Statistically Speaking...

News and views from the Statistics Department

Official Newsletter of the Department of Statistics, University of Warwick

Issue 8: March 2017

News and Events

Welcome to the eighth issue of *"Statistically Speaking..."* - a publication designed for current and past students and staff of the Statistics Department at the University of Warwick.

Thank you to all who contributed to this issue or participated in its production in any way.

Elisabetta Candellero

The new QS World University Rankings by Subject were published on 8th March 2017, and Warwick Statistics has risen in the rankings from 39th last year to 24th this year. The department is now ranked 4th in the UK and 5th in Europe.

From Lotteries to Polls to Monte Carlo

Jeff Rosenthal, University of Toronto

Date, time, venue:
Wednesday 3 May; 6:15 p.m
MS.02, Zeeman Building (Maths and Statistics)

This talk will discuss randomness and probability, to answer such questions as: Just how unlikely is it to win a lottery jackpot? If you flip 100 coins, how close will the number of heads be to 50? How many dying patients must be saved to demonstrate that a new medical drug is effective? Why do strange coincidences occur so often? If a poll samples 1,000 people, how accurate are the results? How did statistics help to expose the Ontario Lottery Retailer Scandal? If two babies die in the same family without apparent cause, should the parents be convicted of murder? Why do casinos always make money, even though gamblers sometimes win and sometimes lose? And how is all of this related to Monte Carlo Algorithms, an extremely popular and effective method of scientific computing? No mathematical background is required to attend.

Please see the website for further details on how to register.

Expert elicitation as good data

By Sophia K. Wright and Martine J. Barons

My PhD is focussed on the robustness of Bayesian Networks (BNs) in terms of structural inaccuracies and misspecification of the priors. I was recently lucky enough to be involved in an expert elicitation workshop run by Martine Barons and Jim Smith to quantify specific elements of a BN-based decision support model for pollinator abundance where data is not available.

Back in January 2016, Martine and I went to Bristol to meet Sarah Webster, Head of UK Biodiversity Policy Unit at DEFRA, who is responsible for the implementation of the National Pollinator Strategy. We presented the decision support paradigm and Sarah recommended a number of potential experts who may be able to assist us with the needed quantification, advising us to also look at the Insect Pollinator Initiative publications for more.

Having secured the services of relevant experts, we chose to use a structured elicitation method because unstructured elicitation of expert opinion is subject to biases that can lead to unreliable results. A number of such biases are well documented in the psychology literature including: Anchoring and adjustment when interviewees tend to use quantitative information from the question or previous answers to formulate their current response by slightly changing the values; Availability when responders deem an event more likely to occur because it has happened recently or has been discussed in the media; Group biases when multiple participants are swayed by the most charis-

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-matic loudest or most senior member of the group. There are several long-established methods for structured elicitation: the Delphi method, Cooke's method and the Sheffield method to name a few. The Delphi method strives for consensus through multiple rounds of estimating and discussing, losing all the data from outliers (who might be correct!). Cooke's method minimises interaction between participants, encouraging each participant to give a personal probability density function, later aggregated using a mathematical aggregation formula. However, the choice of which formula to employ is another subjective decision. The Sheffield method allows all experts to meet and discuss a joint probability density function, sharing knowledge and literature which influences their decision; this method is most affected by group biases and dominant personalities.

The new IDEA method devised by Anca Hanea and Mark Burgman (Melbourne Uni): Investigate, Discuss, Estimate and Aggregate, seeks to build on the strength of the above methods whilst ameliorating their weaknesses. This protocol asks experts for individual estimates of their lowest plausible, highest plausible and best estimate of the quantities of interest (in that order to avoid anchoring on the mid-value). The second round is a facilitated group discussion before a final round where participants are invited to change (or leave) their quantities from round one in light of any new information discovered during the discussion. These final answers are then aggregated mathematically. Calibration questions are extra questions used to give an idea of the relative degrees of expertise and used in weighting the mathematical aggregation formula to give a joint probability density.

One domain expert arrived at Warwick the day before the workshop to aid us in formulating the questions in terms that the participants would understand; the definitions of the quantities were particularly time consuming to devise. The workshop consisted of eleven experts whose expertise spanned different classes of pollinating insects: honey bees, solitary bees and hover flies. Happily, there was no dominating presence during discussions and every attendee participated and provided their individual assessments with confidence. Due to their enthusiasm and high regard for the problem, all the experts have agreed to participate in an online calibration procedure to derive appropriate weights with which we will aggregate their responses.

Overall, the workshop was a resounding success and even attracted the attention of the local media. Many of you might have seen Martine and Anca on BBC Midland Today and in the package for BBC Radio 4 Farming Today. Following this work, we aim to calibrate the experts and finalise the results for use in Martine's larger model of assessing Food Poverty in the UK.

Winton Capital Prize

Dr Matt Moores (Warwick) and Dr Kirsten Gracie (Strathclyde) have been awarded the Winton Capital prize for the best project of the 2015 Postdoctoral Research Assistants Challenge.

The PDRA Challenge is run by the EPSRC Network on Computational Statistics and Machine Learning (NCSML). 5 year-long projects are initially selected, to be carried out by teams of two PDRAs. Its aim is to foster collaboration among PDRAs from different network institutions in computational statistics and machine learning projects, with an award of 2000 pounds used to cover expenses during the project. The outcome of all projects are reviewed a year later by selected members of the network. Drs Moores and Gracie's "Hierarchical clustering of functional data for Raman spectroscopy" was awarded the extra Winton Capital prize of 2000 pounds as the best report from the 2015 cohort.

ASA Student Paper Award

"Francois-Xavier Briol recently received a 2016 Student Paper Award from the section on Bayesian statistical science of the American Statistical Association (ASA) for his paper on "Probabilistic Integration: A Role for Statisticians in Numerical Analysis?". This paper focuses on an emerging area of research called probabilistic numerics. It provides novel theoretical results guaranteeing good performance for a method called Bayesian Quadrature, and includes extensive empirical experiments in applications ranging from computer graphics to oil field simulation.

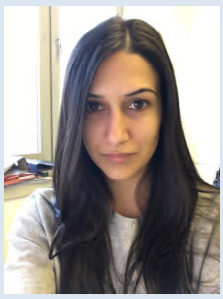
The paper originates from one of Francois-Xavier's OxWaSP mini-projects, and was written in collaboration with faculty from the University of Warwick, Chris Oates and Mark Girolami, and the University of Oxford, Michael Osborne and Dino Sejdinovic.

As part of the award, Francois-Xavier was invited to present the paper at this year's Joint Statistical Meeting in Chicago and attend the awards ceremony."

Welcome

Martin Herdegen

I have joined the Stats department at Warwick a couple of months ago. Before, I have been at ETH Zürich, Switzerland, where I did my PhD and a postdoc. I really like the open, relaxed and stimulating atmosphere here at Warwick. Everyone (students and staff alike) seems motivated and enthusiastic, and it is great to have become part of such a community. My first lecture here was a real pleasure, and I love how passionately students engage with the material. The same can be said about the stochastic finance reading group, whose commitment ("more 9am sessions, please") really surprised me. What shall I say more? There are many interesting seminars here (more than one can attend), there have been many good conversations with colleagues (in particular with my "co-exiles" in Ramphal), and I am looking forward to new and exciting research collaborations. And yes, I should finally confess that I am not an ordinary statistician (if that species exists at all) but a Math Finance guy. My main research interest at the moment is to study equilibria of financial markets with and without frictions. One major application is the question if a financial transaction tax is a good idea or not, and if yes, how it should be implemented.



Panayiota (Nayia) Constantinou

Hello, I am Nayia Constantinou and I was appointed as a Senior Teaching Fellow at the Department of Statistics in August 2016. Before joining Warwick, I completed my PhD in Cambridge and a research fellowship in Bristol. At Warwick, apart from doing teaching, I serve as MSc Admissions Tutor, Open Days Coordinator, and I am involved in activities aimed at enhancing student experience.

Congratulations

PhD Vivas recently passed:

Silvia Calderazzo

Alexey Pak

Ioanna Nteka

Fiona Sammut

Yufan Zhao

Chuan Guo

Prof. Tom Nichols identified as one brain imaging most influential researchers

A recent publication in the journal *NeuroImage* conducted a bibliometric analysis of top 100 cited brain imaging. That analysis found 3 of Prof Nichols papers in this 100 papers, and he was 1 of 28 authors who had 3 or more such papers.

Reference: Kim, H. J., Yoon, D. Y., Kim, E. S., Lee, K., Bae, J. S., & Lee, J. (2016). The 100 most-cited articles in neuroimaging: A bibliometric analysis. NeuroImage. doi:10.1016/j.neuroimage.2016.06.029

Critical weaknesses found in standard statistical methods for brain imaging inference.

Prof. Tom Nichols and his collaborators at Linköping University, Sweden, completed a massive evaluation of widely used statistical methods for functional magnetic resonance imaging (fMRI) data. The methods use linear models in combination of results of extremes of Gaussian processes to allow inference on brain images, identify which portions of the brain show a 'real' change or activation. Their work was unique for using real fMRI data, collected while subjects rested, as null data for this evaluation. They found that commonly used methods had false positive rates upwards of 70% (when 5% was expected), and narrowed the cause of the problem of failed assumptions on the spatial dependence. They show that permutation methods offer a safe and reliable alternative. The work appeared in the Proceedings of the National Academy of the USA, was accompanied by a Commentary penned by statistician Satish Iyengar, and has been covered by news sites like Science Daily and ArsTechnica.

References: Eklund, A., Nichols, T. E., & Knutsson, H. (2016). Cluster failure: Why fMRI inferences for spatial extent have inflated false-positive rates. *Proceedings of the National Academy of Sciences*, 201602413. doi:10.1073/pnas.1602413113

Iyengar, S. (2016). Case for fMRI data repositories. *Proceedings of the National Academy of Sciences*, 201608146. doi:10.1073/pnas.1608146113

Other Seminars & Workshops

Workshops & Masterclasses

Gregynog
21-23 April

Baysm
4 –6 July

CRiSM Seminars
Seminars will be held in D1.07 (Maths)
https://www2.warwick.ac.uk/fac/sci/statistics/crism/seminars

SF@W
Seminars will be held in A1.01
14:00—15:00
Unless otherwise stated

Friday, 5th May
Paolo Guasoni (Dublin City)

Friday, 19th May
Luciano Campi (LSE)

Friday, 9th June
Bruno Bouchard (Paris Dauphine)

Friday 23 June
Johannes Muhle-Karbe (Michigan)

Other Statistics Seminars:

RSS West Midlands Local Group Meetings
More information can be found via the group's website
https://sites.google.com/site/rsswmlg/forthcoming-meetings

Young Researchers' Meeting
Meetings take place 4-5pm, Tuesdays (term time) in the Statistics Common Room
https://www2.warwick.ac.uk/fac/sci/statistics/news/yrm