LEARNING.

LEARNING 2021

LEARNING PROGRAM
FIRST SEMESTER 2021

Detralytics

OUR LEARNING PROGRAM | 1st Sem 2021

FEB 9 & 23 MAR 9 | **FINANCIAL STATEMENT ANALYSIS OF INSURANCE COMPANIES**

3 x 3h30 (14:00 - 17:30) | 900€ | By Donatien Hainaut | English

This training will give you a concise and comprehensive presentation of stock market ratios and of techniques for analysing short term stock market move.

FEB 25 | **LUNCH & LEARN : CYBER-RISK, SECURITY & INSURANCE**

12:30 – 13:30 | FREE | By Olivier Lopez | English

In a world increasingly dependent on digital tools, cyber-risk is an emerging threat for global economy.

MAR 24 & 31 | **CYBER INSURANCE : MODELS FOR PRICING AND RESERVING**

2 x 3h (14:00 - 17:00) | 750€ | By Olivier Lopez | English

In this training, we will describe quantitative tools that can be used to help decision and design on cyber-insurance products.

MAR 30 | **LUNCH & LEARN : INTRODUCTION TO INSURANCE ANALYTICS**

12:30 – 13:30 | FREE | By our Scientific Directors | French

This session will give you a short introduction about statistical learning techniques applied to insurance data analysis.

APR 20 & 27 | **INSURANCE ANALYTICS : A PRIMER (MODULE 1)**

2 x 3h (14:00 - 17:30) | 750€ | By Michel Denuit | French

Do you need some career boosting? Would you like to demystify magic words like cross-validation, bagging, shrinkage… or discover what is hidden behind wild acronyms like GAM, LASSO, GBM, etc. This training is for you!

MAY 11 & 18 | **INSURANCE ANALYTICS : A PRIMER (MODULE 2)**

2 x 3h (09:00 - 12:00) | 750€ | By Julien Trufin | French

The sessions proceed step by step, recalling the fundamental statistical concepts at the heart of tree-based methods. Their relative merits are illustrated by means of several case studies with insurance data.

JUNE 1 2 & 3 | **INSURANCE ANALYTICS : NEURAL NETWORKS (MODULE 3)**

3 x 3h30 (14:00 - 17:30) | 750€ | By Donatien Hainaut | French

The purpose of this training is to introduce participants to neural networks for actuarial pricing. The presentation places a strong emphasis on the practical implementation of these models in Keras, a R library.

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TRAINING SHEET :

FINANCIAL STATEMENT ANALYSIS OF INSURANCE COMPANIES: BEYOND THE NUMBERS

TITLE :	FINANCIAL STATEMENT ANALYSIS OF INSURANCE COMPANIES: BEYOND THE NUMBERS
DATE :	February 9, 23 & March 9, 2021
LENGTH :	3 x 3h
TYPE :	Online Training
INDUSTRY :	Insurance
EXPERTISE :	Actuarial
CPD/PPC POINTS :	
WHO SHOULD ATTEND :	All level
REQUIREMENTS :	
LANGUAGE :	English
LOCATION :	Online via Teams
TRAINER :	Donatien Hainaut
PRICE :	900€

DESCRIPTION	Our Scientific Director, Donatien Hainaut, will give you a concise and comprehensive presentation of stock market ratios and of techniques for analysing short term stock market move.

PROGRAM	We start by reviewing ratios like market to book, price to earnings, price-earnings to growth ratios, payout ratio and dividend yields. We next introduce chartist tools that are used to forecast stock prices based on market-derived data. We focus on moving averages (MA), MA convergence divergence (MACD), momentum, Bollinger bands and stochastic oscillator. These concepts are illustrated on examples and with free web tools. This short session will give you an overview of the content of the training "Financial statement analysis of insurance companies" planned in February 2021.
	1. READING THE FINANCIAL STATEMENTS
	• The balance sheet

	• The Income statement
	• Double entry accounting
	• Cash-_ow statement
	
	2. INTRODUCTION TO IFRS 9, 4 AND 17
	
	    • IFRS 9 : accounting of investments
	    • IFRS 4 : basic principles
	    • IFRS 17 : introduction to BBA & VFA
	
	3. ADDITIONAL TOPICS
	
	    • Consolidation: full and equity methods
	    • Goodwill
	    • Deferred tax assets/liabilities

TRAINING SHEET :

CYBER INSURANCE: MODELS FOR PRICING AND RESERVING

TITLE :	Cyber insurance: models for pricing and reserving
DATE :	March 24 & 31, 2021
LENGTH :	2 x 3h
TYPE :	Online Training
INDUSTRY :	Insurance
EXPERTISE :	Actuarial
CPD/PPC POINTS :	
WHO SHOULD ATTEND :	All level
REQUIREMENTS :	PC with dedicated R packages
LANGUAGE :	English
LOCATION :	Online via Teams
TRAINER :	Olivier Lopez
PRICE :	750€/day

DESCRIPTION	In a world increasingly dependent on digital tools, cyber-risk is an emerging threat for global economy. Since cyber-security engineering can never achieve a perfect protection against this risk, cyber-insurance products aim to provide economic repairs to the policyholders. They also play a role of prevention and assistance to the small business companies which may have difficulties to undertake the IT function on their own.
	Quantifying the impact of cyber-risk is then a challenging task, in various ways:
	• Pricing: due to the difficulty to estimate the frequency and the typical severity of claims, or to precisely identify risk factors, evaluating the proper price of a contract can be hard, especially when launching a new business.
	• Reserving, risk management: right now, the prices of cyber contracts are mainly driven by the market, more than by a precise risk evaluation. An important question is to evaluate

	if a company which sold cyber contracts is able to face the corresponding commitments. • Exclusion: since some cyber events may lead to some catastrophic consequences, policies must determine exclusions, or introduce appropriate limits to the policy. On the other hand, if the limits are too low, the policy becomes unattractive and potential policyholders may not subscribe, so quantitative methods to help to determine exclusions or limits are required. • Systemic events: the risk of a cyber pandemic has to be taken into account, since it can break the mutualisation. Even if such type of events may, in some cases, be excluded from policies, there is still a need to understand how an insurer can respond to such crisis. In this training, we will describe quantitative tools that can be used to help decision and design of such guarantees. A particular attention is devoted to the methodology, and how to adapt to the (poor) quality of data. We will address cyber-insurance first in a classical frequency / cost dichotomy, before giving some ideas on the models that can be used to consider cyber pandemic.

PROGRAM	Introduction to cyber-risk and cyber-insurance: • What is cyber-risk? • Evolution of cyber-risk. • What is expected from cyber guarantees. Quantifying the cost of cyber events: • Public data Vs. Portfolio data. • Determination of risk factors. • Extreme cyber events: short recap on extreme value theory and extreme value regression. • Example: tree-based methods to categorize cyber events. • From the model to exclusion policies. • Mixing public and portfolio data. Frequency of cyber claims and cyber pandemic: • Frequency of cyber claims. • Loss of mutualisation.

	• Models for assessing the impact of a cyber pandemic.

ACQUIRED SKILLS :	After completion of the training session, participants will have acquired a general understanding on the main problematics linked to cyber-risk evaluation.
	They will be able to discuss the quality of cyber data, and to develop models to evaluate the risk associated with a cyber contract, and decision tools to determine the perimeter of the guarantee. They will know how to implement these models using R.

TRAINING SHEET :

INSURANCE ANALYTICS : A PRIMER (MODULE 1)

TITLE :	Insurance analytics: A primer (Module 1)
DATE :	April 20 & 27, 2021
LENGTH :	2 x 3h
TYPE :	Online Training
INDUSTRY :	Insurance
EXPERTISE :	Actuarial
CPD/PPC POINTS :	
WHO SHOULD ATTEND :	All level
REQUIREMENTS :	PC with dedicated R packages
LANGUAGE :	French with English Material
LOCATION :	Online via Teams
TRAINER :	Michel Denuit
PRICE :	750€/day (-20% if the 3 modules are followed)

DESCRIPTION	Do you feel lost in the random forests? Do you need some career boosting? Would you like to demystify magic words like cross-validation, bagging, shrinkage… or discover what is hidden behind wild acronyms like GAM, LASSO, GBM, etc. that you heard during meetings or at the coffee machine, without daring to ask for? Do you wonder whether GLMs should still be considered by actuaries, or better archived in a museum dedicated to the history of the actuarial discipline? If affirmative then you should consider attending this intensive course about statistical learning techniques applied to insurance data analysis!
	This course has been conceived by actuaries for actuaries, accounting for all the specificities of insurance data instead of simply re-using standard recipes borrowed from other fields. The sessions proceed step by step, recalling the fundamental statistical concepts at the heart of the modern learning techniques and the standard GLM approach, and then moving to GAMs, GBMs and tree-based methods like random forests. Their relative merits are illustrated by means of several case studies with insurance data.
	The sessions aim to be interactive, alternating between methodological parts and case studies performed in front of the

audience. Participants are invited to bring their own PC. Documentation including data sets and R code is made available through a supporting website. The installation of R packages prior to attendance is required.

Participants receive free copies of the reference manuals

Denuit, M., Hainaut, D., Trufin, J. (2019). Effective Statistical Learning Methods for Actuaries. Volume 1: GLM and Extensions. Springer Actuarial Lecture Notes Series.

Denuit, M., Hainaut, D., Trufin, J. (2020). Effective Statistical Learning Methods for Actuaries. Volume 2: Tree-Based Methods. Springer Actuarial Lecture Notes Series.

co-authored by the trainers.

PROGRAM	Module 1 : Introduction to insurance analytics and basic models:
	 - Fundamental statistical principles underlying the modern learning approaches (training vs validation set, prediction error, cross validation, bootstrap, etc.)
	 - Insurance data specificities (claim numbers with excess of zeros, claim severities mixing attritional and large claims, observational data, selection bias, correlation vs causality, censoring)
	 - Technical vs commercial price list
	 - Recap' of the current GLM practice, with application to claim reserving, graduation of rates, risk classification
	
	 Generalized linear and nonlinear regression models
	 - Limitations of GLM tools and the need for other techniques
	 - Regularization/shrinkage for GLMs: Lasso, Ridge and related penalties
	 - First extensions:
	     o GAMs, penalized and local likelihood
	     o double GLMs, dispersion around the pure premiums
	     o GAMLSS, beyond dispersion
	 with application to claim reserving, graduation of rates, risk classification
	 - Second extension: GAMboost and GBMs
	     o Forward stagewise regression
	     o Loss functions from exponential dispersion family
	     o Gradients as working responses

ACQUIRED SKILLS :	After completion of the training session, participants will have acquired a general knowledge of insurance analytics. They will be able to select the appropriate approach for their own data, run the R code and interpret the results.
	One month after the end of the training, a follow-up discussion is organized to share experience in implementing the approach that have been presented.

TRAINING SHEET :

INSURANCE ANALYTICS : A PRIMER (MODULE 2)

TITLE :	Insurance analytics: A primer (Module 2)
DATE :	May 11 & 18, 2021
LENGTH :	2 x 3h
TYPE :	Online Training
INDUSTRY :	Insurance
EXPERTISE :	Actuarial
CPD/PPC POINTS :	
WHO SHOULD ATTEND :	All level
REQUIREMENTS :	PC with dedicated R packages
LANGUAGE :	French with English Material
LOCATION :	Online via Teams
TRAINER :	Julien Trufin
PRICE :	750€/day (-20% if the 3 modules are followed)

DESCRIPTION	This course has been conceived by actuaries for actuaries, accounting for all the specificities of insurance data instead of simply re-using standard recipes borrowed from other fields. The sessions proceed step by step, recalling the fundamental statistical concepts at the heart of the modern learning techniques and the standard GLM approach, and then moving to GAMs, GBMs and tree-based methods like random forests. Their relative merits are illustrated by means of several case studies with insurance data.
	The sessions aim to be interactive, alternating between methodological parts and case studies performed in front of the audience. Participants are invited to bring their own PC. Documentation including data sets and R code is made available through a supporting website. The installation of R packages prior to attendance is required.
	Participants receive free copies of the reference manuals
	Denuit, M., Hainaut, D., Trufin, J. (2019). Effective Statistical Learning Methods for Actuaries. Volume 1: GLM and Extensions. Springer Actuarial Lecture Notes Series.

	Denuit, M., Hainaut, D., Trufin, J. (2020). Effective Statistical Learning Methods for Actuaries. Volume 2: Tree-Based Methods. Springer Actuarial Lecture Notes Series.
	co-authored by the trainers.

PROGRAM	1. <u>Module 1 : Tree-based methods</u> - Introduction to recursive partitioning - Classification and regression trees - Bagging - Random forests - Tree-based boosting 2. <u>Module 2 :</u> We start this module by a review of concepts behind neural networks and calibration methods. A case study (Wasa database) illustrates how to use neural networks for non-life insurance pricing. This is followed by an introduction to NeuralNet and Keras during which participants can test the R code used in illustrations. We will also see how to fight overfitting with dropout, Lasso and Ridge approaches.

ACQUIRED SKILLS :	After completion of the training session, participants will have acquired a general knowledge of insurance analytics. They will be able to select the appropriate approach for their own data, run the R code and interpret the results.
	One month after the end of the training, a follow-up discussion is organized to share experience in implementing the approach that have been presented.

TRAINING SHEET :

INSURANCE ANALYTICS : ACTUARIAL NEURAL NETWORKS – PRINCIPLES & INTERPRETABILITY (MODULE 3)

TITLE :	INSURANCE ANALYTICS : ACTUARIAL NEURAL NETWORKS – PRINCIPLES & INTERPRETABILITY (MODULE 3)
DATE :	June 1, 2 & 3, 2021
LENGTH :	3 x 3h
TYPE :	Online Training
INDUSTRY :	Insurance
EXPERTISE :	Actuarial
CPD/PPC POINTS :	6 CPD
WHO SHOULD ATTEND :	All level
REQUIREMENTS :	PC with dedicated R packages
LANGUAGE :	French with English Material
LOCATION :	Online via Teams
TRAINER :	Donatien Hainaut
PRICE :	750€/day (-20% if the 3 modules are followed)

DESCRIPTION	The purpose of this training is to introduce participants to neural networks for actuarial pricing. The presentation places a strong emphasis on the practical implementation of these models in Keras, a R library.
	This webinar will be given via Microsoft Teams by Donatien Hainaut, Scientific Director at Detralytics Donatien and professor at UCLouvain where he is Director of the new Master program in Data Science, statistical orientation.

PROGRAM	We start this course by a review of concepts behind neural networks and calibration methods. A case study (Wasa database) illustrates how to use neural networks for non-life insurance pricing.
	This is followed by an introduction to NeuralNet and Keras during which participants can test the R code used in illustrations. We will

![Detralytics logo]

also see how to fight overfitting with dropout, Lasso and Ridge approaches.

Finally, we show how bottleneck neural networks are used for reducing the dimension of a dataset, acting in a similar way to a non-linear principal component analysis. We illustrate this technique on mortality forecasting. R code will be provided to participants.

ACQUIRED SKILLS :	Concepts: • Introduction to feed-forward neural networks • Gradient boosting neural networks • Training of supervised networks • Application to non-life actuarial pricing • Case study: the Wasa dataset Practical implementation: • Implementation: Excel, NeuralNet and Keras • Cross Validation • Fighting overfitting: Lasso & Ridge • Bottleneck network: an application to mortality forecasting

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