8th International Gerber-Shiu Workshop

in Honor of the Retirement of Prof. Jose Garrido

July 3rd and 4th, 2020

Concordia University
1450 Guy Street, MB 10.201, Montréal, Canada H3H 0A1

Program

Day 1

8:45 - 9:15 – Registration and light breakfast

9:15 - 9:30 - Welcoming address

9:30 - 11:00 Session Chair : Manuel Morales (Université de Montréal)

9:30-10:00 **Hansjoerg Albrecher** (Université de Lausanne)
Title: To be determined

10:30-11:00 **Gordon Willmot** (University of Waterloo)
Title: To be determined

11:00-11:30 **Shuanming Li** (University of Melbourne)
Title: To be determined

11:30 - 11:45 - Coffee Break

11:45 - 12:30 Keynote Session Chair: Elias Shiu (University of Iowa)

Hans U. Gerber (Université de Lausanne - *Retired*)
Title: To be determined

12:30 - 14:00 –Lunch

14:00 – 15 :30 Session Chair : Hansjoerg Albrecher (Université de Lausanne)

14:00-14:30 **Jun Cai** (University of Waterloo)
Title: To be determined
14:30-15:00 **Georgios Pitselis** (University of Piraeus)
Title: To be determined
15:00-15:30 **Silvia Mayoral** (Universidad Carlos III de Madrid)
Title: To be determined

15:30- 15:45 - Coffee Break

15:45 – 16:45 Session Chair : Yi Lu (Simon Fraser University)

15:45-16:15 **Manuel Morales** (Université de Montréal)
Title: To be determined
16:15-16:45 **Runhuan Feng** (University of Illinois at Urbana-Champaign)
Title: To be determined

16:45 - 17:15 Keynote Session Chair: Gordon Willmot (University of Waterloo)

Jose Garrido (Concordia University)
Title: *Deep Neural Networks with Long Short-Term Memory for Human Mortality Modeling*

17:15 -18:45 – Ceremony and Cocktail

Day 2

9:00 - 9:15 – Light breakfast

9:15 - 10:45 Session Chair : Jun Cai (University of Waterloo)

9:15-9:45	**Yi Lu** (Simon Fraser University) Title: To be determined
9:45-10:15	**Alfredo E. Dos Reis** (Technical University of Lisbon) Title: To be determined
10:15-10:45	**Qihe Tang** (University of Iowa) Title: To be determined

10:45 - 11:00 - Coffee Break

11:00 – 12 :20 Contributed Talks Session - Chair : Jose Garrido (Concordia University)

11:00-11:20	**TBD** Title: To be determined
11:20-11:40	**TBD** Title: To be determined
11:40-12:00	**TBD** Title: To be determined
12:00-12:20	**TBD** Title: To be determined

12:20 -12:30 – Closing Ceremony

12:20 - 14:00 –Lunch

14:00 - 17:00 –Tour of the AI Montreal Ecosystem ? (We could give them a tour to IVADO, Element AI and pitch them the AI ecosystem – we invite startups in the insurance space)

19:00 - 22:00 –Banquet

Appendix: Abstracts

Jose Garrido (Concordia University)

Title: Deep Neural Networks with Long Short-Term Memory for Human Mortality Modeling

Abstract: Accurate modeling and forecasting of human mortality rates is important in actuarial science, to price life insurance products, pension plan evaluations, and in finance, to price derivative products used to hedge longevity risk.

Data shows that mortality rates have been decreasing at all ages over time, especially in the last century. Predicting the extent of future longevity improvement represents a difficult and important problem for the life insurance industry and for sponsors of pension plans and social security programs.

The most popular methodology to forecast future mortality improvement was proposed by Lee and Carter (1992, JASA). It consists of a two-steps process, shown to suffer identifiability issues, both in the Lee-Carter Model and its subsequent extensions, mostly due to the inherent two-steps model setup.

We propose a very distinct, data--driven approach using a class of Deep Neural Networks to model and forecast human mortality. The main component in the neural networks is a long short-term memory (NN-LSTM) layer, which was introduced by Hochreiter and Schmidhuber (1997, NC), to fix vanishing gradients in simple recurrent neural networks. The model can be constructed for short-term as well as for long-term forecasting, respectively.

We model the dependence mortality improvement observed simultaneously in different countries. Current mortality improvement models are fitted to single country sub-populations separately, even if improvement trends are similar in different countries.

The multi-population problem presents serious computational challenges that we tackle with NN-LSTMs, fitted to learn from the more than 40 single country populations included in the Human Mortality Database https://www.mortality.org/.