

Analysis of the Innovative Application of Big Data in Insurance Technology

Zhiling Liu

Zhengzhou College of Finance and Economics, Zhengzhou, 450000, China

Keywords: Big Data; Technology Insurance; Application

Abstract: To drive the transformation of business processes and models in the technology insurance sector, this paper utilizes the vast scale, rapid flow, diversity, and low-value density of big data to penetrate various application scenarios in insurance technology. It first introduces the technical principles of big data. Then, addressing the pain points of the insurance industry, it suggests solutions based on big data technology. Subsequently, the paper presents the application scenarios of big data in insurance companies. Finally, it explores the future opportunities and challenges of big data in the insurance industry.

1. The Technical Principles of Big Data

When discussing big data, let's first consider four classic cases. The first case involves Walmart, which discovered through big data analysis that placing beer next to diapers was an effective sales strategy, significantly increasing beer sales. This demonstrates the charm of big data. The second case is a friendly scientific competition, which narrates an event in 2001 where Ted Ruger, a professor at the University of Pennsylvania, and political scientists Andrew Martin and Kevin Quinn conducted a contest to predict the outcomes of Supreme Court cases in 2002. The results showed that big data (75%) was more accurate than experience (59%). The analysis process of big data workflow is illustrated in Figure 1.

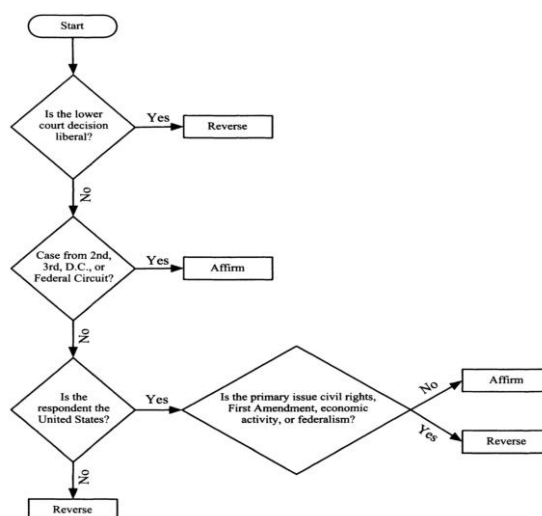


Figure 1: Diagram of the Friendly Scientific Competition

According to Gartner's definition, Big Data requires new processing models to possess stronger decision-making, insight discovery, and process optimization capabilities to accommodate massive, rapidly growing, and diverse information assets.[1] McKinsey believes that big data has four characteristics: vast data scale, high-speed dynamic data systems, diverse data types, and low value density. These four features of big data are like panning for gold in an endless sea of sand. Data, akin to priceless treasures, is scattered in various forms and structures across the vast sands, making collection and utilization extremely challenging. This requires formidable computing power. Utilizing cloud computing technology can enable the collection, storage, computation, transmission, and application of data from massive, fragmented, low-value-density sources in the shortest possible time, aiding businesses in gaining insights and achieving leapfrog development.[2]

To better understand the information above, let's consider two financial scenarios. The first is when you are trying to research inclusive finance issues. How do we comprehensively evaluate the development level of inclusive finance in each region? We know the set of indicators proposed by the central bank and how to comprehensively evaluate them to form an index. This is where dimensionality reduction comes into play, as shown in Figure 2:

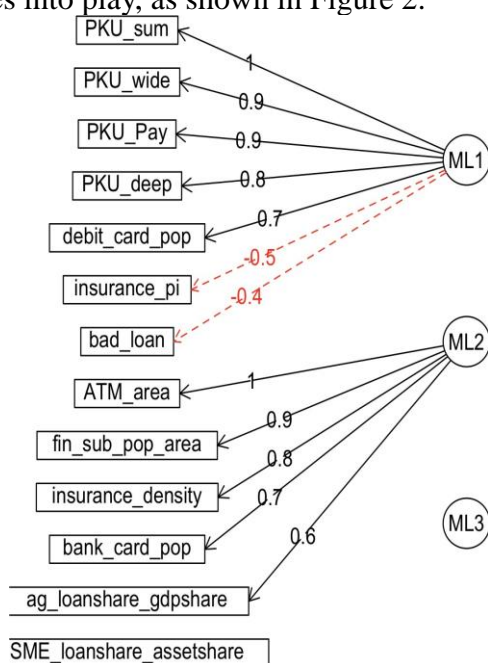


Figure 2: Indicator Dimensionality Reduction Diagram

Traditional data management technology mainly focuses on static data, researching the quantitative relationships among known, historical data. For instance, traditional actuarial pricing relies on empirical data for calculations. On the other hand, big data computing primarily handles dynamic data, processing large amounts of real-time, structured, and unstructured data, or non-standardized data.[3] This involves developing algorithm models that continuously optimize based on real-time data, used for exploring the correlation between unknown data sets. These characteristics can help businesses optimize their workflows, swiftly adapt to market changes, and enhance strategic insights. Now, consider another financial scenario: you are a bank credit officer with detailed financial information provided by a business applying for a loan. How do you predict the business's likelihood of defaulting? This involves classification, as shown in Figure 3:

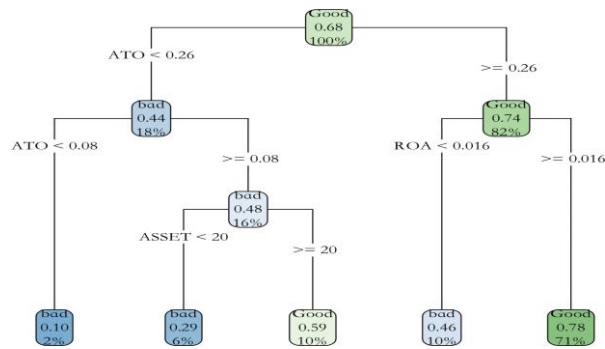


Figure 3: Indicator Classification Diagram

2. Pain Points in the Insurance Industry that Can Be Addressed with Big Data

2.1. Discovery of Potential Customers

The insurance industry has a vast potential customer base. However, traditional marketing methods, such as door-to-door visits and telemarketing, are not targeted enough to effectively sell products. These broad-brush approaches not only waste resources but also risk alienating consumers, leading to low insurance sales rates and potential damage to the insurance company's image.[4]

2.2. Pricing of Insurance Products

Traditional insurance products are often homogenized, with strong replicability, resulting in limited profits and little room for innovation. Insurance companies struggle to provide personalized services to different customer groups, offer relevant value-added services, or set differentiated prices based on varying risk profiles. Moreover, under the traditional insurance framework, the presence of moral hazards limits the effectiveness of loss prevention and mitigation, making it challenging to educate insured individuals about risk and encourage proactive disaster prevention behaviors.[5]

2.3. Claims Processing in Insurance Companies

Claims processing has always been a major issue troubling insurance consumers. Following an insurance event, the process involves numerous steps such as reporting the incident, filing a claim, surveying, reviewing documents, and fulfilling compensation responsibilities before the insured can receive compensation. The cumbersome claims process not only exhausts considerable manpower and resources of the insurance company but also results in time and resource losses for the consumers.

2.4. Lack of Data in Insurance Product Development

The uncertainty of insurance products necessitates the use of appropriate models and actuarial methods for the design of insurance company products, relying on a wealth of empirical or laboratory data for prediction and assessment. This presents a challenge to the supply of insurance.[6] A prime example is the ongoing promotion of catastrophic insurance development in our country. However, the relative scarcity of data on catastrophic insurance makes actuarial and claims processing more difficult.

3. Big Data Solutions in the Insurance Industry

3.1. Utilizing Big Data to Understand Potential Customers

Insurance companies can use big data to gather information on potential customers' personal details and behavioral characteristics. This data helps in understanding the risks, risk characteristics, types, and customers' awareness of insurance. By segmenting customers based on this data and cross-referencing it, companies can accurately target specific customer groups, predict and analyze customer behavior, and reach out to them at the right time and place. This approach enhances insurance sales conversion rates and reduces unnecessary marketing expenses.

3.2. Using Big Data for Differential Pricing

Big data enables differential pricing for individuals within different risk groups, essentially offering personalized pricing and managing moral hazards of the insured. Insurance companies can collect data on lifestyle, dietary, and driving habits using smart devices, home automation, sensors, mobile apps, etc. Artificial intelligence systems analyze this data, continuously assessing the risk level of the insured in various aspects. Differential pricing is then applied based on actuarial models that consider behavioral differences among consumers. Additionally, companies can use this data to offer personalized advice and warnings to high-risk individuals, encouraging them to change harmful behaviors and reduce moral hazards through additional premiums or other means.

3.3. Applying Big Data in Claims Management and Processing

Insurance companies use big data in claims management and processing. After an incident, policyholders can upload images and proof via mobile apps as per the company's claims requirements. AI systems also gather information from sensor history, enabling big data technology to automatically assess damage extent and estimate repair costs, quickly processing claims requests and compensating losses. Continuous data accumulation and algorithm optimization enhance the prediction and handling of unprecedented case types.

3.4. Employing Big Data in Anti-Fraud Measures

Big data is also employed in anti-fraud measures. Techniques like image recognition and historical data comparison can significantly reduce instances of insurance fraud. This approach enables insurance companies to make more just and reasonable judgments regarding the authenticity of claims.

4. Application Scenarios of Big Data in Insurance Companies

When discussing big data in insurance companies, many may think of products like Ant Financial's "Loss Assessment Treasure," which utilizes big data to quickly estimate the amount of loss in car accidents with minimal error compared to manual assessments. The specific application scenarios include the following:

Using Big Data to Discover Potential Customers for Precise Marketing

Insurance companies can exploit their vast data repositories in combination with big data analytics to identify potential customers for precise marketing. For example, the Chubb Insurance Group in the United States collaborates with SAS Analytics Software. SAS bases its analysis on customer data from various business lines of the insurance company, including demographics, geography, and behavioral attitudes, to create more refined customer segments. This system allows targeted insurance product promotion to specific groups at the right time and place, significantly reducing marketing expenses while increasing sales conversion rates and reducing the loss of high-value customers.

4.1. Timely Intervention in Insured Individuals' Behaviors Using Big Data Technology

While differentiating product pricing using big data, insurance companies can also intervene in insured individuals' behaviors in real-time. Taking health insurance as an example, companies first collect data using smart devices, wearables, and mobile apps to monitor various health indicators of the insured. Based on data analysis, they can guide insured individuals to adopt healthier lifestyles and dietary habits. Insurers might recommend low-salt, low-fat diets, provide reminders for exercises to counteract sedentary habits, and assist in smoking cessation. For policyholders who follow these health management recommendations, insurers can offer discounted rates. Conversely, for those who neglect risk management or disregard these health suggestions, insurers may even increase premiums as a form of penalty. An example of this dynamic premium setting mechanism is the "Dance, Dance, Revolution" project in the United States, aimed at reducing obesity in children.

4.2. Rapid Claims Processing and Anti-Fraud Measures Using Big Data

Moreover, big data applications extend to rapid claims processing and anti-fraud measures. Platforms like Ant Financial's insurance service use image recognition technology to compare uploaded photos and other proof materials against a vast database. Combined with the insured's credit history, these factors enable quick and accurate claim verification and online processing. This approach significantly aids insurance companies in reducing fraudulent claims and their likelihood.

5. Conclusion

Big data is poised to have a significant impact on the insurance industry, offering substantial development opportunities. With the application of big data, traditional methods based on sample structures and historical data are being replaced by comprehensive, unstructured, non-standard, real-time data. Insurance companies can leverage this data to predict the behaviors of the insured and more.

Currently, in various aspects such as business expansion, market marketing, product design, and service operations in the insurance industry, the influence of big data is already evident. However, the application of big data in the insurance sector also presents numerous challenges, with perhaps the biggest challenge originating from within the industry itself. Due to competitive relationships among different insurance companies, it's difficult to share personalized customer data across companies. When an insured individual switches providers, the detailed and personalized data needs to be recollected and recalculated by the new insurer, as this data does not transfer with the customer. This situation necessitates the establishment of a data-sharing alliance that spans societal or even global scales. The future application of big data will depend on how much data insurance companies can access and manage, representing a significant challenge for the industry.

References

- [1] Xu Xian, Liu Binglei. *Analysis of Application Scenarios of Regulatory and Compliance Technologies*. *Shanghai Insurance*, 2019(07):18-21.
- [2] Xu Xian, Liao Mengdi. *Application and Prospects of Insurtech in Traditional Insurance Marketing*. *China Insurance*, 2019(05):24-28.
- [3] Xu Xian, Fang Xi. *Regulatory Technology, Compliance Technology and Financial Technology*. *China Insurance*, 2019(04):21-26.
- [4] Xu Xian, Zhang Hang. *Construction and Application of Knowledge Graph in the Insurance Industry*. *China Insurance*, 2019(03):24-29.
- [5] Xu Xian. *Blockchain and Insurance Innovation: Mechanism, Prospects, and Challenges*. *Insurance Research*, 2017(05):43-52.
- [6] Xu Xian. *Framework and Trends of Insurance Technology*. *China Finance*, 2017(10):88-90.