The Application of Artificial Intelligence in Insurance Underwriting and Risk Management

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Abstract: With the rapid iteration of artificial intelligence technology and its deep integration with financial technology, the insurance industry is undergoing a structural transformation from being labor-intensive to technology-intensive. Underwriting and risk management, as the core components of insurance business, have become the key scenarios for the application of artificial intelligence technology. This paper systematically reviews the current status of artificial intelligence technology in insurance underwriting and risk management, analyzes the application of core technologies such as machine learning, computer vision, natural language processing, Internet of Things, and large language models in optimizing underwriting processes, risk identification, precise pricing, and risk mitigation, and examines the existing problems in the current application process, including data quality, algorithm interpretability, regulatory adaptation, and talent shortage. It also looks forward to the future trends of technology integration and industry development, providing theoretical references for insurance companies to promote the deep application of artificial intelligence technology, improve underwriting efficiency and risk management levels, and contribute to the high-quality development of the insurance industry.

Keywords: Artificial Intelligence; Insurance Underwriting; Risk Management; Precise Pricing; Risk Reduction; Insurance Technology.

1. Introduction

The core operating logic of the insurance industry is the aggregation, dispersion and control of risks. Underwriting, as the entry point of the insurance business, directly determines the quality of risk assumption and business profitability of insurance companies. Risk management runs through the entire process of the insurance business and is the core competitiveness for maintaining the sustainable operation of insurance companies. The traditional insurance underwriting and risk management models highly rely on manual experience, which have problems such as cumbersome processes, low efficiency, lagging risk identification, and insufficient pricing accuracy [1]. They are difficult to meet the development needs of the insurance industry in the new era for digitalization, refinement, and diversification, and also cannot meet consumers' expectations for efficient and personalized insurance services.

In recent years, artificial intelligence technology has shown an explosive development trend. Core technologies such as machine learning, deep learning, computer vision, and natural language processing have gradually matured, providing strong technical support for the transformation and upgrading of insurance underwriting and risk management [2]. Artificial intelligence technology has advantages such as efficient data processing, precise pattern recognition, and autonomous learning and iteration, which can break through the limitations of traditional manual operations and achieve the automation of underwriting processes and the intelligence of risk management, promoting the transformation of the insurance industry from passive risk assumption to active risk prevention and control, and upgrading from group rough pricing to individual actuarial pricing [3].

This paper systematically reviews the research progress of artificial intelligence technology in insurance underwriting and risk management, analyzes the key problems and solutions in practical application, and prospects future development trends, so as to provide a reference for the digital transformation of the insurance industry and promote the deep integration of artificial intelligence with insurance underwriting and risk management.

2. Application of Core Artificial Intelligence Technologies in the Insurance Sector

2.1 Machine Learning and Deep Learning

Machine learning is the core support of artificial intelligence technology. Its core principle is to enable computers to autonomously learn data features and inherent patterns from massive data through algorithms, without the need for explicit programming instructions, and to achieve predictions and judgments on unknown data. Deep learning, as an important branch of machine learning, is based on neural network models and can handle multi-dimensional, unstructured complex data. Through feature extraction and transformation of multiple layers of networks, it achieves higher accuracy in prediction and recognition, and is the core driving force for the deep application of artificial intelligence technology in the insurance field. In insurance underwriting and risk management, machine learning and deep learning technologies are mainly used in scenarios such as data mining, risk modeling, and precise prediction. By learning from multi-dimensional data such as the personal information, health data, property information, and behavioral data of policyholders, risk assessment models are constructed to accurately identify and quantify underwriting risks; through the analysis of historical claim data and risk event data, the probability and loss degree of future risks are predicted, providing data support for the formulation of risk management strategies. Common algorithms include logistic regression, decision trees, random forests, gradient boosting trees, neural networks, convolutional neural networks, etc [4,5].

2.2 Computer Vision

Computer vision technology is based on image recognition, video analysis, etc., enabling computers to have the ability to "see" and understand image and video content, and to achieve rapid extraction, analysis, and recognition of image information. This technology mainly includes core links such as image preprocessing, feature extraction, target detection, and image segmentation. In the insurance field, it is mainly used in scenarios such as physical inspection, damage identification, and voucher review, effectively replacing manual operations and improving work efficiency and recognition accuracy. In the insurance underwriting process, computer vision technology can be used for physical inspections of insured items such as vehicles, houses, and equipment, by taking images or videos, automatically identifying the model, age, and condition of the items, and determining whether the items meet underwriting conditions; in risk management and claim processes, it can be used for vehicle damage assessment, house damage assessment, and medical voucher identification, by analyzing damaged item images, automatically identifying damage locations and degrees, accurately calculating loss amounts, and identifying false claim vouchers to prevent claim fraud risks [6,7].

2.3 Natural Language Processing

Natural language processing technology is an artificial intelligence technology used to handle human natural language. Its core lies in enabling interaction and understanding between computers and human language, and it can perform operations such as extracting, analyzing, translating, and generating text, speech, and other natural language information. This technology mainly includes core functions such as text classification, entity recognition, sentiment analysis, semantic understanding, speech recognition and synthesis. It is mainly applied in the insurance field in scenarios such as policy review, clause interpretation, customer service, and risk information extraction. In the insurance underwriting process, natural language processing technology can be used to automatically review the text information filled out by policyholders, such as application forms, health declarations, and related supporting documents, quickly extracting key information and determining whether the policyholders have truthfully disclosed information and whether there are any risks concealed; in the risk management process, it can be used to analyze text information such as news, industry reports, and laws and regulations, extracting information related to insurance risks, and promptly warning of potential risks; in the customer service process, through speech recognition and semantic understanding technologies, intelligent customer service can be realized, quickly responding to customers' inquiries, claims, and other demands, improving customer service efficiency and experience [8].

2.4 Internet of Things

The Internet of Things technology connects various objects in the physical world with the Internet through sensors, radio frequency identification and other devices, enabling intelligent identification, positioning, tracking, monitoring and data collection of these objects. In the insurance industry, this technology is mainly used for real-time collection and monitoring of risk data, which can break through the lag and limitations of traditional risk data collection, achieve real-time tracking of the risk status of insured objects, and provide precise data support for underwriting pricing and risk management. The Internet of Things technology is most widely applied in the fields of auto insurance, agricultural insurance and property insurance. In the auto insurance field, through on-board Internet of Things devices, real-time data such as vehicle speed, mileage, braking frequency and driving habits can be collected, accurately assessing the risk level of drivers; in the agricultural insurance field, through sensor devices deployed in farmlands and livestock farms, real-time data such as temperature, precipitation, soil moisture, crop growth status, livestock health status can be collected, enabling real-time monitoring and early warning of agricultural risks; in the property insurance field, by deploying monitoring sensors on enterprise factories, equipment and family residences, the operating status and safety conditions of the targets can be monitored in real time, promptly discovering potential safety hazards and preventing risks from occurring [9].

2.5 Large Language Models and Retrieval-Enhanced Generation Technology

Large language models are a major breakthrough in artificial intelligence technology in recent years. They are trained based on massive text data and possess powerful capabilities in natural language understanding, generation, and reasoning, enabling complex text interactions and decision support. However, the hallucination problem of large language models poses compliance risks in the highly regulated insurance industry. The emergence of retrieval-enhanced generation technology effectively addresses this issue. By combining large language models with professional knowledge bases, the model first retrieves relevant professional knowledge and data before generating answers, thereby significantly improving the accuracy and interpretability of the answers and reducing the risk of black-box decision-making. In the insurance underwriting and risk management fields, large language models and retrieval-enhanced generation technology are mainly used in scenarios such as underwriting decision-making, clause interpretation, and claim reasoning. By integrating insurance clauses, underwriting rules, and historical case studies into the knowledge base, the model can accurately underwrite complex insurance cases and provide clear underwriting conclusions and bases [10]; in the claim process, by retrieving insurance clauses and historical claim cases and combining with claim material information, the model can accurately determine and calculate the claim liability, while clearly explaining the claim basis to customers, thereby enhancing the transparency and credibility of claims.

3. Application of Artificial Intelligence in Insurance Underwriting

3.1 Intelligent Processing of Insurance Applications and Document Verification

Under the traditional model, policyholders need to fill out a large number of paper forms, and insurance company reviewers need to manually review each policy application, ID card, health certificate, property certificate and other related materials one by one. This not only requires a lot of time and effort but also easily leads to omissions in the review and judgment errors, resulting in low review efficiency. The application of artificial intelligence technology has enabled the entire process of policy application and material review to be fully automated. In the policy application stage, through natural language processing and speech recognition technologies, policyholders can quickly fill in the policy information through voice or text, and the system automatically converts the voice information into text information and conducts real-time verification of the filled information, reminding the policyholders to supplement missing information and correct erroneous information, thereby improving the policy application experience and the accuracy of the policy information. In the material review stage, computer vision technology can automatically recognize and extract information from paper or

electronic materials such as identity information, and natural language processing technology can automatically review the extracted text information, judging the authenticity, completeness and consistency of the information, and quickly identifying false materials, information concealment and other issues [11].

3.2 Precision of Risk Assessment

The traditional risk assessment model mainly relies on the manual experience of assessors, combined with the limited information provided by the policyholders for judgment. This model has problems such as inconsistent assessment standards, significant influence of subjective factors, and inaccurate risk identification, which can easily lead to adverse selection and moral hazard. The application of artificial intelligence technology has achieved the precision and scientificity of risk assessment. Through machine learning and deep learning technologies, integrating multi-dimensional data such as personal information, health data, property information, behavioral data, historical insurance application and claim data of the policyholders, a precise risk assessment model is constructed to quantitatively score the risk level of the policyholders and the insured objects, and accurately identify potential risks. Compared with traditional manual assessment, the artificial intelligence risk assessment model can handle massive data, discover hidden patterns in the data, avoid the limitations of human experience and the influence of subjective factors, and improve the accuracy and consistency of risk assessment. In the health insurance underwriting field, the risk assessment model can precisely assess the health risks of policyholders by analyzing data such as health declarations, physical examination reports, medical history records, and living habits, identify potential major disease risks, and provide a basis for underwriting decisions; in the auto insurance underwriting field, a driving risk assessment model is constructed by collecting driving behavior data from vehicle-mounted IoT devices, combined with information such as the driver's age, driving experience, and history of traffic violations, to precisely assess the risk level of the driver and identify high-risk drivers [12]; in the property insurance underwriting field, the property loss risk of the insured object is evaluated by collecting data such as the operation data and environmental data of the object through IoT devices, combined with information such as the location and usage period of the object, to assess the risk level of the insured object.

3.3 Automation of Underwriting Decisions

The traditional underwriting decision-making model mainly relies on the manual judgment of underwriting personnel. Underwriting personnel make decisions such as accepting coverage, rejecting coverage, increasing premiums, or excluding liability based on the risk assessment results, insurance terms, underwriting rules, etc. This model has problems such as low underwriting efficiency, inconsistent underwriting standards, and the impact of differences in underwriting personnel's professional levels on decision quality, making it difficult to meet the needs of large-scale insurance applications. The application of artificial intelligence technology has enabled the automation and standardization of underwriting decisions. By converting insurance terms, underwriting rules, etc. into algorithmic logic that computers can recognize, and combining them with machine learning to build a risk assessment model, the system can automatically review and evaluate insurance applications, make standardized underwriting decisions without manual intervention. For routine and low-risk insurance applications, the system can directly pass the underwriting and issue the policy [13]; for high-risk and complex insurance applications, the system can automatically mark them and submit them to manual underwriting personnel for further review, achieving the organic combination of automated underwriting and manual underwriting, which not only improves underwriting efficiency but also ensures underwriting quality.

3.4 Precision of Insurance Rates

The traditional insurance rate pricing model mainly adopts a group-based pricing approach, determining a uniform insurance rate based on limited categorical variables such as the age, gender, and occupation of the policyholder. This pricing method ignores the risk differences among individuals, resulting in a mismatch between the rate and the risk, and is prone to the problem of adverse selection, where high-risk customers enjoy low rates while low-risk customers bear high rates. This affects the profitability and sustainable operation of

insurance companies. The application of artificial intelligence technology has enabled precise insurance rate pricing, that is, differentiated pricing based on individual risks. Through machine learning and Internet of Things technology, integrating multi-dimensional risk data of policyholders and insured subjects, a precise rate pricing model is constructed [14]. Based on the individual's risk level, a personalized insurance rate is determined, achieving a precise match between risk and rate. This pricing method not only ensures the risk controllability and profitability of insurance companies but also provides more favorable rates for low-risk customers, enhancing customer satisfaction and insurance application willingness.

4. Application of Artificial Intelligence in Insurance Risk Management

4.1 Intelligent Risk Identification

The traditional risk identification model mainly relies on manual investigation and experience judgment, which is unable to cover all risk scenarios and has low identification efficiency and strong lag. It often discovers risks only after they occur, and cannot prevent risk losses in a timely manner. The application of artificial intelligence technology has enabled intelligent risk identification and comprehensive coverage. Through machine learning, natural language processing, Internet of Things and other technologies, it integrates insurance business data, customer data, industry data, external environment data and other multi-dimensional data to build a risk identification model, which monitors various risk indicators in real time and promptly identifies potential risks and issues risk warnings. Compared with traditional manual identification, the artificial intelligence risk identification model can handle massive data, discover hidden risks in the data, achieve early identification and warning of risks, and improve the efficiency and accuracy of risk identification [15].

4.2 Quantitative Risk Assessment

The traditional risk assessment model mainly relies on manual experience for qualitative assessment, resulting in highly subjective and inaccurate assessment results. It is difficult to precisely quantify risks and unable to provide scientific data support for risk decisions. The application of artificial intelligence technology has enabled scientific quantification of risk assessment. Through machine learning and deep learning technologies, integrating multi-dimensional data such as historical risk data and real-time monitoring data, a quantitative risk assessment model is constructed to precisely quantify various risks, calculate indicators such as the probability of risk occurrence and expected losses, and determine risk levels. This quantitative assessment method can avoid the influence of subjective human experience, improve the accuracy and scientificity of risk assessment, and provide reliable data support for the risk decisions of insurance companies. In property insurance risk management, by collecting target operation data, environmental data, etc., combined with historical loss data, a property loss risk assessment model is constructed to quantitatively assess the probability and degree of loss of the target, providing a basis for insurance rate pricing and the formulation of risk control measures; in health insurance risk management, by analyzing the health data, medical history records, etc. of the policyholders, a health risk assessment model is constructed to quantitatively assess the probability and medical expense expenditure of major diseases for the policyholders, providing support for the design of health insurance products and risk management; in catastrophe risk management, by integrating meteorological data, geological data, historical catastrophe loss data, etc., a catastrophe risk assessment model is constructed to quantitatively assess the probability, impact range and loss degree of catastrophes, providing a basis for catastrophe insurance product pricing, reserve accrual, and risk dispersion [16,17].

4.3 Efficient Risk Control

The traditional risk control model mainly relies on manual monitoring and post-event handling. The risk control measures lack specificity and efficiency, making it difficult to achieve effective risk control. The application of artificial intelligence technology has enabled the efficient and precise risk control. Through technologies such as the Internet of Things, machine learning, and automated control, an intelligent risk control system is constructed to monitor risk status in real time. Based on the risk assessment results, it automatically takes

targeted risk control measures to achieve real-time control and dynamic adjustment of risks. At the same time, artificial intelligence technology can realize the automation of the risk control process, reducing manual intervention and improving the efficiency of risk control. In auto insurance risk management, through real-time monitoring of driving behavior by on-board IoT devices, when it is detected that the driver has dangerous driving behaviors such as speeding, fatigue driving, or sharp turns, the system automatically issues warning information to remind the driver to drive safely and reduce the probability of traffic accidents; for high-risk drivers, the insurance company can adjust the insurance rate, increase underwriting conditions, etc., to strengthen risk control. In agricultural insurance risk management, through real-time monitoring of the growth status and environmental conditions of farmland and livestock and poultry by IoT devices, when abnormal environmental factors such as temperature, precipitation, and soil moisture are detected, which may lead to crop yield reduction or livestock disease, the system automatically issues warning information to remind the policyholder to take measures such as irrigation, fertilization, and epidemic prevention, to reduce agricultural risk losses. In claim risk control, after identifying risks such as false claims and fraud through artificial intelligence technology, the system automatically marks suspicious claim cases and submits them to the manual review personnel for further verification, and at the same time takes measures such as suspending claims and rejecting claims to prevent fraud risks in claims and reduce claim losses [18].

4.4 Intelligent Risk Mitigation Services

Risk mitigation has become an important development direction in insurance risk management in recent years. Its core lies in actively taking measures to reduce the probability and severity of risks, achieving source control of risks rather than merely conducting post-event compensation. The application of artificial intelligence technology has promoted the intelligent upgrade of risk mitigation services, enabling insurance companies to shift from passive risk acceptors to active participants in risk management.

5. Problems Arising from the Application of Artificial Intelligence in Insurance Underwriting and Risk Management

5.1 Data Quality Issues

Currently, the data quality in the insurance industry varies greatly, with problems such as data omission, data errors, data duplication, and low data standardization. These issues seriously affect the training effect and application accuracy of artificial intelligence models. On one hand, the insurance policy information and health data provided by policyholders may be false or incomplete, resulting in insufficient data authenticity. On the other hand, the data of each business department within the insurance company is independent, lacking unified data standards and data management systems, and the data is highly fragmented, making it impossible to achieve effective integration and sharing of data, and it is difficult to form a complete customer profile and risk data system. At the same time, the data sharing mechanism in the insurance industry is not perfect. There are barriers in data sharing between insurance companies and external institutions such as medical institutions, public security departments, transportation departments, and meteorological departments, making it difficult to obtain sufficient external data for model training and risk assessment. For example, in health insurance underwriting and risk management, insurance companies are unable to obtain the complete medical history data of policyholders, which affects the accuracy of the health risk assessment model; in vehicle insurance risk management, the sharing of violation data and accident data with the transportation department is insufficient, making it impossible to comprehensively assess the risk level of drivers [19].

5.2 Algorithm Explainability Issues

The insurance industry is a highly regulated sector. Every pricing decision and every reason for denial of a claim must have a clear logical basis. The underwriting decisions, risk assessment, claim review and other processes must be traceable and explainable to meet regulatory requirements and customer needs. Currently, the application of artificial intelligence models in insurance underwriting and risk management often only provides decision results but cannot explain the generation process and basis of the decision. Once there are underwriting rejections or claim

rejections, insurance companies find it difficult to explain the rationality of the decision to customers and regulatory authorities, which is likely to lead to customer complaints and regulatory doubts, and also increases the compliance risks of insurance companies. Although retrieval-enhanced generation technology has improved the explainability of algorithms to a certain extent, when the model calls dozens of variables and undergoes hundreds of calculations to finally provide a pricing result or underwriting conclusion, how to clearly explain this process to customers and ensure that this process does not introduce discriminatory factors remains an urgent problem to be solved. Moreover, algorithm black boxes may also lead to the generation of algorithmic biases. For example, in risk assessment, the algorithm may exhibit discrimination against specific groups due to data bias, affecting the fairness of insurance services [20].

5.3 Regulatory Adaptation Issues

The rapid application of artificial intelligence technology in insurance underwriting and risk management has posed new challenges to the insurance regulatory system. Currently, the insurance regulatory system is mainly designed for traditional insurance business models and lacks comprehensive regulatory rules, standards and measures for the application of artificial intelligence technology in the insurance sector. The adaptability of the regulatory system is insufficient [21]. On one hand, regulatory rules lag behind technological development. There are no clear regulatory requirements and norms for new business models such as artificial intelligence underwriting, intelligent pricing, and intelligent claims. This leads to insurance companies lacking clear regulatory guidance when applying artificial intelligence technology, making them prone to compliance risks. On the other hand, regulatory measures are relatively traditional and lack intelligent regulatory tools for artificial intelligence technology, making it difficult to achieve real-time monitoring, risk warning and compliance supervision of artificial intelligence models, and unable to promptly detect and prevent various risks brought about by the application of artificial intelligence technology. At the same time, the application of artificial intelligence technology also involves issues such as data security and privacy protection. The current regulatory rules are not yet complete, and insurance companies may have risks of data security and privacy leakage in the processes of data collection, storage, use and sharing, affecting the legitimate rights and interests of customers.

5.4 The Problem of Talent Shortage

The application of artificial intelligence technology in insurance underwriting and risk management requires a large number of interdisciplinary talents with expertise in insurance, computer technology, mathematics, statistics, etc. Such talents need to understand the business processes and core requirements of insurance underwriting and risk management, as well as master the core principles, algorithm models and application methods of artificial intelligence technology, and be able to achieve the deep integration of technology and business. Currently, the shortage of interdisciplinary talents in the insurance industry is very prominent, and the talent structure is unreasonable, making it difficult to meet the demand for the deep application of artificial intelligence technology [22]. On one hand, most traditional employees in insurance companies only have insurance expertise and lack knowledge in computer technology, mathematics and statistics, etc., which makes it impossible for them to adapt to the requirements of artificial intelligence technology application and unable to participate in the training, optimization and application of artificial intelligence models. On the other hand, most professionals with artificial intelligence technology lack business knowledge in the insurance industry and do not understand the core requirements of insurance underwriting and risk management, making it difficult for them to develop artificial intelligence application solutions that are in line with the actual insurance business.

6. The Development Trend of the Application of Artificial Intelligence in Insurance Underwriting and Risk Management

6.1 Technological Intelligence Enhancement

In the future, artificial intelligence technology will be deeply integrated with emerging technologies such as big data, cloud computing, and blockchain, creating a synergistic effect and further enhancing the intelligence level of

insurance underwriting and risk management. Big data technology will provide more massive and multi-dimensional data support for artificial intelligence models, improving their accuracy and generalization capabilities; cloud computing technology will provide powerful computing power support for the application of artificial intelligence technology, enabling rapid training, optimization, and deployment of models, and reducing the cost of technology application; blockchain technology will ensure the immutability and traceability of data, enhancing the authenticity and security of data, addressing the trust issues in data sharing, and promoting the improvement of the data sharing mechanism in the insurance industry. At the same time, artificial intelligence technology itself will continue to iterate, and the integration application of large language models and retrieval-enhanced generation technologies will be more widespread, further solving the problem of insufficient algorithm interpretability and achieving more accurate decision support; the recognition accuracy and efficiency of computer vision and natural language processing technologies will continue to improve, capable of covering more complex application scenarios, and achieving intelligentization of the entire underwriting process and risk management.

6.2 Full-process Application Scenarios

Currently, the application scenarios of artificial intelligence technology in insurance underwriting and risk management mainly focus on core aspects such as data review, risk assessment, underwriting decision-making, and claim risk control. In the future, as the technology continues to mature and business demands keep upgrading, the application scenarios will expand continuously, achieving full-process and all-round coverage of insurance underwriting and risk management. In the underwriting process, it will expand from the current application of insurance application, data review, and underwriting decision-making to product design and customer precise marketing, by analyzing customer needs through artificial intelligence technology, designing personalized insurance products, achieving precise marketing for customers, and improving the conversion rate of insurance applications; in the risk management process, it will expand from the current risk identification, assessment, and control to risk warning, risk handling, and risk review, achieving full-process control of risks, and improving the effectiveness of risk management. At the same time, artificial intelligence technology will be widely applied in more insurance sub-sectors, in addition to the currently widely used fields such as auto insurance, health insurance, and property insurance, it will gradually expand to sub-sectors such as agricultural insurance, old-age insurance, catastrophe insurance, and liability insurance, targeting the business characteristics and risk features of different sub-sectors, developing personalized artificial intelligence application solutions to enhance underwriting efficiency and risk management levels in each sub-sector.

6.3 Algorithm Enhancement

With the continuous tightening of regulatory requirements and the continuous improvement of customer demands, algorithm interpretability will become an important development direction for the application of artificial intelligence technology in insurance underwriting and risk management. In the future, through technological innovation and method optimization, the interpretability of artificial intelligence algorithms will be continuously enhanced to solve the problem of black-box decision-making and achieve traceability, interpretability, and verifiability of algorithmic decisions. On one hand, efforts will be made to strengthen the research and application of interpretable artificial intelligence technologies, develop algorithm models with interpretability, so that the process and basis of algorithmic decisions are clearer and more transparent, and can clearly explain the rationality of the decisions to customers and regulatory authorities. On the other hand, a sound algorithm review and supervision mechanism will be established to conduct full-process review and supervision of the training, optimization, and application of artificial intelligence algorithm models, promptly discover and correct algorithm biases and algorithm errors, and prevent compliance risks brought by algorithm black boxes. At the same time, data security and privacy protection will be strengthened, and a data management system and security protection system will be established to standardize the collection, storage, use, and sharing of data, ensuring that data security and privacy are not leaked and meeting

regulatory requirements and customer demands.

6.4 Talent Optimization

In the future, as artificial intelligence technology is deeply applied in insurance underwriting and risk management, the demand for comprehensive talents will continue to increase. The insurance industry will increase its efforts in cultivating and recruiting such talents, accelerate the construction of a team of comprehensive talents, and optimize the talent structure. On one hand, insurance companies will strengthen the training of their internal traditional employees, offering training in insurance professional knowledge, computer technology, mathematical statistics and other interdisciplinary knowledge to enhance the comprehensive literacy of the employees, enabling them to meet the requirements of the application of artificial intelligence technology. On the other hand, they will increase the introduction of external comprehensive talents, attracting those with both insurance professional knowledge and artificial intelligence technology to join, and at the same time, strengthening cooperation with universities, research institutions, and conducting school-enterprise cooperation, industry-university-research integration to jointly cultivate insurance and artificial intelligence comprehensive talents, improving the quality of talent supply and meeting the development needs of the industry.

7. Conclusion

Artificial intelligence technology has effectively addressed the pain points of traditional insurance underwriting and risk management, significantly improving underwriting efficiency and risk control capabilities, and driving the industry to shift from being labor-intensive to technology-intensive, from passive compensation to proactive risk control, and from group-based uniform pricing to individualized precise pricing. Currently, the application still faces challenges such as data quality, algorithm interpretability, regulatory adaptation, and talent shortage, which require the collaboration of insurance companies, regulatory authorities, universities, and research institutions to address. Insurance companies should strengthen technological research and data governance, accelerate the cultivation of composite talents; regulatory authorities need to establish a rule system that is adapted to intelligent applications, regulate development; universities and research institutions should enhance technological innovation and talent supply. In the future, as the technology continues to mature and bottlenecks are gradually overcome, artificial intelligence will deeply integrate into the entire insurance process, reshape the industry ecosystem, and help the insurance industry achieve higher-quality development and better fulfill its functions of risk protection and social governance.

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