Analisis Resiko

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Contents

Preface

Book Description

Loss Data Analytics is an interactive, online, freely available text.

- The online version contains many interactive objects (quizzes, computer demonstrations, interactive graphs, video, and the like) to promote *deeper learning*.
- A subset of the book is available for *offline reading* in pdf and EPUB formats.
- The online text will be available in multiple languages to promote access to a *worldwide audience*.

What will success look like?

The online text will be freely available to a worldwide audience. The online version will contain many interactive objects (quizzes, computer demonstrations, interactive graphs, video, and the like) to promote deeper learning. Moreover, a subset of the book will be available in pdf format for low-cost printing. The online text will be available in multiple languages to promote access to a worldwide audience.

How will the text be used?

This book will be useful in actuarial curricula worldwide. It will cover the loss data learning objectives of the major actuarial organizations. Thus, it will be suitable for classroom use at universities as well as for use by independent learners seeking to pass professional actuarial examinations. Moreover, the text will also be useful for the continuing professional development of actuaries and other professionals in insurance and related financial risk management industries.

Why is this good for the profession?

An online text is a type of open educational resource (OER). One important benefit of an OER is that it equalizes access to knowledge, thus permitting a broader community to learn about the actuarial profession. Moreover, it has the capacity to engage viewers through active learning that deepens the learning process, producing analysts more capable of solid actuarial work.

Why is this good for students and teachers and others involved in the learning process? Cost is often cited as an important factor for students and teachers in textbook selection (see a recent post on the $400 textbook). Students will also appreciate the ability to "carry the book around" on their mobile devices.

Why loss data analytics?

The intent is that this type of resource will eventually permeate throughout the actuarial curriculum. Given the dramatic changes in the way that actuaries treat data, loss data seems like a natural place to start. The idea behind the name *loss data analytics* is to integrate classical loss data models from applied probability with modern analytic tools. In particular, we recognize that big data (including social media and usage based insurance) are here to stay and that high speed computation is readily available.

Project Goal

The project goal is to have the actuarial community author our textbooks in a collaborative fashion. To get involved, please visit our Open Actuarial Textbooks Project Site.
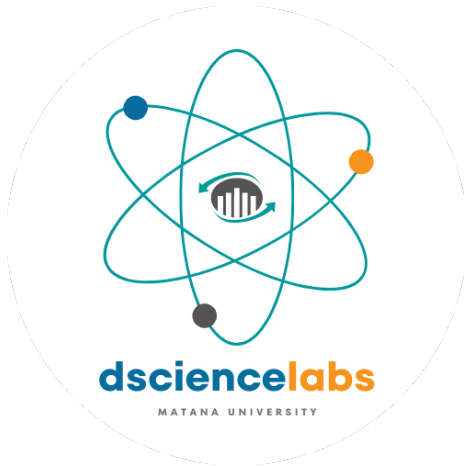
Acknowledgements

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We also wish to acknowledge the support and sponsorship of the International Association of Black Actuaries in our joint efforts to provide actuarial educational content to all.

Contributors

The project goal is to have the actuarial community author our textbooks in a collaborative fashion. The following contributors have taken a leadership role in developing *Loss Data Analytics*.

- **Bakti Siregar, M.Sc** is a Professor at the Department of Mathematics and Actuarial Science and Associate Provost for Assessment and Accreditation at the American University in Cairo (AUC). Amin holds a PhD in Statistics and is an Associate of the Society of Actuaries. Amin is the recipient of the 2016 Excellence in Academic Service Award and the 2009 Excellence in Teaching Award from AUC. Amin has designed and taught a variety of statistics and actuarial science courses. Amin's current area of research includes quantitative risk assessment, reliability assessment, general statistical modelling, and Bayesian statistics.

- **Yosia** is an associate professor in the Risk and Insurance Department at the Wisconsin School of Business. He is also the Charles & Laura Albright Professor in Business and Finance. Professor Shi is an Associate of the Casualty Actuarial Society (ACAS) and a Fellow of the Society of Actuaries (FSA). He received a Ph.D. in actuarial science from the University of Wisconsin-Madison. His research interests are problems at the intersection of insurance and statistics. He has won several research awards,

including the Charles A. Hachemeister Prize, the Ronald Bornhuetter Loss Reserve Prize, and the American Risk and Insurance Association Prize.

- **Clara Della** is an associate professor in the Department of Statistics and Actuarial Science at The University of Iowa. He is an Associate of the Society of Actuaries, and has volunteered in various elected and non-elected roles within the SoA. Having a broad theoretical interest as well as interest in computing, he has published in prominent actuarial, computer science, probability theory, and statistical journals. Moreover, he has worked in the financial industry, and since then served as an independent consultant to the insurance industry. He has experience educating actuaries in both Mexico and the US, serving in the roles of directing an undergraduate program, and as a graduate adviser for both masters and doctoral students.

- **Karen** is an Assistant Professor at the Department of Statistics at Purdue University. He is the Associate Director of Purdue's Actuarial Science. Prior to joining Purdue in 2016, he completed the PhD at York University (2012-2015). He obtained the Fellow of the Society of Actuaries (FSA) in 2017. His research expertise are in dependence modelling, risk management, and pricing. During the PhD candidature, Jianxi also worked as a research associate at the Model Validation and ORSA Implementation team of Sun Life Financial (Toronto office).

- **Brigita** is a senior lecturer at Macquarie University in Australia, where he has served as the undergraduate actuarial program director since 2018. He obtained his PhD in 2015 from Nanyang Technological University in Singapore. He is a fully qualified actuary, holding the credentials from both the US Society of Actuaries and Australian Actuaries Institute. His major research interests are mortality modelling, longevity risk management and bonus-malus systems.

- **Naufal** is associate professor at the University of Antwerp. He has a degree in Mathematics and a PhD in Science: Mathematics, obtained at the University of Antwerp. During his PhD he successfully took the Master in Insurance and the Master in Financial and Actuarial Engineering, both at KU Leuven. His research focuses on the adaptation and application of robust statistical methods for insurance and finance data.

- **Garry** is an Associate Professor in the Risk, Insurance and Healthcare Management Department in the Fox School of Business, Temple University. She is an Associate of the Society of Actuaries. She teaches courses in Actuarial Science and Risk Management at the undergraduate and graduate levels. Her research interests include corporate governance of insurance companies, capital management, and sentiment analysis. She received her Ph.D. from The Wharton School of the University of Pennsylvania.

Reviewers

Our goal is to have the actuarial community author our textbooks in a collaborative fashion. Part of the writing process involves many reviewers who generously donated their time to help make this book better. They are:

- Yair Babab
- Chunsheng Ban, Ohio State University
- Vytaras Brazauskas, University of Wisconsin - Milwaukee
- Yvonne Chueh, Central Washington University
- Chun Yong Chew, Universiti Tunku Abdul Rahman (UTAR)
- Eren Dodd, University of Southampton
- Gordon Enderle, University of Wisconsin - Madison
- Rob Erhardt, Wake Forest University
- Runhun Feng, University of Illinois
- Brian Hartman, Brigham Young University
- Liang (Jason) Hong, University of Texas at Dallas
- Fei Huang, Australian National University
- Hirokazu (Iwahiro) Iwasawa
- Himchan Jeong, University of Connecticut
- Min Ji, Towson University
- Paul Herbert Johnson, University of Wisconsin - Madison
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- Samuel Kolins, Lebonan Valley College
- Andrew Kwon-Nakamura, Zurich North America
- Ambrose Lo, University of Iowa
- Mark Maxwell, University of Texas at Austin
- Tatjana Miljkovic, Miami University
- Bell Ouelega, American University in Cairo
- Zhiyu (Frank) Quan, University of Connecticut
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- Ranee Thiagarajah, Illinois State University
- Ping Wang, Saint Johns University
- Chengguo Weng, University of Waterloo
- Toby White, Drake University
- Michelle Xia, Northern Illinois University
- Di (Cindy) Xu, University of Nebraska - Lincoln
- Lina Xu, Columbia University
- Lu Yang, University of Amsterdam
- Jorge Yslas, University of Copenhagen
- Jeffrey Zheng, Temple University
- Hongjuan Zhou, Arizona State University

Other Collaborators

- Alyaa Nuval Binti Othman, Aisha Nuval Binti Othman, and Khairina (Rina) Binti Ibraham were three of many students at the Univeristy of Wiscinson-Madison that helped with the text over the years.
- Maggie Lee, Macquarie University, and Anh Vu (then at University of New South Wales) contributed the end of the section quizzes.
- Jeffrey Zheng, Temple University, Lu Yang (University of Amsterdam), and Paul Johnson, University of Wisconsin-Madison, led the work on the glossary.

For our Readers

We hope that you find this book worthwhile and even enjoyable. For your convenience, at our Github Landing site (https://openacttexts.github.io/), you will find links to the book that you can (freely) download for offline reading, including a pdf version (for Adobe Acrobat) and an EPUB version suitable for mobile devices. Data for running our examples are available at the same site.

In developing this book, we are emphasizing the online version that has lots of great features such as a glossary, code and solutions to examples that you can be revealed interactively. For example, you will find that the statistical code is hidden and can only be seen by clicking on terms such as

R Code for Frequency Table

```
Insample <- read.csv("data/Insample.csv", header=T,  na.strings=c("."),
                        stringsAsFactors=FALSE)
Insample2010 <- subset(Insample, Year==2010)
table(Insample2010$Freq)
```

We hide the code because we don't want to insist that you use the R statistical software (although we like it). Still, we encourage you to try some statistical code as you read the book – we have opted to make it easy to learn R as you go. We have set up a separate R Code for Loss Data Analytics site to explain more of the details of the code.

Like any book, we have a set of notations and conventions. It will probably save you time if you regularly visit our Appendix Chapter **??** to get used to ours.

Freely available, interactive textbooks represent a new venture in actuarial education and we need your input. Although a lot of effort has gone into the development, we expect hiccoughs. Please let your instructor know about opportunities for improvement, write us through our project site, or contact chapter contributors directly with suggested improvements.

Chapter 1

Introduction to Loss Data Analytics

Tuliskan semua BAB 1 disini

Chapter 2

Frequency Modeling

Tuliskan semua Bab2 disini

Chapter 3

Modeling Loss Severity

Tuliskan semua Bab3 disini

Chapter 4

Model Selection and Estimation

Chapter 5

Aggregate Loss Models

Chapter 6

Simulation and Resampling

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Experience Rating Using Credibility Theory

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Insurance Portfolio Management including Reinsurance

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Appendix B: Iterated Expectations

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Appendix C: Maximum Likelihood Theory

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Appendix D: Summary of Distributions

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Appendix E: Conventions for Notation

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Glossary