Chapter 11
Big Data Analytics for Insurance

11.1 Introduction

In the last few chapters, we have seen the application of Big Data Analytics to various application domains. In this chapter, we shall examine its role in insurance.

The insurance domain has been a long-time user of conventional data processing techniques and therefore the information about customers, market trends and competition is abundantly available in legacy systems. In addition to the legacy systems, there is a huge amount of unstructured data coming from emails, social networks, messages, blogs, all put together usually referred to as "Big Data". Analyzing such variety of data will be of substantial value for insurance activities [1, 2] such as marketing and underwriting, in addition to reducing costs in operational activities which can enable better strategy formulation and risk reduction in insurance.

However, the Big Data applications call for Big Infrastructure which only the top-tier insurance companies have in place. The new type of infrastructure based on Hadoop type of environments requires technical support teams for configuring, administering and managing Hadoop clusters and the associated Hadoop family of software modules and also more recent and modern tools to handle deployment, scalability and management. Most of these tools require management of changes to configurations and other pieces by writing scripts of software. Making changes to one appliance entails a manual, time-intending process that leaves doubts in administrator's mind whether the changes have been implemented throughout the application cluster. This delay due to heterogeneous system was the reason behind the delays in Big Data deployment and implementations in organizations which proposed to implement Big Data. Alternatively, proprietary vendors as Oracle, IBM, EMC^2, Teradata who provide homogeneous software (and hardware) appliances for Big Data Applications are known to be very expensive and therefore very limited.

However, some proprietary solution (as Stack IQ) is now offered for implementing the applications of Big data environment for insurers.

In this chapter, we shall survey the methodology of deployment of big data application in Insurance sector.

11.2   The Insurance Business Scenario

The greater longevity of customers added with the business in times of financial crises and recession competition provides challenges. Such challenges motivate the identification of new products in insurance business and also about which methodologies and techniques are required to be adopted for marketing and advertising of the insurance products, and also assessment of risk and fraud detection. Actuaries [3] have been deploying analytical techniques for pricing of insurance policies. Earlier limited data windows were available to them to analyze and plan for implementation of the schemes. However, now we have a contrasting situation of data deluge. Today, we have a new opportunity to enhance the incomes and reduce the costs and thereby be more competitive. Better quality of claims processing and assessment of risk is possible given the large data, based on the demographic and psychographic trends.

Applying analytical tools to their new and huge volumes of data requires a distinctly different infrastructure from traditional database architectures and query products. This big data infrastructure needs to be installed (Hadoop clusters, for example) and analytics tools are required to be deployed on that infrastructure to obtain analytical results and insights which are required to be trusted by the company concerned for acting upon them [3].

11.3   Big Data Deployment in Insurance [4]

Major insurance companies such as MetLife and Travelers, Bajaj Insurance and Capital One are deploying these Big Data Analytical techniques. The insurance company, MetLife, has been analyzing their Big Data for identifying patterns and how risk mitigation can be aimed; product performance can be monitored by trend analyses. Travelers is another company which uses analytics techniques on their own Big data in order to identify new products or rationalize existing products and also better understand risks globally. Other companies such as Progressive Insurance Company and Capital One have experimented on how to segment their customers by deploying classification techniques. They tailor their products accordingly and make special offers based on segmented customer profiles.

11.4   Insurance Use Cases [5]

How and what the insurance companies do in deploying Big Data Analytics? The following are some use cases:

1. **Risk Avoidance**

In contrast to the risk assessment of a human agent who sold insurance after having a firsthand knowledge of the personal life of the customer, today's virtual world

requires external and internal risk assessment. This calls for building standard models based on new Big Data of customers for quantifying risk. Such application contains analysis of customer behavioral models based on the data of customers profiles over a long period of time, added with cross-reference to specific type of products. Risks inherent in specific products can be assessed.

2. **Personalized Product Formulation**

Personalized policies at appropriate premiums can be devised depending on demographic data, health record data, driving record data, etc. Therefore, the personalized policies can be evolved and offered based on personal data and specific personal needs and risks. For car insurance, sensors inside cars can help track customer behavior in tasks of driving time, brake frequency, average speed, traffic crimes, etc. When we add to this personal data the policy and customer profile data from the actuaries, we will provide the basis for how best we can rate a driver based on his performance and behavior patterns.

3. **Cross-selling and Lap Selling**

By monitoring the customer behavior through multiple channels such as social networking statements/tweets, web site click stream data and account information, it will be possible for the insurers to suggest additional products that meet and match the customer requirements and their budgets. In such applications, it may be possible to sketch customer habits to assess risks and also suggest changed customers behavior to reduce risks.

4. **Fraud Detection**

Insurance fraud can be better detected by deploying techniques such as pattern and graph analysis, in addition to social network analysis and cohort networks. The potential future and presently existing fraud can be possibly determined better by collecting data from social networks which can be analyzed for detecting normal or suspected behavior.

5. **Disaster/Catastrophe Planning**

To be able to better prepared for disasters/catastrophes which may occur anytime, statistical models can be analyzed, enhanced with direct actionable inputs from customers. This can help reducing the quantum and extent of insurance claims and also accelerate response by insurers.

11.5 Customer Needs Analysis

The insurance applications and products such as life insurance and annuity are complex and automating the discussion between prospective customers, on one hand, and their advisors, on the other hand, to improve the sale of insurance policies which will improve the efficiency.

11.6   Other Applications

Sentiment analysis, loyalty analysis, loyalty management, campaign design, campaign management and value analysis of customers are some of the other applications of Big Data Analytics in insurance.

11.7   Conclusion

In this chapter, we have summarized the application of Big Data Analytics to Insurance sector that includes use cases with applications in risk avoidance, personalized product formulation, cross-selling/lap-selling fraud detection, disaster/catastrophic planning and customer needs analysis.

11.8   Review Questions

1. Explain how Big Data Analytics Techniques are relevant to Insurance Sector Bankers.
2. What are the challenges the Insurance Sector business faces how? And how the application of analytics tools will help solve the challenges faced in Insurance business?
3. How the Big Data Analytics Techniques can be applied in Insurance?
4. What are the various use cases of Insurance Business for Big Data Analytics?
5. How personalized product formulation can be done?
6. How fraud detection can be done?
7. How disaster/catastrophe planning be performed?
8. What are the various other applications of Big Data Analytics in Insurance sector?

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