

Big Data Analytics in the Insurance Market

EMERALD STUDIES IN FINANCE, INSURANCE, AND RISK MANAGEMENT

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EMERALD STUDIES IN FINANCE, INSURANCE,
AND RISK MANAGEMENT VOLUME 5

Big Data Analytics in the Insurance Market

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Preface

The insurance industry has always been quite conservative; however, the adoption of new technologies is not just a modern trend but a necessity to maintain the competitive pace. This book will be a ‘must’ for people who require a good knowledge of big data concepts and their applications in the real world, particularly in relation to insurance. It will benefit people working in finance and for master’s students using big data tools. The authors present big databases: data analysis methods, learning processes, application to insurance, and position within the insurance market. Well-known authors write individual chapters in this field. Combining academic rigour and a strongly practice-oriented approach addresses both the competitive environment and the insurance business management. Furthermore, it provides a general overview of insurance undertakings and technical topics are explained in depth. Filling an important gap in the market for textbooks on the insurance business, it is divided into nine chapters with sub-topics.

The modern administration of insurance companies requires a wide variety of current knowledge and relevant background information. The primary goal and main objective of this book is to provide good knowledge of big data concepts and their applications, particularly in the field of life and non-life insurance. Big Data and Analytics for Insurers is the industry-specific guide to creating operational effectiveness, managing risk, improving financials, and retaining customers. In the advent of big data and analytics, this book fills the void with concrete information on using big data in the context of day-to-day insurance operations and strategy. This book also examines the behaviour of individuals at risk and insurance industry decision-makers involved in selling, buying, and regulation. It compares their actions to those predicted by benchmark models of choice derived from classical economic theory. This book fills a critical need in setting forth the role of modern risk analysis in managing catastrophe risk: storms, hurricanes, tornadoes, geomagnetic events, terrorism risk, earthquakes, floods, COVID-19. There is no comparable reference work for this important subject area. It strikes a good balance between the technical aspects of the subject and the practical aspects of decision-making. From fraud analytics in claims management to customer analytics, to risk analytics in solvency, the comprehensive coverage presented makes this book an invaluable resource for any insurance professional, which include practitioners and policy-makers working at insurance companies, insurance agents, brokers, insurance underwriters, underwriter manager, insurance associations, bankers, consultants, attorneys, the new insurance company hires, risk managers, financial planners, and business owners. This book is equally

appropriate for advanced undergraduate and graduate students of economics, management, and finance; this text provides the background required to understand current research.

The main objectives of this book are to:

- Provide deeper insights into big data concepts and their applications, particularly in life and non-life insurance.
- Investigate big data's specific impact on the insurance industry.
- Provide case studies, worked-out examples, and step-by-step methods for dealing concretely with specific situations.
- Focus on towards a critical need in setting the role of modern risk analysis in managing catastrophe risk.
- Highlight the remarkable impact of telematics in increasing the productivity of motor insurance and health insurance.

Foreword



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The emergence of analytics in big data and artificial intelligence has hit the tip of the iceberg for profound transformation in the insurance market. Many established insurance companies had invested heavily in the automation of insurance products. Over the period, the insurance products have been diversified to meet challenging and dynamic environments.

The edited book highlights the current aspects of the insurance market in terms of analysing big data generated from insurers' practices and dependence and the economics of structured and unstructured data. The upcoming technologies like text analysis, emotion detection, social media extraction, text mapping and their significance in generating revenue in the insurance market is described. Also, how productivity is increased by the use of telematics in the health sector and motor insurance sector. Later in the text, the role of big data in the growth of sustainable economics with FDIs, trustworthiness and ethics are discussed. The related use cases of data science for claim processing, fraud detection and prevention, policy administration, pricing and underwriting are discussed. The cybersecurity issues, data protection, and big data regulatory reforms are presented at the end. The book is very well structured to provide an overall understanding of the current practices, trends, future technologies in the field of the insurance market.

I wish the readers a great learning ahead, and indeed this book will mark a milestone in their learning journey.

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Chapter 1

Cybersecurity and Data Privacy in the Insurance Market

Priti Rani Rajvanshi, Taranjeet Singh, Deepa Gupta and Mukul Gupta

Abstract

Introduction: The frequency and complexity of cyber assaults have grown in recent years. Consequently, organisations have increased their expenditures in more robust infrastructure to protect themselves from these cyber assaults. These organisations' assets, data, and reputations are at risk due to rapidly increasing cybercrimes. However, complete protection from these many and ever-changing threats is very challenging as a result. To deal with them, companies are taking steps to reduce risks and limit company losses in their occurrence.

Purpose: Progressively, the insurance sector organisations are including digital protection as a component of the board's general danger technique. Protection enterprises, then again, depend on accurately expecting risks, while a significant number of them depend on normalised approaches. Because of the exceptional attributes of the digital assaults, transporters now and again depend on subjective strategies dependent on master decisions. There is an unmistakeable absence of observational information on digital protection, specifically subjective examinations planning to comprehend and depict necessities, impediments, and cycles applicable for digital protection.

Methodology: There are various unanswered inquiries and worries about the oversight and legitimate and administrative assessment of network safety weaknesses in the protection business. In the wake-up of looking over all these worries and issues, steps to alleviate them are laid out after an extensive literature survey and secondary data sources. In this study, the authors have principally viewed the executive parts of the associations as the danger. While considering network protection, their insight of needs

was taken as one among a few dangerous treatment systems, just as the necessities of the organisations' protection in assessing the danger level of likely customers.

Findings: This section analyses past research in network safety and information security in the protection market. The danger of the executives' strategies, the numerical models, and the forecasts of digital occasions are illustrated in this section. Lastly, the future headings are likewise expressed momentarily.

Practical implications: This review might be valuable for additional examination and logical discussion, yet additionally for down-to-earth applications. Moreover, it could be gainful to organisations as a supportive instrument for better agreement on what digital protection is and how to get ready to take on network safety and information security procedures in the association.

Significance: These associations' resources, information, and notoriety are in danger because of quickly expanding cybercrimes. Cybercriminals are utilising more refined approaches to start digital assaults. Digital protection was anticipated to affect security conduct before any proof was gathered. Progressively, organisations are including digital protection as a feature of their general danger to the executive system. Because of the exceptional attributes of the digital assaults, transporters as often as possible depend on subjective methods dependent on master decisions. Thus, this space of network safety and information security is vital uniquely in the protection market.

Keywords: Cybersecurity; cyber insurance; cybercrimes; data privacy; cyber laws; cloud computing

JEL classifications: C00; C63; G00; G10; G22; G30

1. Introduction

1.1. Cybersecurity

Cybersecurity is principally about individuals, cycles, and innovations cooperating to envelop the full scope of danger decrease, weakness decrease, discouragement, worldwide commitment, occurrence reaction, versatility, and recuperation arrangements and exercises, including personal computer (PC) network tasks, data confirmation, law requirement, and so forth.

Cybersecurity is so significant in what's turned into a dominating computerised world:

- Cyberattacks can be amazingly costly for organisations to persevere.
- Notwithstanding monetary harm endured by the business, an information break can likewise cause untold reputational harm.

- Cyberattacks these days are turning out to be continuously ruinous. Cybercriminals are utilising more modern approaches to start digital assaults. Guidelines, for example, General Data Protection Regulation (GDPR), drive associations to care more for the individual information they hold. For the above reasons, digital protection has become a significant piece of the business. The emphasis currently is on creating proper reaction designs that limit the harm in a digital assault. However, an association or an individual can foster an appropriate reaction plan just when he has a decent grasp on digital protection essentials (Lemnitzer, 2021). Digital protection and security accreditation have been powerful and broadly acknowledged methods for overseeing vulnerability and chances and setting up trust in the arrangement of digital frameworks. Affirmation gives proof of an agreeable ordinary appraisal of the arrangement of assistance against insurance components intended to relieve security chances. Moreover, protection
 - i. establishes liability of taking care of the expenses of re-instating administration arrangement following interferences or deviations from authoritative commitments or potentially administrative guidelines;
 - ii. can give remuneration to misfortunes endured by administration shoppers because of inappropriate help activity (e.g. loss of individual or monetarily touchy information).

Certificate and protection have been utilised as two instruments of hazard moderation and trust foundation in a wide range of administrations and enterprises, like the development organisations, transportation, neighbourliness, information and communications technology (ICT), medical care, and administrations in the financial area according to a protection viewpoint, having network safety affirmations is an approach to show that specific security controls have been carried out as per fitting principles (Mooney & Zimmermann, 2020). Along these lines, for confirmed items, some insurance agencies require decreased charges (Angelini, Ciccotelli, Franchina, Marchetti-Spaccamela, & Querzoni, 2020; Woods & Moore, 2019). The significant new income openings emerging from digital protection should be supplemented by enormous expense reserve funds (Pandey, 2016; Tripathi & Mukhopadhyay, 2020). Digital protection is characterised to be the best approach to move the monetary dangers identified with organisation and PC episodes to an outsider (Huang & Wang, 2009). Contrasted and customary protection strategies for business interference and wrongdoing, a digital protection strategy can likewise cover, for example, computerized information misfortune, harm, and burglary, just as misfortunes because of organization blackouts, PC disappointments, and site disfigurement. Fig. 1 displays the workflow of the insurance process in cybersystems.

As manifested by ongoing business sector reports, the reception of digital protection has hugely expanded throughout the last decade, accomplishing a yearly development pace of more than 30% since 2011 (Woods & Moore, 2019). This is likewise reflected in the developing number of cases submitted for digital occurrences in a wide scope of business areas (Grigoriadis, 2017) and that, in scarcely any striking cases, have seen insurance agencies paying even

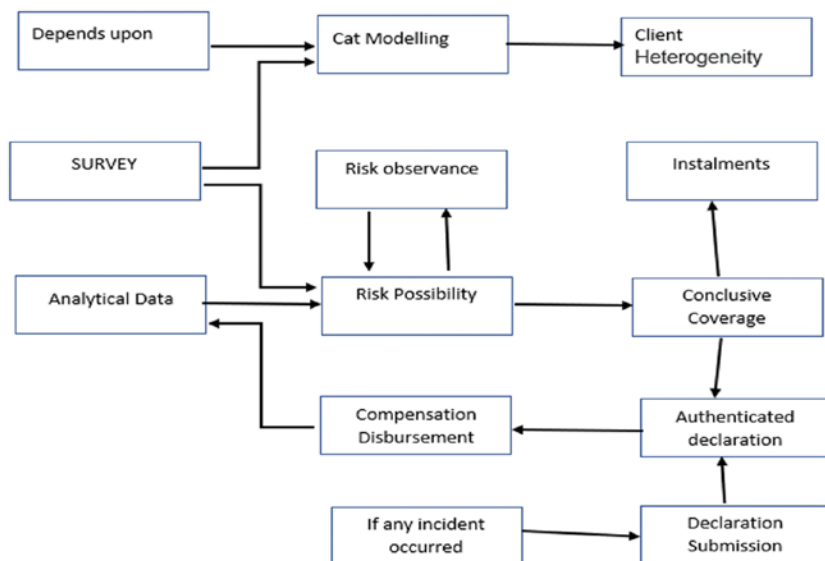


Fig. 1. Cyberinsurance Workflow. *Source:* Adapted from [Dambra, Bilge, and Balzarotti \(2020\)](#).

hundred-million-dollar reimbursement (Ilves, Evans, Cilluffo, & Nadeau, 2016). Pursuing this direction, the digital protection market is gauged to arrive at 14 billion USD in gross charges by 2022 (Trang, 2017), and a few pointers affirm this heading. To begin with, digital violations have never been so productive (Angelini et al., 2020), and the developing number of assaults is expanding the attention to board individuals about digital dangers and the difficulty of just depending on preventive arrangements (Tripathi & Mukhopadhyay, 2020). This pushes a developing number of organisations, among which significantly more little and medium-sized ventures, to begin considering network safety protection as a danger relief procedure: indeed, the information shows that 66% of them would have to close down whenever hit by an information break (Pandey, 2016).

One more solid driver for the digital protection area is the presentation of worldwide guidelines on by and by recognisable data misfortune, like GDPR and California Consumer Privacy Act (CCPA). For example, the need to cover fines and the significant expense of client warnings are now making interest in buying digital protection (Sullivan & Nurse, 2021). All in all, while specialists and security specialists are as yet discussing whether digital protections even bode well and how they could be better executed, insurance agencies are now selling them as a feature of their portfolio. We might like it or not, yet this is now a reality – and as it regularly occurs in our field, security needs to find a youthful innovation that was raced to the market. As we will find in the remainder of this paper, organisations are battling against the interest of digital approaches as existing instruments and systems to survey hazard openings and evaluate are deficient in the digital space. Albeit past examinations have reasoned that disregarding cataclysmic

situations, by far most of the digital dangers are insurable (Kshetri & Kshetri, 2017; Romero, 2020; Selby, 2020), transporters are missing robust systems, norms, and instruments to complete their estimations. As we will thoroughly detail later in this work, the outcome is that subjective appraisal of such dangers prompts mistaken assessments, not appropriately custom-made to the clients but fundamentally dependent on midpoints for their modern areas (DeKorte, 2019).

There is an inescapable understanding that shrewd protection contracts or blockchain innovation overall will appropriately affect an assortment of use situations inside the protection area later on. For example, the model given as pay-per-use protection models, miniature protection agreements, or cheats anticipation frameworks (Dambra et al., 2020). Nonetheless, in Europe, the protection market is exceptionally controlled today, which makes it extremely testing to set up new items dependent on another innovation or enter the market as a protection new business overall (Grima, Kizilkaya, Sood, & Erdem Delice, 2021; Grima, Spiteri, & Romănova, 2020; Romănova, Grima, Spiteri, & Kudinska, 2018).

Safety net providers face motivations to set up control components to decrease digital misfortunes. Researchers foresee the business will expand security levels by offering premium limits for a safer framework (Huang & Wang, 2009). Some propose guarantors centre around decreasing misfortunes post-occurrence by going about as the so-called quarterbacks of information break reaction (Woods & Moore, 2019). These cases about digital protection depend on instinct and self-revealing separately. Setting up whether and how these components happen is important, particularly given that policymakers are thinking about exorbitant mediations to help the market (Cedarbaum, Finkel, & Zachary, 2013) government going about like the (digital) guarantor.

1.2. Cyber Laws

1.2.1. Guidelines. In terms of digital protection, five obnoxious laws to consider: The Information Technology Act (ITA) of 2000 was enacted. The ITA, enacted in 2000, governs India's digital legislation. The primary motivation behind this Act is to provide reliable legal comprehensiveness to online businesses through the registration of ongoing records with the government. In any event, when the digital assailants became slicker, they were beaten by the human proclivity to misuse innovation, which resulted in a series of adjustments. The scope of ITA has now been expanded to include all of the most recent technological advancements. The ITA is the most noteworthy, commanding the Indian enactment to administer cybercrime comprehensively: Section 43 – This section applies to those who damage computer systems without the owner's permission. In such situations, the owner might guarantee payment for the whole injury. Area 66 – Applicable if an individual is determined to have submitted any demonstration referred to in segment 43 inconsistently or deceptively. Detention for such offences might last up to three years, with a fine of up to Rs 5 lakhs. Area 66B – Comprises the disciplines for deceptively obtaining specialised devices or computers, with a possible three-year sentence. A fine of Rs might also follow this sentence, 1 lakh depending on the severity. Area 66C – This section looks at

identity thefts, including advanced faker markings, hacking passwords, or other unique ID features. A fine of Rs. 1 lakh may accompany detention for three years if the defendant is found guilty.

Segment 66 D – This part was added at the viewer's request, and it focuses on thwarting criminals who use PC assets to perform pantomime. The Indian Penal Code (IPC) was enacted in 1860. The IPC, 1860 – enacted alongside the ITA of 2000 – defines identity theft and related digital fraud. The IPC's most important section deals with digital forgeries: falsification (Section 464), pre-made cheating setups for forgery (Section 468), documentation that is false (Section 465), presenting a forged report as authentic (Section 471), and damage to one's reputation (Section 469). The Companies Act of 2013 was passed in 2013. The business partners refer to the Companies Act of 2013 as a legally binding promise. The Act's instructions codify all essential techno-legitimate compliances, putting less consistent businesses in a legal bind. The Companies Act of 2013 gave the Serious Frauds Investigation Office (SFIO) to indict Indian companies and their leaders.

Similarly, with the publication of the Companies Inspection, Investment, and Inquiry Rules, 2014, SFIOs have been far more aggressive and severe in this regard. The meeting ensured that all administrative compliances, including digital legal sciences, e-disclosure, and network security persistence, were addressed. The Companies (Management and Administration) Rules, 2014, recommend stringent rules affirming the network safety commitments and obligations upon the organisation chiefs and pioneers.

2. Literature Review

[Dambra et al. \(2020\)](#) examine prior research in cyberinsurance and categorise previous studies into four categories, each focussing on the economic factors, legal issues, and technological elements.

[Ilves et al. \(2016\)](#) outline NATO and the European Union (EU)'s existing tactics to defend its members' interests against such threats. Both organisations have realised that cybersecurity is a major danger to their basic aims in the last decade. They have developed increasingly ambitious policies, formed new institutions, and (in the EU's case) enacted laws to address these risks.

To outsource corporate cybersecurity oversight to the insurance sector, [Trang \(2017\)](#) proposed that hospitals, banks, and big businesses be required to acquire cyber-liability insurance. A mandatory cyber-liability system mandates implementing current, up-to-date cybersecurity standards to help prevent data breaches and reduce losses.

[Angelini et al. \(2020\)](#) presented the Italian National Framework for Cybersecurity and Data Protection; a framework adapted on the National Institute of Standards and Technology (NIST) Cybersecurity Framework that incorporates features and tools to correctly consider data protection issues in a coherent and integrated manner with cybersecurity aspects.

The benefits and drawbacks of adopting cyberinsurance to incentivise cybersecurity measures are discussed by [Sullivan and Nurse \(2021\)](#). These findings are based on examining previous industry reports and academic studies.

A review of theoretical and practical difficulties and possibilities is provided for smart cities by [Habibzadeh, Nussbaum, Anjomshoa, Kantarci, and Soyata \(2019\)](#) in terms of technical elements and policy and governance concerns.

[Gavénaitè-Sirvydienè \(2019\)](#) clearly describes a cyber-risk and a cyberinsurance policy as cyber-type hazards are linked to technology and information assets, and financial institutions and insurance market authorities classify them as operational risk.

[Churi, Pawar, and Moreno-Guerrero \(2021\)](#) present the utility and protection variables of the Indian medical care information and examine the utility viewpoint and security issues concerning Indian medical care frameworks. It has been discovered that there have been various examinations that concentrate on Indian medical services information. Security issues in medical services, explicitly in India, are brought about by ordinary carelessness, culture, governmental issues, spending plan constraints, enormous populace, and existing frameworks. It surveys the Indian medical services framework and the applications that drive it. Furthermore, the paper likewise maps how protection issues are going on in each medical care area in India. Protection has been the most overlooked piece of the Indian medical care framework. With India being a country with 130 billion, much medical care information is produced each day. The odds of information breaks and other security infringement on such touchy information can't have stayed away as they cause people serious worries. This paper isolates the medical care framework's advances and records the protection that should be tended to be first.

The insurance sector has consistently been intensely dependent on information for exact risk evaluation, guaranteeing, and estimating. The expanding accessibility of information and improved preparing capacities now available to guarantors can bring various advantages for insurers and customers. The granularity of information from various sources can prompt more customised and reasonable protection items, expanded decisions, and more productive adjusting for clients. Insurers can likewise profit from big data analytics (BDA) by extending their dispersion reach, guaranteeing more precise estimating and bringing their expense edges down to work on functional efficiencies, better extortion discovery, and fewer cases because of further developed risk conduct by clients ([BDAI, 2020](#)).

As per [Zhabynets \(2014\)](#), the improvement of high innovation gives limitless freedoms to proficient business, and yet it makes some data for secret activities more open. The insurance agencies providing protection assurance and ensuring security for their clients should be the rearward in the rundown of monetary foundations' secret data spillage. The creator thinks that the issue of information assurance and data security of insurance agencies takes on an extraordinary earnestness in the present climate. The paper's motivation is to examine channels and sorts of secret data spills, attributes of present-day advances spill in data security for home-grown insurance agencies, and their consistency with global principles of data security. Results: Fast improvement of data innovation, protection administration deals through the internet, and varied developments prove expanded necessities for the assurance of individual information and other classified data by the insurance agencies. Home-grown backup plans start to present progressed

assurance innovations for secret information, including Data loss prevention software (DLP) frameworks, understanding the significance of data security. The practice of global norms of data security has not been exceptionally well known in Ukraine yet in correlation with the created nations because there is an absence of the administrative necessities in the data security framework for the guarantors. From the creator's perspective, the present circumstance could antagonistically influence the safety net providers' standing and cause the deficiency of trust among the protection administrations' customers.

Sasha [Romanosky](#), [Ablon](#), [Kuehn](#), and [Jones \(2019\)](#) have introduced the main thorough topical investigation of digital protection approaches recorded by insurance agencies with state protection controllers. The review gathered more than 235 strategies from New York, Pennsylvania, and California, just as arrangements posted openly on transporters' sites, and independently analysed three principal parts: the inclusion, the application surveys, and the rate plans. It was discovered that there is extremely amazing comparability (more comparative than normal) across the covered misfortunes, with more variety in prohibitions. This recommends that transporters, overall, are to some degree predictable in recognising digital dangers and have a specific measure of trust in their capacity to value these dangers.

The study shows that there is no cyber security insurance (CSI) supplier in Malawi as of now. This can adversely affect Malawi's general data or network protection since certain organisations that work with touchy information cannot put resources into Malawi because of the absence of a CSI. In light of our conversation, it has been shown that CSI can assist with improving the digital protection of countries or organisations since the insurance agencies cannot guarantee associations that don't execute needed least network safety measures ([Kondwani & Kim, 2017](#)).

3. Issues in the Insurance Industry

Protection is a system of hazard move and sharing by pooling dangers and assets among a gathering of people presented with comparable sorts of dangers to serve the individuals who endure misfortune by the danger. Protection is, along these lines, a monetary device extraordinarily made to decrease the monetary effect of unanticipated occasions and make monetary security. To be sure, every individual who needs to secure himself against monetary difficulty ought to think about protection ([Seth & Sood, 2020](#); [Sood, Seth, Jindal, & Sadawarti, 2021](#)). The protection industry requires a more smoothed out application conveyance model, versatile assets, computerisation of manual cycles for fabricate, combination, test, and organisation. The significant difficulties most protection associations face are working on the speed and nature of their assembles and abbreviating their application conveyance lifecycle while lessening the time spent on fixing issues ([Biddle & Reath, 2018](#)). A portion of the difficulties in the current cycles are:

- Customer assumptions are ceaselessly changing, and if dissatisfied on the explicit time, it results in troubled client.
- Increased pace of creation delivers because of agile way of thinking.