Block Course „Deep Learning with Actuarial Applications in R”

Dates:
18/19th June 2020

Overview:
Neural networks and deep learning are getting a lot of attention due to significant achievements in the analysis of unstructured data (such as language processing, machine translation, image and audio recognition) and are widely used in consumer goods. Neural Networks combined with the availability of large datasets and necessary computing power allow to train deep and complex neural networks.

Neural networks on structured tabular data, which is the data that actuaries mainly work with, are still used less frequently. This two-day block course will introduce the use of neural networks for modelling actuarial data and put a focus on the application and specific peculiarities of neural networks for tabular data usually present in insurance risk modelling.

The course is suited for all actuaries who are familiar with R and who like to get familiar with neural networks and unsupervised learning and apply them using R. The exercises will be run on in a cloud environment to ensure all the required packages are available and installed.

Purpose and Nature:
The goal of this two-day block course is to introduce the participants to neural networks for the modelling of insurance risk in general and life insurance. Therefore, we will provide an introduction into neural networks from a mathematical perspective and from an implementation point of view using R and the keras package. We also give a short introduction into unsupervised learning.

The course will be practical and consists of approx. 50% presentations where the models are introduced and explained. The other 50% are exercises where the participants are using R/RStudio, the keras package and apply the concepts to publicly available insurance risk data.

The content of the course is mainly based on the published tutorials of the SAV “Data Science” working group and available on https://www.actuarialdatascience.org.

Prerequisites:
- Good knowledge of insurance risk modelling
- Experience in basic R programming, i.e. familiar with tidyverse, ggplot2 and base package (Hint: you should already know how to fit a glm in R)
- Participants need to bring their own laptop. It is an advantage to have R/RStudio installed locally, but not required to do the exercises.

Topics:
- Topic 1: Recap: Generalized Linear Models
- Topic 2: Feedforward Neural Networks
- Topic 3: Combined Actuarial and Neural Network Models
- Topic 4: Recurrent Neural Networks
- Topic 5: Unsupervised Learning
- Topic 6: Non-discriminatory Insurance Pricing

Language:
The language of the block course will be English.

Venue:
KV Business School Zürich, Bildungszentrum Sihlpost, Sihlpostgasse 2, 8004 Zürich

Lecturer's CV:

- *Mario Wüthrich* is Professor in the Department of Mathematics at ETH Zurich, Honorary Visiting Professor at City, University of London (2011-2022), Honorary Professor at University College London (2013-2019), and Adjunct Professor at University of Bologna (2014-2016). He holds a Ph.D. in Mathematics from ETH Zurich (1999). From 2000 to 2005, he held an actuarial position at Winterthur Insurance, Switzerland. He is fully qualified actuary SAA (2004), served on the board of the Swiss Association of Actuaries (2006-2018), and is Editor-in-Chief of ASTIN Bulletin.
- *Daniel Meier* is a fully qualified actuary of the SAV, holds a Ph.D. in Computer Science from University of Konstanz (2007) and works for Swiss Re since 2008 in Risk Management and Life & Health Research & Development.
- *Jürg Schelldorfer* is a fully qualified actuary of the SAV and chairs its "Data Science" working party. Since 2017, Jürg works as a Senior Data Scientist in the Digital & Smart Analytics team of Swiss Re. Previously, he worked for KPMG Switzerland and AXA Switzerland as a non-life actuary. In 2018, he was also a visiting lecturer at the University of Basel.
- *Roland Schmid* is an avid data scientist with extensive expertise in leading technical projects in the areas of financial services and quantitative risk management. With a background in business economics as well as statistical and IT consulting, he is the founding partner of Mirai Solutions - where he is particularly engaged in leveraging state-of-the-art technologies to distill complex business concepts into specialized solutions by harnessing the power of statistical modelling and data analytics.

Course Fee and Registration:

- CHF 1'500.- (including dinner)
- Registration deadline: 15th May 2020
- Registration Link

Number of Participants:
Min: 20, Max: 30

CPD's:
For members of the SAV, 12 CPD's for the full course are provided.

Partner:
The course is supported by Mirai Solutions GmbH, Gotthardstrasse 25, 8002 Zürich.

Coordination and Contact:
SAV Geschäftsstelle
Holger Walz (Geschäftsführer)
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Programme:

Thursday, 18th June 2020

08.00 – 08.30 Registration
08.30 – 09.00 Introduction & Welcome
09.00 – 10.00 Recap: Generalized Linear Models
10.00 – 10.30 Coffee Break
10.30 – 11.30 Exercise Generalized Linear Models
11.30 – 12.30 Lunch
12.30 – 14.00 Feedforward Neural Networks
14.00 – 15.00 Introduction keras
15.00 – 15.30 Coffee Break
15.30 – 16.30 Exercise Feedforward Neural Networks
16.30 – 17:45 Combined Actuarial and Neural Network Models
19.00 – 21.30 Dinner

Friday, 19th June 2020

08.30 – 10.00 Exercise Combined Actuarial and Neural Network Models
10.00 – 10.30 Coffee Break
10.30 – 12.00 Recurrent Neural Networks
12.00 – 13.00 Lunch
13.00 – 14.30 Exercise Recurrent Neural Networks
14.30 – 15.00 Unsupervised Learning
15.00 – 15.30 Coffee Break
15.30 – 16.30 Unsupervised Learning / Non-Discriminatory Insurance Pricing
16.30 – 17.30 Exercise Unsupervised Learning
17.30 – 17.45 Closing