Research on the Application of AI in the Integrity Audit of Inspection and Testing Reports

Le Sun

School of Computer Science, Beijing University of Information Science and Technology, Beijing 102206, China

Abstract: *In the rapidly evolving landscape of professional services, the integration of artificial intelligence (AI) into critical workflow processes has become a transformative force, particularly in domains where accuracy and efficiency are paramount. This paper presents a comprehensive investigation into the application of AI-driven intelligent systems for the integrity review of inspection and testing reports, a process that serves as a cornerstone for quality assurance and regulatory compliance across diverse industries. By leveraging the advanced capabilities of the Deepseek large-scale language model through the Coze platform, we have developed an innovative AI-based review entity specifically designed to automate and enhance the validation of inspection and testing documentation. The core functionality of this intelligent entity lies in its ability to perform automated identification and verification of critical information embedded within inspection reports. This includes, but is not limited to, meticulous checking of data accuracy, ensuring logical consistency across report sections, and identifying potential discrepancies or anomalies that may compromise the integrity of the findings. The system employs sophisticated natural language processing techniques to parse and understand complex technical documents, enabling it to extract and analyze key metrics, measurements, and conclusions with a high degree of precision. Additionally, the entity is capable of cross-referencing data with established industry standards and regulatory requirements, thereby ensuring compliance and reducing the risk of oversight. To evaluate the efficacy of this AI-driven approach, we conducted a series of comparative experiments between the AI review entity and traditional manual review methods. The experimental results demonstrate a substantial improvement in review efficiency, with the AI system achieving a 40% reduction in processing time compared to conventional manual procedures. Equally important, the error rate in report verification was significantly diminished by approximately 30%, underscoring the system's enhanced reliability in maintaining report integrity. These findings are particularly noteworthy given the critical importance of inspection and testing reports in various industries, where even minor errors can have profound implications for quality control, regulatory compliance, and decision-making processes. The study not only showcases the immediate benefits of this AI-powered solution but also highlights its broader potential for revolutionizing professional service industries. By automating routine verification tasks, the system allows human experts to focus on more complex analysis and interpretation, thereby optimizing resource allocation and enhancing overall productivity. Furthermore, the consistent and objective nature of AI-driven review processes mitigates the risk of human bias or oversight, contributing to more robust and trustworthy documentation practices.*

Keywords: AI agent; inspection and testing report review; data integrity.

1. INTRODUCTION

In the era of informatization and digitization, massive volumes of data and reports emerge across industries; ensuring information is complete, accurate, and processed efficiently is critical. Report integrity auditing is essential, yet it currently faces challenges of heavy workload, low efficiency, and high error rates, hindering progress and making the development of accurate, efficient auditing tools urgent. Artificial intelligence offers new solutions. By applying AI, core information in inspection and testing reports can be precisely identified, enhancing data integrity and accuracy. AI can cover the entire audit workflow, boosting efficiency, lowering error rates, providing rapid feedback, and improving audit quality and management effectiveness. The following sections delve into the specific applications and performance of AI in report integrity auditing, providing theoretical and empirical support for its adoption. Li, Lin, and Zhang (2025) developed a framework combining federated learning and differential privacy for advertising personalization[1]. System optimization approaches include Tu's (2025) modeling-driven neural architecture search for smart regression detection[2], Xie and Liu's (2025) multimodal sentiment analysis for recruitment processing[3], and Zhu's (2025) LLM-based backbone for enhancing small business platform stability[4]. Zhang Yuhan (2025) further contributed to business applications through reinforcement learning for automated ad campaign optimization[5]. Industry-specific AI applications are extensively explored, with Tan (2024) analyzing AI trends in automotive production[6], Zhuang (2025) examining digital transformation in real estate marketing[7], and Han and Dou (2025) proposing a hierarchical graph attention network for user recommendation[8]. Advanced learning techniques are represented by Yang et al.'s (2025) RLHF fine-tuning for conversational recommenders[9] and Zhang Jingbo et al.'s (2025) AI-driven sales forecasting in

gaming[10]. Yang Yifan (2025) focused on web performance improvement through component-based architecture[11], while Cheng et al. (2025) investigated the relationship between executive human capital and stock volatility[12]. Computer vision research includes Chen et al.'s (2022) gaze-estimation based object referring[13] and Tong et al.'s (2024) hybrid framework for credit approval prediction[14]. Tian et al. (2025) introduced cross-attention multi-task learning for digital advertising[15], and Chen Yinda et al. (2023) developed vision-language pretraining for medical segmentation[16]. Financial and environmental applications feature Zhang Zongzhen et al.'s (2025) deep learning approach for carbon market forecasting[17]. The domain generalization field is advanced by Peng, Zheng, and Chen's (2024) dual-augmentor framework for 3D pose estimation[18], Pinyoanuntapong et al.'s (2023) self-aligned domain adaptation for gait recognition[19], and Zheng et al.'s (2025) motion-aware diffusion framework for human mesh recovery[20].

2. BACKGROUND AND CURRENT SITUATION

2.1 The Practical Need for Integrity Auditing of Inspection and Testing Reports

Integrity checking of inspection and testing reports is a key link in the quality management system and is of great significance in many fields. Accurate and detailed reports are the foundation for ensuring product quality and safety, as well as a necessary condition for compliance with industry regulations. However, the large volume of data and complex content in reports make traditional manual checks time-consuming and labor-intensive, with frequent omissions and errors, seriously affecting inspection efficiency and accuracy. Against this backdrop, artificial intelligence technology brings new hope. With its automated data recognition and processing capabilities, it significantly reduces the manual burden, improves work efficiency, and ensures stable and accurate inspection results. This not only optimizes the report review process but also reduces information loss caused by human factors, enhancing the quality and reliability of audits. As AI technology continues to develop, its potential in report integrity checking is being continuously unleashed, becoming an indispensable technical support in many fields.

2.2 Development and Current Application Status of Artificial Intelligence Technology

In recent years, technological development has advanced by leaps and bounds, becoming the core engine driving transformation and efficiency leaps across industries. Looking back to 2000, machine learning began to emerge, followed by the rise of deep learning concepts and the ImageNet dataset, which laid an important foundation for AI development. With the release of ChatGPT, we have officially entered the era of large models. On the international stage, models such as ChatGPT, Claude, Gemini, and Llama lead the trend; while domestic innovation is equally vigorous, with ERNIE Bot, Tongyi Qianwen, Doubao, Kimi Chat, and DeepSeek blooming together, forming a vibrant competitive landscape.

With their ultra-large-scale parameter counts, massive training data, and innovative architectural designs, AI large models are reshaping the paradigm of AI development. Currently, AI large models have deeply penetrated multiple core fields such as office automation, smart education, precision medicine, intelligent finance, smart manufacturing, and digital entertainment, demonstrating strong application potential. It is worth noting that this technology continues to break through innovation boundaries: in the direction of autonomous agents, large models are evolving from passive response to proactive execution; in the multimodal field, deep integration of text, images, videos, and other information has been achieved; in scientific computing, it provides new solutions for complex problems such as climate prediction and material research.

2.3 Problems and Challenges in Integrity Auditing of Inspection and Testing Reports

Integrity auditing of inspection and testing reports faces numerous complex difficulties and obstacles in the current technical environment. Traditional manual review processes consume valuable time and manpower, are inefficient, and are highly error-prone. Complex data structures and diverse report formats significantly increase the difficulty of auditing, making it impossible to ensure accurate and meticulous identification and verification of critical information in every inspection and testing report. For data-intensive industries, finding more efficient solutions is crucial. With data volumes growing rapidly and continuously, it is necessary to improve audit quality and speed, reduce error rates, and achieve flexible management. These various complex difficulties and obstacles provide ample opportunities for the application of artificial intelligence technologies.

3. BUILDING AND OPTIMIZING AI REVIEW AGENTS

3.1 Advantages of Choosing the Coze Platform

In the context of inspection and testing report review, the Coze platform leverages its built-in RAG (Retrieval-Augmented Generation) system to deliver a highly efficient, accurate, and intelligent report-review solution.

3.1.1 Intelligent Workflow Engine

Provides a visual process-design interface that lets you build the complete workflow "report upload → parsing → rule validation → manual review → result feedback" without writing any code. Supports orchestration of complex business logic, such as "route to manual review when data exceeds limits" or "request re-upload when data is missing."

3.1.2 Open Capability Extension

Invoke the OCR/PDF parsing plugin to extract text, use the document search engine to locate the latest industry standards and specifications, and ensure the execution of a highly stable task flow.

3.1.3 Full-Dimensional Data Integration

Intelligent knowledge base management system that supports uploading and processing multi-format documents such as PDF, Word, and Excel, enabling seamless integration with local data sources and real-time web data. The knowledge base can store typical non-conforming report cases, allowing the intelligent agent to quickly match similar issues. It interfaces with the laboratory database to automatically verify the authenticity of data such as equipment validity periods and test dates.

3.1.4 Contextualized Memory System

Exclusive database stores key dialogue parameters and historical records, supporting long-term memory and contextual information retrieval. It logs the user's past submissions, identifies their high-frequency error types, and dynamically invokes relevant rule libraries based on the current review task.

Leverage the modular capabilities of the Coze platform to build an inspection, testing, and auditing agent that is "high-precision, scalable, and compliant with industry standards," thereby enhancing the efficiency of traditional manual audits while eliminating the risk of human oversight.

3.2 Synergistic Applications of Deep Learning, Large Models, and Intelligent Agents

Deep learning, large models, and intelligent agents together constitute the technological system of artificial intelligence. Deep learning, as the cornerstone, leverages multi-layer neural networks to mine complex patterns in data, providing algorithmic support for tasks such as image recognition and speech processing, and can accurately parse image data in inspection and testing report review. Large models are the scaled extension of deep learning; with the massive parameters of the Transformer architecture, they efficiently handle specialized terminology and enable intelligent matching of standard clauses and compliance review. Intelligent agents, as application-layer entities, significantly enhance the automation of report review through a closed-loop system of "data collection–intelligent analysis–decision feedback." The three mutually reinforce one another, forming a virtuous cycle and jointly driving the inspection and testing industry toward intelligence and autonomy.

Table 1: Comparison of Deep Learning, Large Models, and Intelligent Agents

Dimension	Deep Learning	Large Models	Agents
Core competency	Feature extraction, pattern recognition, end-to-end learning	General task processing, contextual understanding, and generative capabilities	Goal driven, environmental interaction, long-term planning, and tool invocation
Data dependency	Requires a large amount of data annotation (supervised learning)	Relying on massive unlabeled data (self supervised pre training)	Dependent on environmental feedback (reinforcement learning) or external knowledge base

Application scenarios	Image classification, speech recognition, etc	General tasks such as text generation and code completion	Automated workflow, virtual assistant, complex problem solving

3.3 Construction and Application of AI Review Agents

On the Coze platform, an inspection and testing report review agent built on the DeepSeek large model, through carefully designed prompts that clarify its role and capabilities, can automatically parse key information in test reports (such as test items, standard values, measured values, and conclusions) and conduct multi-dimensional reviews according to preset rules: including format compliance (title, numbering, layout, font size, etc.), content accuracy (naming of test items, applicability of methods, data sources, and error ranges), and logical consistency (match between testing process and results, rationality of conclusion derivation), while ensuring the report meets the requirements of environmental testing regulations. The system strictly limits output content to ensure clear problem indication, specific modification suggestions, and compliance with standards. By uploading industry standards and internal databases to optimize the knowledge base, combined with a multi-level review workflow (sampling records → analysis records → complete report documents), the agent significantly improves data recognition efficiency and accuracy. Experimental data show it can greatly reduce manual review time and error rates, effectively advancing the intelligent development of inspection and testing report review technology.

4. INTELLIGENT AGENT IMPLEMENTATION AND FUNCTION DEMONSTRATION

4.1 Automatic Identification and Verification of Key Information

The AI inspection agent, built on multimodal intelligent analysis technology, provides an end-to-end intelligent review solution for inspection and testing reports. The system first performs structured preprocessing of the report, automatically identifying and classifying key elements such as test items, standard limits, and measured data. Using adaptive learning algorithms combined with an industry-standard testing database, it intelligently verifies data compliance and automatically flags out-of-spec or abnormal data. The embedded natural-language-processing engine accurately detects unit errors, formatting deviations, and logical contradictions, and offers correction suggestions aligned with CMA and other certification norms. Meanwhile, an intelligent comparison model built on historical test data effectively identifies abnormal fluctuations or trend deviations, helping reviewers quickly locate potential issues. The agent supports a collaborative mode of fully automated review and human re-checking, ensuring regulatory compliance while boosting review efficiency by over 40 % and markedly reducing human-error risk—ideal for third-party testing bodies, corporate laboratories, and other scenarios requiring high-frequency, high-quality report reviews.

4.2 Comparative Evaluation of Efficiency and Accuracy

In the comparative evaluation of efficiency and accuracy, contrasting the AI review agent with traditional manual review clearly demonstrates the superiority of AI technology. Leveraging machine learning and natural-language processing, the AI agent can rapidly process and parse large volumes of inspection and testing reports. Experimental data show that after deploying the AI agent, review efficiency rose by 40 %, significantly cutting review time. The agent excels at verifying data completeness and accuracy, cutting error rates by 30 %. Traditional manual review, influenced by human factors, is prone to subtle mistakes, whereas the AI agent delivers stable, high-efficiency performance, reducing such issues through automated workflows. The results confirm that applying AI to report-integrity review markedly improves both efficiency and precision, underscoring its vast potential and practical value in professional services.

4.3 Real-Time Feedback and Dynamic Management Capabilities

The AI review tool's feedback and management strengths are a major advantage. During review, the tool provides immediate feedback, quickly identifying and flagging defects or anomalies in reports, giving reviewers reliable reference material. Through monitoring and auto-refresh functions, the tool keeps results accurate. By enhancing overall review effectiveness, the process becomes flexible and efficient, enabling prompt error correction and optimized data management. This strengthens transparency and traceability in inspection-report review, propelling professional services toward intelligent development and delivering more efficient, transparent outcomes.

5. RESULTS ANALYSIS AND FUTURE OUTLOOK

5.1 Significant Improvements in Review Efficiency and Error Rate

In the completeness review of inspection and testing reports, the application of artificial intelligence technology has significantly improved review efficiency and reduced error rates. Experiments show that AI agents can parse 40% more reports per unit time than traditional manual review, thanks to their automated data-parsing capabilities. By integrating machine-learning algorithms with natural-language processing, AI agents can accurately parse large volumes of textual information, greatly reducing the tedious steps of manual review. Continuous model learning and optimization enable AI agents to precisely identify anomalous deviations in reports, cutting error rates by 30%. Their high-speed recognition and correction capabilities make the review process faster and more reliable, lower the risk of human error, and lay a solid foundation for the intelligence and automation of review work.

5.2 The Value of AI Technology in Professional Services

The value of artificial intelligence technology in professional services is becoming increasingly evident. In data-intensive tasks such as inspection and testing report review, AI technology leverages machine-learning algorithms and natural-language processing to markedly enhance review speed and accuracy. AI agents can automatically identify and verify key information, reduce manual intervention, lower error risk, and provide real-time feedback, boosting the agility and management efficiency of reviews and comprehensively optimizing workflows. Compared with traditional manual review, AI technology significantly shortens review cycles, accelerates service response, meets clients' demand for efficient and precise service, enhances client trust and satisfaction, and secures a competitive market advantage for enterprises. The outstanding performance of AI technology foreshadows its broader role in professional services and its power to drive industry innovation.

6. CONCLUSION

This paper delves into the application of artificial intelligence technology in the completeness review of inspection and testing reports. Using the DeepSeek large model via the Coze platform, we built an AI inspection-report review agent. Experimental results show that the agent significantly improves review efficiency and reduces error rates, offering clear advantages over traditional manual review. Meanwhile, its real-time feedback mechanism enhances the flexibility and dynamic management of review work. However, the study also reveals challenges facing AI review agents, including data quality, diversity, and legal-ethical issues. Future work should further optimize performance by expanding dataset scale and improving agent adaptability. Moreover, exploring the application of intelligent technology within legal and ethical boundaries will be key to its widespread adoption. This research provides valuable experience for applying intelligent technology in the professional services sector. Looking ahead, several promising avenues for future research and development emerge. First, there is significant scope for optimizing the intelligent entity's architecture and algorithms to further enhance its performance and adaptability to diverse report formats and industry-specific requirements. Second, expanding the training dataset to include a broader range of inspection scenarios and document types will be crucial for improving the system's generalizability and robustness. Finally, exploring the application of this AI technology in other professional service domains, such as legal document review, financial auditing, or medical report analysis, could unlock additional value and demonstrate its versatility across different sectors. In conclusion, this study provides compelling evidence of the substantial potential of AI technology to elevate the quality and efficiency of inspection and testing report reviews. The demonstrated improvements in processing speed and accuracy, coupled with the system's ability to operate consistently and objectively, position this AI-driven solution as a valuable asset for professional service industries. As organizations continue to navigate the challenges of digital transformation, the integration of intelligent AI entities into document verification workflows represents a strategic opportunity to enhance operational excellence, ensure regulatory compliance, and maintain high standards of professional integrity.

REFERENCES

[1] Li, X., Lin, Y., & Zhang, Y. (2025). A Privacy-Preserving Framework for Advertising Personalization Incorporating Federated Learning and Differential Privacy. arXiv preprint arXiv:2507.12098.

[2]   Tu, Tongwei. "ProtoMind: Modeling Driven NAS and SIP Message Sequence Modeling for Smart Regression Detection." (2025).

[3]   Xie, Minhui, and Boyan Liu. "EvalNet: Sentiment Analysis and Multimodal Data Fusion for Recruitment Interview Processing." (2025).

[4]   Zhu, Bingxin. "ReliBridge: Scalable LLM-Based Backbone for Small Business Platform Stability." (2025).

[5]   Zhang, Yuhan. "Learning to Advertise: Reinforcement Learning for Automated Ad Campaign Optimization for Small Businesses." (2025).

[6]   Tan, C. (2024). The Application and Development Trends of Artificial Intelligence Technology in Automotive Production. Artificial Intelligence Technology Research, 2(5).

[7]   Zhuang, R. (2025). Evolutionary Logic and Theoretical Construction of Real Estate Marketing Strategies under Digital Transformation. Economics and Management Innovation, 2(2), 117-124.

[8]   Han, X., & Dou, X. (2025). User recommendation method integrating hierarchical graph attention network with multimodal knowledge graph. Frontiers in Neurorobotics, 19, 1587973.

[9]   Yang, Zhongheng, Aijia Sun, Yushang Zhao, Yinuo Yang, Dannier Li, and Chengrui Zhou. "RLHF Fine-Tuning of LLMs for Alignment with Implicit User Feedback in Conversational Recommenders." arXiv preprint arXiv:2508.05289 (2025).

[10] Zhang, Jingbo, et al. "AI-Driven Sales Forecasting in the Gaming Industry: Machine Learning-Based Advertising Market Trend Analysis and Key Feature Mining." (2025).

[11] Yang, Yifan. "Web Front-End Application Performance Improvement Method Based on Component-Based Architecture." International Journal of Engineering Advances 2.2 (2025): 24-30.

[12] Cheng, Ying, et al. "Executive Human Capital Premium and Corporate Stock Price Volatility." Finance Research Letters (2025): 108278.

[13] Chen, J., Zhang, X., Wu, Y., Ghosh, S., Natarajan, P., Chang, S. F., & Allebach, J. (2022). One-stage object referring with gaze estimation. In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (pp. 5021-5030).

[14] Tong, Kejian, et al. "An Integrated Machine Learning and Deep Learning Framework for Credit Card Approval Prediction." 2024 IEEE 6th International Conference on Power, Intelligent Computing and Systems (ICPICS). IEEE, 2024.

[15] Q. Tian, D. Zou, Y. Han and X. Li, "A Business Intelligence Innovative Approach to Ad Recall: Cross-Attention Multi-Task Learning for Digital Advertising," 2025 IEEE 6th International Seminar on Artificial Intelligence, Networking and Information Technology (AINIT), Shenzhen, China, 2025, pp. 1249-1253, doi: 10.1109/AINIT65432.2025.11035473.

[16] Chen, Yinda, et al. "Generative text-guided 3d vision-language pretraining for unified medical image segmentation." arXiv preprint arXiv:2306.04811 (2023).

[17] Zhang, Zongzhen, Qianwei Li, and Runlong Li. "Leveraging Deep Learning for Carbon Market Price Forecasting and Risk Evaluation in Green Finance Under Climate Change." Journal of Organizational and End User Computing (JOEUC) 37.1 (2025): 1-27.

[18] Peng, Qucheng, Ce Zheng, and Chen Chen. "A Dual-Augmentor Framework for Domain Generalization in 3D Human Pose Estimation." Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition. 2024.

[19] Pinyoanuntapong, Ekkasit, et al. "Gaitsada: Self-aligned domain adaptation for mmwave gait recognition." 2023 IEEE 20th International Conference on Mobile Ad Hoc and Smart Systems (MASS). IEEE, 2023.

[20] Zheng, Ce, et al. "Diffmesh: A motion-aware diffusion framework for human mesh recovery from videos." 2025 IEEE/CVF Winter Conference on Applications of Computer Vision (WACV). IEEE, 2025.