, and the final responsibility for appraisal conclusions still lies with appraisers, whose output results need to be professionally verified.

3.2. Key technical support

The application of AI in risk management of asset appraisal relies on the collaborative support of multiple core technologies to build a complete intelligent technical system.

3.2.1. Machine learning and deep learning

As core technologies, they can build risk identification and prediction models through historical data training to automatically identify compliance risk points, evaluate parameter rationality, and detect data abnormalities. For example, a model trained based on regulatory penalty cases can trigger early warnings when parameters deviate from market benchmarks.

3.2.2. Natural language processing (NLP)

Used to process unstructured texts such as appraisal reports, contracts, and legal provisions, realizing automatic compliance verification of reports, extraction of key contract information, and mining of public opinion risks, assisting in verification and compliance control.

3.2.3. Knowledge graph

Structurally associating appraisal standards, industry data, transaction cases, etc., to form a knowledge network, providing support for process guidance, case retrieval, and risk correlation analysis, and assisting appraisers in scientifically setting parameters.

3.2.4. Computer vision (CV)

Combined with equipment such as drones and satellite remote sensing, realizing automatic inventory and status monitoring of physical assets, solving verification problems of assets such as real estate, agriculture, forestry, and minerals, and improving verification accuracy [13].

3.2.5. Privacy computing and blockchain

Privacy computing realizes “data available but not visible” to ensure the security of sensitive data sharing; blockchain realizes non-tamperable and full-traceable processes and data, ensuring the authenticity and compliance of working papers.

4. Practical paths and scenario applications of AI empowering risk management in asset appraisal

The empowerment of AI on risk management in asset appraisal runs through the entire business process. From pre-risk screening in business acceptance, precise control in appraisal implementation, to compliance verification in report issuance and subsequent dynamic monitoring, risks can be effectively prevented and controlled through intelligent technologies.

4.1. Business acceptance stage: Pre-risk screening to avoid pitfalls from the source

Business acceptance is the first line of defense in risk management, with the core of identifying potential risks and avoiding undertaking high-risk projects. AI can realize the intelligent screening of conflicts of interest, integrating cooperation history, personnel connections, industrial and commercial equity and other data based on knowledge graphs to automatically screen conflicts of interest and trigger early warnings. Moreover, it can also realize the project risk level assessment, building quantitative models to divide risk levels, and prompting strengthened control or rejection of high-risk projects [14].

4.2. Appraisal implementation stage: Full-process risk control to improve accuracy

Appraisal implementation is a risk-intensive link, and AI can accurately control core pain points as follows:

(1) Intelligent data collection and cleaning, capturing multi-source data through web crawlers, and automatically correcting outliers through algorithms to ensure data quality;

(2) Multi-dimensional empowerment of verification, realizing automatic confirmation, cross-validation of multi-source data, and intelligent inventory of physical assets;

(3) Risk control of profit prediction, building parameter evaluation models, automatically conducting sensitivity analysis, and retrieving similar cases to assist parameter setting.

4.3. Report issuance stage: Automatic compliance verification to ensure procedural compliance

The core of this stage is to prevent risks such as non-compliant reports and logical contradictions. AI can realize as follows:

(1) Intelligent compliance verification of reports, automatically checking the completeness of report elements and data accuracy based on the standard knowledge base;

(2) Automatic traceability of processes, recording the full-process operations relying on blockchain, and automatically generating standardized working papers;

(3) Intelligent three-level review, integrating AI into the review process to ensure the substantiveness of reviews and avoid formalism.

4.4. Subsequent management stage: Dynamic risk monitoring to achieve continuous improvement

Risk management is a process of continuous improvement. AI can break the limitation of lagging traditional monitoring as outlined:

(1) Dynamic project monitoring, connecting real-time data to build revaluation models, providing real-time early warnings for high-risk projects and conducting regular reviews;

(2) Analysis of industry risk trends, identifying common risks and emerging risks based on industry-wide data;

(3) Continuous optimization of the management system, putting forward suggestions for system optimization by analyzing historical risk data.

5. Challenges faced by AI empowering risk management in asset appraisal

Despite the significant application value of AI, it still faces many challenges in technology implementation and industry adaptation, restricting the effect of in-depth integration.

5.1. Technical level: “Black Box” dilemma and insufficient adaptability

The decision-making process of deep learning models is concealed and lacks interpretability, which does not meet the traceability and verifiability requirements of the appraisal industry and is prone to regulatory questioning; the appraisal methods and risk points vary greatly among different asset types and industry scenarios, and existing models have insufficient versatility. The high cost of technology implementation for small and medium-sized institutions exacerbates the gap in technology application in the industry [15].

5.2. Data level: Data silos and quality control difficulties

The data required for appraisal is scattered among different institutions, lacking effective sharing mechanisms, and the problem of data silos is prominent; the industry has low data standardization, insufficient completeness, and questionable authenticity, which restricts model accuracy; appraisal involves a large amount of sensitive data, leading to great pressure on data security and privacy protection, and is prone to violating laws and regulations such as the "Data Security Law" and "Personal Information Protection Law".

5.3. Legal and institutional level: Lack of liability definition and standards

Laws and regulations have not yet clarified the liability boundary of AI applications. If appraisal errors occur due to model misjudgment, it is difficult to reasonably divide the liability among technology companies, appraisal institutions, and appraisers. There is a lack of special standards for the application of AI in appraisal, and institutions lack unified guidance for application. The traditional regulatory model is difficult to adapt to the new risk management scenarios after the application of AI.

5.4. Talent level: Shortage of interdisciplinary talents

The in-depth integration of AI and asset appraisal requires interdisciplinary talents who not only master appraisal professional knowledge but also are familiar with AI technology. Currently, most industry practitioners lack technical capabilities, while technology talents lack appraisal professional backgrounds, resulting in a significant gap in interdisciplinary talents. The existing personnel have insufficient technical training, and some appraisers have insufficient understanding of AI technology and resist changes, restricting the promotion and application of technology.

6. Optimization countermeasures for AI empowering risk management in asset appraisal

Promoting the in-depth integration of AI and risk management in asset appraisal requires the collaboration of the government, industry associations, appraisal institutions, and technology enterprises, and efforts from multiple dimensions such as technology, data, systems, and talents.

6.1. Technical level: Promote innovation and adaptability to solve the "Black Box" dilemma

Focus on industry needs to develop interpretable AI models that enable the visualization of risk early warnings and valuation logic. Promote collaboration among universities, enterprises, research institutions, and technology companies to develop scenario-specific models and advance model lightweighting. Meanwhile, industry associations should take the lead in building intelligent service platforms to provide low-cost, accessible AI services for the entire industry, thereby reducing the technological gap and fostering balanced development.

6.2. Data level: Strengthen governance to break data silos

Industry associations should take the lead in building standardized databases and clearly defining data collection standards and quality requirements. A trusted data space should be established by leveraging privacy computing and blockchain technologies to enable secure data sharing. Meanwhile, appraisal institutions need to improve their data security management systems, strengthen employee security training, and ensure the compliant and responsible use of data.

6.3. Institutional level: Improve standards and clarify liability boundaries

Industry associations should accelerate the development of specialized standards for AI applications, clearly defining model specifications, data requirements, and related guidelines. Guided by the principle of "human-led and AI-assisted," the primary responsibility of appraisers should be clarified, alongside the establishment of a robust liability traceability mechanism. Meanwhile, regulatory authorities should build intelligent supervision platforms, incorporate AI applications into routine practice inspections, and strike a balance between technological innovation and risk control.

6.4. Talent level: Strengthen training to consolidate the talent foundation

Universities should optimize their curricula by incorporating AI-related courses to cultivate interdisciplinary talent. Industry associations and institutions should establish regular training mechanisms to enhance the technical application capabilities of existing appraisers. At the same time, institutions are encouraged to recruit technology professionals, build cross-functional teams, and foster a "human-machine collaboration" environment, thereby guiding the industry to actively adapt to digital transformation.

7. Conclusion

AI technology provides a new solution for risk management in asset appraisal, which can effectively solve the pain points of traditional models such as low efficiency, insufficient accuracy, and slow response, promote the transformation of risk management from experience-driven to data-driven, and enhance the industry's compliance level and professional service capabilities. Currently, the integration of AI and risk management in asset appraisal still faces many challenges in technology, data, law, and talents, requiring joint efforts and multiple measures. In the future, with the continuous innovation of technology, the improvement of systems, and the gradual gathering of talents, AI will be deeply integrated with the asset appraisal industry, building an intelligent risk management system featuring "technology empowerment, system guarantee, data support, and talent leadership". Appraisal institutions should actively embrace the trend of digital transformation, rationally use AI tools, strengthen human-machine collaboration, continuously improve risk management levels, and provide more solid professional guarantees for the healthy development of the market economy.

Disclosure statement

The author declares no conflict of interest.

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