

# The Statistical Society of Australia

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# 2016 AUSTRALIAN STATISTICAL CONFERENCE

The 23rd Australian Statistical Conference was held in Canberra over 5-9 December 2016. As for some earlier ASC's it was held in conjunction with Australian Conference on Teaching Statistics (OZCOTS), and for the first time, in conjunction with the Australasian Data Mining Conference (AusDM). The 420 registrations well exceeded expectations. There were 20 from New Zealand and nearly 80 from other overseas counties.

The conference was opened by Professor Deep Saini, recently appointed as Vice-Chancellor and President of the University of Canberra. He emphasized the importance of statistics and data science. There were nine key note speakers. Professor Sue Wilson from the University of New South Wales delivered the inaugural P.A.P. Moran Lecture on the influence of genetics and genomics. Professor Jae-Kwang Kim, Iowa State University, gave the Foreman Lecture on informative sampling. Professor Xue Li from the University of Queensland spoke on the data mining topic of an Opinion Search Engine. The Australian Statistician, Mr David Kalisch, gave the Knibbs Lecture on 'Big Data' and Official Statistics, and there is a fuller report on it in this article. Professor Ming-Yen Cheng from the National Taiwan University presented Hypothesis Testing in High Dimensions and Professor Bill Cleveland of Purdue University talked about big data and computationally complex analytic methods. Emeritus Professor George Cobb of Mount Holyoke College talked about data science and the humanities and Professor Jeffrey Rosenthal explained adaptive MCMC. Dr Kay Lipson from Online Education Services re-imagined Online Learning.

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### SSA

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# DEADLINE FOR NEXT NEWSLETTER 10 May 2017

# FROM THE ACTING EDITOR

As we get ourselves into gear for 2017 (and a fair bit of 2017 has already gone by!), those of us who attended ASC 2016 can look back on a successful and enjoyable conference. Our thanks for making this happen go to Bill Gross, Conference Chair, and his Local Arrangements Committee, and to Warren Muller, Program Committee Chair, and his Program Committee.

I was particularly struck by how well the programs of the other two organizations involved in the conference (AustDM and OZCOTS) were integrated with the SSA conference component. I believe that the success of future SSA conferences (and perhaps the future success of SSA?) will be enhanced by joint activities with like-minded organizations.

Helen MacGillivray mentioned some interesting developments on the horizon for OZCOTS, and we look forward to further news about this. SSA values its association with OZCOTS, and wants to continue and strengthen links with any successor to OZCOTS.

### **Doug Shaw**

**Acting Editor** 

# **EVENTS IN AUSTRALIA**

### MODEL SELECTION WITH R

10-11 April 2017, Canberra

### **INTERNATIONAL CONFERENCE ON ROBUST STATISTICS 2017**

3-7 July 2017, Wollongong

### **YOUNG STATISTICIANS CONFERENCE 2017**

26-27 September 2017, Tweed Heads

# JOINT INTERNATIONAL SOCIETY FOR CLINICAL BIOSTATISTICS AND AUSTRALIAN STATISTICAL CONFERENCE 2018

26-30 August 2018, Melbourne

# INTERNATIONAL EVENTS

### ISI REGIONAL STATISTICS CONFERENCE (RSC)

21 - 24 March 2017, Bali, Indonesia

### 6TH ANNUAL SURVIVAL ANALYSIS FOR JUNIOR RESEARCHERS (SAFJR 2017)

5-6 April 2017, Leicester, England, UK

### 61ST WORLD STATISTICS CONGRESS - ISI2017

16-21 July 2017, Marrakech, Morocco

### JOINT CONFERENCE ON BIOMETRICS & BIOPHARMACEUTICAL STATISTICS

28 August-1 September 2017, Vienna, Austria

### **EUROPEAN CONFERENCE ON DATA ANALYSIS (ECDA)**

27-29 September 2017, Wrocaw, Poland

To have your event added to this list, please forward the event details in the above format to eo@statsoc.org.au



### **SECTION CHAIRS**

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### Young Statisticians' Network

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Further contact details for Society Secretaries and Section Chairs can be obtained by contacting the Society on (02) 6251 3647.

There were 340 papers presented with 40 each from AusDM and OZCOTS. There were 122 contributed papers for SSA, 37 more papers in 12 invited sessions organised by the sections of SSAI and 22 poster presentations. There were memorial sessions for the eminent Australian statisticians, Joe Gani and Peter Hall, who died in 2016.

A number of awards were presented or announced at the conference. Professor Kerrie Mengersen was awarded the Pitman Medal for outstanding contributions to statistics in Australia and this is reported on page 6. Professor Willim Dunsmuir was awarded Honorary Life Membership by the Society. Geoff Lee and Paul Sutcliffe were announced as recipients of Service Awards which will be presented at Branch meetings. The Pitman Prize, for the best student talk at the conference, was won by Thais Rodrigues from the University of New South Wales. The Poster Display and Awards Ceremony for the annual National Schools' Poster Competition was hosted by A/Prof Peter Howley in conjunction with the ASC2016 (see page 7).

The venue, Hotel Realm was very good, the food excellent and the conference ran very smoothly, thanks to the Conference Organisers, Arinex, and everyone involved.

### **Bill Gross**

Chair ASC2016 Organising Committee



# ARE YOU ACCREDITED?

Are you aware that the Statistical Society runs a very successful Accreditation program? It was implemented in 1998 and we currently have over 120 members with AStat Accreditation and about 30 members with GStat Accreditation. To find out more about the program please go to http://www.statsoc.org.au/ careers-accreditation/professional-accreditation/.

The Statistical Society would like to congratulate the following members on their recent AStat Accreditation:

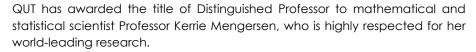
Lan Kelly Naor Bar-Zeev Peter Baker



# HIGH PRAISE FOR QUT'S NEW DISTINGUISHED PROFESSOR KERRIE MENGERSEN,

# **NOW A PITMAN MEDALIST**





"Distinguished Professor Mengersen is a national and international leader in her discipline, recognised extensively for her applied research work which has had a significant impact on science in different domains," QUT Vice-Chancellor Professor Peter Coaldrake said.

"She is held in the highest esteem by her peers for her leadership of large research teams and her work has inspired others and influenced colleagues across the world.

"The title of Distinguished Professor recognises accomplishments at the highest level. It recognises not only past eminence but potential for ongoing excellence."

On the same day that Distinguished Professor Mengersen's title was announced by QUT, the Statistical Society of Australia awarded her the prestigious Pitman Medal. This is the first time the Medal, which recognises outstanding achievement in the statistics discipline, has been awarded to a woman.

Professor Mengersen's research areas include Bayesian statistics and applied interests in biometrics, biostatistics, environmetrics, genetic and industrial statistics.

Her methodology has been used to map people with cancer in small communities throughout Queensland over a decade.

She has also worked to protect critically endangered cheetahs in southern Africa and orangutans in Indonesia, tapping into local knowledge and building statistical models to guide conservation efforts.

Her most recent work has further developed the management of iconic species in South Africa, Asia and South America, as well as Australia.

In 2015, Professor Mengersen was made an Australian Laureate Fellow and is currently a Deputy Director of the ARC Centre of Excellence for Mathematical and Statistical Frontierswhich has one of its largest nodes at QUT.

The recommendation to award the title was made by an Assessment Committee which drew advice from external referees of international standing.

QUT has awarded the title of Distinguished Professor to only six individuals. Prior to Distinguished Professor Mengersen, the title was awarded to Federation Fellow Professor John Hartley, Professor James Dale AO, Professor Stuart Cunningham AM, Professor Judith Clements AC and Professor Aileen Moreton-Robinson.

### Media contact:

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# STATISTICAL EDUCATION SECTION REPORT

# **National Schools Competition continues to grow**

In conjunction with the ASC2016, the national schools' poster competition's 2016 Display and Awards Ceremony was held at Hotel Realm, Canberra on 8 December. The event recognised the 828 students nationwide who took part in the competition and submitted 293 team posters for judging.

Each participating team comprised two to five students, in divisions ranging from Years 3 to 10, and each team was required to produce an informative poster presentation which addressed a practical research question, based on the collection and interpretation of data. In addition to competing for gift cards valued up to \$150, participants were awarded with certificates and provided with an opportunity to learn more about Statistics, its importance within STEM and the Health and Environmental Sciences, as well as engage with academic and professional staff working within the discipline.

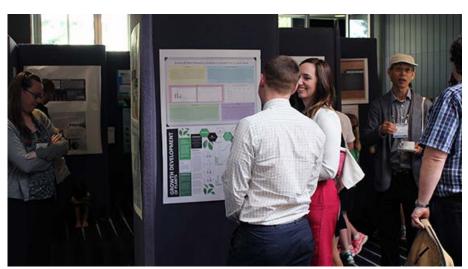
The International Statistics Institute's President-elect, Professor Helen MacGillivray, commended the competition in her keynote address during OZCOTS2016. Key representatives from the ACT Education System and the Director of Scientific Computing and Systems Engineering at Geosciences Australia, Dr Ole Nielsen, attended the awards ceremony, with Dr Neilson declaring, "Merging the children's learning with the real world is so important and so rare. This is such a great initiative!"

Winners and honourable mentions came from all participating states; NSW, Queensland, WA, Tasmania, ACT and Victoria. These teams and their posters are published at https://www.ssaipostercomp.info/winners.html.

The 2016 competition was well supported by a network of mentors willing to attend schools to assist teachers and students better understand the importance of the field, and the many judges who help lighten the load, to whom I give a special thanks!

The national competition is about to enter its fourth year since the Hunter pilot and it continues to go from strength to strength. Participant numbers have increased from 85 students in the pilot program in 2014, to 235 in 2015 and 828 students nationally in 2016 who submitted posters by the annual due dates in November.





Attendees enjoying the poster display

> Continued from previous page

# Would you like to be involved in the 2017 competition and develop the next generation of statisticians?

Perhaps you would like to be a mentor, or maybe to help judge (all done online in late November), or even be a regional coordinator.

To assist, I have processes and materials that will simplify your activity and efforts - including some instructional videos which should be available later this month.

How much you are involved is up to you; we can discuss options and I'll endeavour to keep your workload as light as you prefer - having points of contact around Australia and additional judges would be invaluable!

Please contact peter.howley@newcastle.edu.au or phone 02 49 215518 to discuss.

In any event, please advertise widely.

### **TEACHERS ARE SAYING:**

"...a great vehicle for collecting real data, finding meaning amongst it all, and presenting it for a real audience. 21st Century learning at its best!", Head Math Teacher;

"a resounding success...motivates and engages students", Head Teacher, Teaching and Learning;

"... a rewarding experience. So often in the mathematics curriculum, statistics is taught and practised in segregated pieces, and it's not that often that students get a chance to put it all together in a meaningful way.", Mathematics and Film, TV and New Media Teacher.

### **MENTORS (WHO ATTEND SCHOOLS** TO ASSIST) ARE SAYING:

"It was highly rewarding ... I was also inspired by their keenness in science and statistics"

"The poster competition provides students with a unique opportunity to combine the skills they have learned in Science, Mathematics and English to investigate a real world problem. I use the skills that are explored in the poster competition in my occupation to assist in experimental design."

### A/Prof Peter Howley

The University of Newcastle Chair of Statistical Education Section

Follow me on Twitter: @peterhowley0





# **NEW IN 2017**

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26 - 30 JUNE 2017 A THREE-DAY CONFERENCE, TWO-DAY WORKSHOP INSPIRING INDUSTRY & RESEARCH COLLABORATION









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# WHERE CAN AMSIIntern TAKE YOU?

DRIVING INDUSTRY & UNIVERSITY COLLABORATIONS

# **GOVERNMENT OF BRUNEI SPONSORED**

# **WORKSHOP ON EVIDENCE-BASED**

# **DECISION AND META-ANALYSIS**

The Department of Planning, Development and Research (DPDR) of the Ministry of Education, Government of Brunei Darussalam organised a 3-day Workshop on Evidence-based Decision and Meta-Analysis with Applications from 23-25 January 2017 at the Rizqun International Hotel in Bandar Sri Begawan, Brunei.

Professor Shahjahan Khan, Professor of Statistics, University of Southern Queensland, Toowoomba, Australia and the Chief Editor of Journal of Applied Probability and Statistics (JAPS), presented the Workshop. The free statistical software MetaXL, an add-on to MS Excel, was extensively used to illustrate various statistical computations and conduct meta-analyses of different datasets from many diverse areas including education.

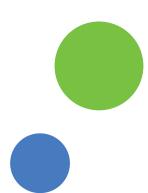
The Assistant Director of DPDR, Dr Hj Ashri bin Haji Ahmad welcomed the participants and introduced the presenter. Twenty seven officials from different Departments of the Ministry of Education participated in the Workshop.

The first day of the Workshop was devoted to the presentations on introductory statistics using SPSS and the statistical methods that are essential for understanding meta-analysis of summary statistics from different independent trials/studies to provide necessary statistical background to the participants. The Workshop emphasised the importance of being evidence-informed for the decision-makers, especially the essence of the levels and quality of evidence including the design of studies. The systematic reviews, as opposed to narrative reviews, must avoid every kind of bias in order to make the systematic reviews and meta-analyses objective and reproducible.

In addition to introducing various types of effect measures of common effect size for different types of outcome variables, the Workshop covered different statistical models such as fixed and random effects models. Then the presenter introduced the recently published method, the inverse variance heterogeneity (IVhet) model and focussed on the major problems with the random effects model in the way of comparing the two models to deal with heterogeneous meta-analyses.

MetaXL software, accessible at http://www.epigear.com/index\_files/metaxl. html was used to compare the results of the meta-analyses of the same dataset using the fixed, random effects, and IVhet models with particular emphasis on the variation in the redistribution of inverse variance weights under different models, in addition to any variation in the final results.

Because of the background and experience of the participants, and in view of the need of the Ministry of Education, several illustrations on meta-analysis of independent educational studies were included in the presentation and hands-on practices were undertaken. A complete set of notes, example datasets, and presentation slides were provided to all participants prior to the Workshop.





Workshop participants including seatied from the left Dr Hj Ashri bin Haji Ahmad, Professor Shahjahan Khan, and Dr Habibah Binti Haji Sion.

The Workshop was initiated and coordinated by Dr Siti Noor Naasirah Syahiirah Abdullah Teo, Dyg Siti Noorihan binti Hj Daud, and Dk Sri Muliaty Pg Mohamed. Clearly the Workshop shows the highest level of commitment of the Department to improve the quality of its statistics and engagement to make significant contributions in applied research.

The event was very well covered by the media including an English daily, the Borneo Bulletin, in its 24 January issue.

### Professor Shahjahan Khan

University of Southern Queensland Contact Shahjahan.Khan@usq.edu.au





# Make It Cheaper identifies \$1,800 electricity savings for SSA member\*

Did you know that some energy retailers can switch you to a higher rate or lower discount when your contract expires? It happens. Make It Cheaper want to make sure it doesn't happen to you.

That's why SSA partnered with **Make It Cheaper** – to help members save money on electricity. One member in NSW jumped on board and managed to save \$1,800 per annum for their household.

In fact 75% of SSA members that have taken advantage of the Make It Cheaper service have found themselves a saving.

The service is completely free. To see what you could save, call Make It Cheaper directly on the SSA Members Hotline on (02) 8077 0158 or email a copy of a recent electricity bill, with your contact details, to ssa@makeitcheaper.com.au for a free quote. It's that easy.

\* \$1,800 per annum, based on previous usage.

Note: This service is only available for members in the ACT, NSW, QLD, SA and VIC.

# SSA GOLDEN JUBILEE TRAVEL GRANT

It provides overseas travel funds to the Society's student members, who can prove consecutive SSA membership for a minimum of two years and who wish to attend overseas conferences at which they present a paper or poster.

A maximum of \$1000 is available per application, limited to a single trip during the course of the student's studies. Students will not be supported in their first year of study and will have had to be members of the Society for at least 2 years prior to the application deadline. Applications are required to be lodged in advance of travelling. In exceptional circumstances an application can be for post-conference support, but the application will then have to be made within 1 month of returning and the 2 year mandatory membership period prior to departure must still be met. Exceptional circumstances are limited to unforeseeable student out of pocket expenses arising from other funding sources not fulfilling their obligation or changes to the trip that could not have been avoided.

If successful the student member is required to produce original receipts for amounts of equal or greater value than the grant. These receipts will be returned to the student marked with how much has been reimbursed. The student will therefore still be able to use the receipts for proof of attendance or to claim any funding shortfall from other organisations. The student member will also need to supply a report of his or her involvement in the conference to be published in the SSA newsletter. This report should confirm the actual travel details and papers presented.

Recipients of the grant are asked to acknowledge the SSA's support in the presentations and in any published version of the paper.

One travel grant is available per year. Assuming that more than one application will be received per year, either the Executive Committee or a special committee would help with the selection process.

For more information or to apply, contact the SSA Office (eo@statsoc.org.au).

With this travel grant program the SSA seeks to underline its objective to further the study, application and good practice of statistical theory and methods in all branches of learning and enterprise. It has been implemented to confirm to members that the SSA is willing to support student statisticians and their budding careers.

### A complete application will consist of

- Information on the conference and its importance to student's work (2-3 lines)
- Details of the paper/s/poster student wants to present at the conference
- A list of other funds sought or promised, including student's home institution
- Student's out of pocket expenses expected
- Any other supporting material student feels is necessary
- A letter of support SIGNED by one of student's supervisors AND student's Departmental Head
- Student's CV

The application deadline is 31 March 2017.



# **CANBERRA BRANCH**

# David Salt - Decisions that save species: of triage and taboo

### 28 June 2016

David Salt, the Editor of Decision Point, the research magazine of the ARC Centre of Excellence for Environmental Decisions (CEED), gave a stimulating talk on the challenges of conserving species and communities with perpetually underfunded resourcing. His presentation, 'Decisions that save species: of triage and taboo', discussed the difficult problem of choosing among threatened species for limited conservation funding, and the role that 'conservation triage' could play.

David introduced the topic with examples of particular species that were at high risk of extinction, highlighted the tendency for conservation resources to be spent on large charismatic species, and the generally opaque, ad hoc nature in which conservation funding is allocated. Conservation triage has the same principles as medical triage where choices can be harsh - "there is nothing we can do for this species, but maybe we can save this one." The goal of conservation triage is to make informed decisions about where funding should be allocated.

David introduced the Project Prioritisation Protocol (PPP) that has been used in New Zealand to help decide on resourcing where the effectiveness of proposed actions is considered a simple function: of Benefit (the fraction of the community that will benefit from the conservation actions); Weight (a subjective assessment of the community's value); the probability of Success; and the Costs associated with implementation. While they attempt to make funding allocation more transparent, cost-benefit approaches like the PPP can be unpopular with people because they don't like the idea of "giving up on a species." However, David made the point that without engaging honestly with the decline of biodiversity, and the associated under-funding of conservation activities, the community is still effectively giving up on species, just in a different way to making explicit triage-type decisions.

At any rate, the news is not good: Species that have been assessed for extinction risk are on average moving closer to extinction; natural habitats in most parts of the world continue to decline in extent and integrity; and the five principal pressures directly driving biodiversity loss (habitat change, over-exploitation, pollution, invasive alien species and climate change) are regarded as either constant or increasing in intensity. David provided a sobering summary of ecosystem and biodiversity health in Australia.

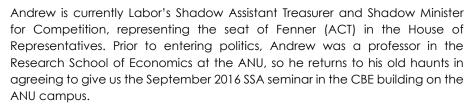
It can be common for scientists and economists to agree on how threatened species should be valued, and subsequently managed. It is one thing for ecologists to be suspicious of economists, and vice versa, but even within the field of conservation science there can be little agreement on how best to proceed. The goal of conservation has been approached from two different paradigms: focused on the needs and wants of humans vs. the intrinsic or inherent rights and values of nature.

In one sense I feel the concept of triage can too easily be embraced by politicians as a solution. A solution where they can justify the current, modest amounts being spent on conservation. To offer triage as a solution accepts that no more can be done when this is not necessarily true. The information that

can be collated or estimated while planning a triage approach seems useful, however: How much is the rate of extinction, decline and recovery of different species influenced by the resources that are spent? Are there any opportunities available to improve conservation of multiple species or increase the available funding? How does the public value different species, and how does the public weigh extinctions of species against further decline and recovery? With the answers to these sorts of questions under our belt, we can still ask the question whether we can spend more. Some Australian conservation scientists have made the claim that "If Australia didn't fly one of its FA18 fighter bombers for six months per year then we would save enough money to prevent the extinction of all of Australia's bird species over the next 80 years". But I'm not sure of the uncertainty associated with that estimate.

P. Tennant

# **Andrew Leigh "The Luck of Politics"**



Given his history he is clearly well qualified to speak both on "luck" and on "politics", and he began his seminar by making the point that chance (regarded as "factors outside our control"), good or bad, has played a huge role in bringing the world to where it is today. True enough as we enter the last week of a vastly amazing US presidential contest.

Andrew continued with a number of examples of chance occurrences in various areas of human activity - in war, in sport, etc. - but soon turned to focus on smaller scale situations more specifically driven by random mechanisms, especially, of note, what happens at the ballot box.

He reported on some statistical investigations he and his office have carried out into the effects of various extraneous factors on the outcomes of ballots; in particular the advantage that may accrue to candidates by seemingly irrelevant chance occurences of various kinds, or situational factors such as where their names were placed on the ballot paper. This ordering is of course important as we know, and these days is decided on at random (in fact, by a double random procedure, as he explained), superseding the method employed in an earlier part of our history, whereby candidates were listed in alphabetical order of surname. The long-term consequences of that are easy to imagine ...

It's no surprise that being on top of a ballot paper provides a boost in votes (of the order of 1%, estimates Andrew), but perhaps less well known that a shorter, common name is also worth around 1% (a quick scan by this reporter of the 150 currently in the Oz House of Reps reveals Tonys, Julies, Lisas, Sharons, Johns, Nicks and of course a Malcolm and a Bill - but no Hillary or Donald -- hmmm...); and possessing "beauty" (how measured? - to do with "symmetry", somehow) is worth 1%-2% (!). And as Andrew emphasizes, a 1% change can make all the difference; we were blessed with large-statured Kim Beazley for so long with an even smaller margin, and of course the memory of the 2010 hung parliament is still vivid with us.



Among parliamentarians, surely Andrew is unique in having an understanding of probability and statistics; not only this, but in having some examples at his fingertips. In response to a question he was able to name a couple of instances in Oz history where the candidate won office by a single vote!

And speaking of questions, the audience (or at least, this reporter) was pleasantly surprised to observe during question time that not only did Andrew address precisely the question put to him, but also answered it directly. If only all politicians...

But seriously, questions ranging from how much is error in polls taken into account by pollies? (not much), is the rise of Trump due to luck? (not entirely...), sports stars won a genetic lottery, do we overvalue them? (admire them for their accomplishments...), &etc. were taken on board genially and answered in some detail.

In all, among these and other amusing sidelights, Andrew provided a most entertaining and instructive seminar. He joined the group for a Chinese dinner afterwards and continued the discussions with good humour.

### **Ross Maller**

### Foreman and Knibbs Lectures

As the Australian Statistical Conference 2016 was in Canberra both the Branch's annual lectures were incorporated into the conference as keynote talks. Each lecture consisted of about 50 minutes presentation and 10 minutes questions from the floor. Unlike when the lectures are presented at a Branch meeting, there were no formal discussants.

Foreman Lecture – Monday 5 December 2016 "Some recent topics on informative sampling"

The Foreman Lecture was presented by Prof. Jae-kwang Kim, Department of Statistics, Iowa State University, USA & Department of Mathematical Sciences, KAIST, Korea.

Biography Jae-kwang Kim is a former Director of the Center for Survey Statistics and Methodology and a Professor in the Department of Statistics at Iowa State University. He is a fellow of ASA and the recipient of the 2015 Gertrude M. Cox award. He is a co-author of the book Statistical Methods for Handling Incomplete Data. He has worked for the Census Bureau and Westat, and has also acted as a consultant for several national surveys in Korea. He has published more than 50 papers in the area of survey sampling and missing data analysis.

In analytic studies, survey data are often obtained with complex sampling designs and the resulting analyses require special attention to handle the sampling design. When the distribution in the sample is different from the distribution in the population, the sampling design is called informative and the analytic inference under informative sampling becomes more complicated.

In the talk, some recent topics on informative sampling were covered. Topics included optimal estimation, Bootstrap-based tests, analysis of multilevel models, Bayesian inference, and multiple imputation under informative sampling.

Acknowledgement The Australian Bureau of Statistics is thanked for its generous sponsorship of Prof. Kim's travel expenses.

Knibbs Lecture – Tuesday 6 December 2016 "'Big Data', Official Statistics and National Statistical Offices"

The Knibbs Lecture was presented by David W. Kalisch, Australian Statistician, Australian Bureau of Statistics, Canberra.

Biography David W. Kalisch was appointed the 15th Australian Statistician on 11 December 2014. As Agency Head of the Australian Bureau of Statistics he is accountable for the functions and operations of the Bureau. He has also been appointed as the non-judicial member of the Australian Electoral Commission.

Mr Kalisch is an economist with public sector experience in research and analysis, policy development and service delivery. He has an interest in labour markets, macroeconomics, retirement incomes, welfare to work strategies and health policy. He has pursued organisational performance and renewal through recent leadership responsibilities.

Mr Kalisch was previously the Chief Executive Officer of the Australian Institute of Health and Welfare for four years, a Commissioner at the Productivity Commission and a Deputy

Secretary in the Commonwealth Department of Health. He has had Senior Executive roles in a range of Departments since 1991, has had two appointments at the Organisation for Economic Co-operation and Development (OECD) in Paris, and was a member of the Australian Delegation to the OECD. He studied economics at the University of Adelaide, is a Public Policy Fellow at the Australian National University and is a Fellow of the Australian Institute of Company Directors.

The Australian Bureau of Statistics has a long history of using 'big data' in producing official statistics. In the current environment of fiscal restraint; high expectations of data availability by governments and the community; and rapidly emerging new forms of information, National Statistical Offices must consider how big data can be used in the production of official statistics, weighing up both the opportunities and the risks. This was explored in the context of the Australian Bureau of Statistics five year transformation program and the broader direction of official statistics in Australia.

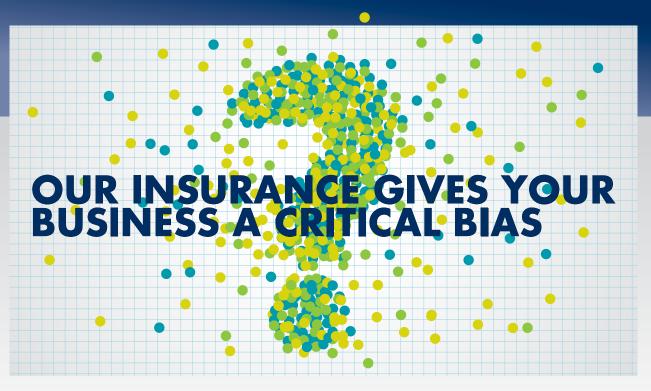
### Warren Müller

# Cao Yi - "Scalable Machine Learning for R"

For the first meeting of the SSAI Canberra branch in 2017 (24 January), joint with the R Data Scientists group, Cao Yi gave a talk on machine learning for very large datasets in R with a particular emphasis on how this can implemented straightforwardly using the software MapR. Cao Yi is a senior data scientist at MapR, who holds a Ph.D. degree in Operations Research from the National University of Singapore. He has deep expertise on statistical machine learning and optimization, spanning multiple applications in manufacturing, utility, retail, and insurance. Prior to joining MapR, he spent over 3 years in Pivotal, helping customers in the region derive business value from big data.

The talk reviewed several of the popular libraries R contains, along with the integration to MapR, which allows users to interact with large-scale, unstructured data sets through the use of a distributed environment. After a brief intro to deep learning concepts, Cao provided a practical yet insightful demo on how to leverage H2O from R to detect anomalies in recent Australian stock prices. The talk was extremely well attended with around 60 people from academic, public, and private sectors. Furthermore, the audience was thoroughly engaged and there were extensive discussions after the talk between Cao, MapR representatives, and many attendees.





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# **NSW BRANCH**

# Why web analytics needs statisticians more than ever?

On 23 August 2016, the NSW Branch was fortunate to have Rod Jacka, Managing Director of Panalysis, to give a talk at UTS on web analytics. Web analytics is the measurement, collection, analysis and reporting of web data in order to understand and optimise web usage. Rod's talk highlighted some of the work Panalysis does and explained how their work helps people to implement data-driven decision-making processes.

Digital marketing is the key driver in the development of web analytics. Companies spend an estimated \$6 billion dollars in 2015 on it, so many tools exist to track the results. Among all these tools, Google Analytics is most commonly used and Rod demonstrated with a few examples on how Panalysis utilised it for market analysis. Although the usage of these tools is widespread, most of the people using them are not skilled in data analysis so results are prone to incorrect interpretations. For instance, populations being studied are not well defined and sample means are used all the time even it makes no sense.

Rod concluded his talk by discussing why web analytics needs more statisticians. Not only would having more statisticians bring a more disciplined approach and reduce errors arising from the analysis, there are also lots of potential areas and challenging problems such as cross device marketing attribution that need statisticians' help to solve.

Rod's talk was very well attended and the audience responded to his wellpresented and thought provoking talk by asking a series of questions. Rod also invited people that are interested in the subject to get in contact with him or come along to Web Analytics Wednesday for which details can be found at wawsydney.com. Those interested in the full presentation may find it here.

### Thomas Fung



# **NSW Young Statisticians Careers and Networking Event**

The Young Statisticians Careers & Networking Evening for 2016 was held on September 13th at The Occidental Hotel at Wynyard, Sydney. The evening was very well attended and it was great to see so many students and early career statisticians from different areas of statistics, including government, industry and academia.

This year we had four great speakers from the Financial, Health, Media and Consulting Services industries who each gave a short presentation. The speakers were Dr Payam Mokhtarian, a data scientist working for Domain Data Products at Fairfax Media, Nischith Kashyap, Manager of Analytics and Enterprise Intelligence at EYC3, Dr Diane Hindmarsh, Lead Analyst, Patient Survey Team from the Bureau of Health Information, and John Watkins, product Owner, CommCollect Program from the Commonwealth Bank.



The four speakers talked about a wide variety of topics including the methods and skills used in their field of work, the roles available to statisticians in their industries, information about their own backgrounds, and career opportunities in their industries. They all gave very engaging talks and provided a great deal of useful information for both current students and recent graduates.

After the talks, SSA provided drinks and finger food and attendees had the opportunity to chat with the speakers and with each other. Judging from the noise, the number of people who stayed on after the talks and the feedback, the evening was a great success. Thank you very much to all of the speakers for 2016, and if anyone is interested in speaking at the 2017 event, please don't hesitate to get in contact!

# Sandy Burden



# Answering important questions about the environment using multivariate space-time modelling

The October meeting of the NSW Branch was held at UTS and the speaker was Andrew Zammit-Mangion from the Centre for Environmental Informatics, NIASRA at the University of Wollongong. Andrew took us through several different arms of his research, all of which involve multivariate spatio-temporal modelling. The application areas were interestingly diverse examples of modelling: mass loss from the Antarctica ice sheet (and subsequent sea level rise); ozone in terms of maximum temperature; atmospheric gas inversion (predicting unobserved emission levels in terms of other observed spatial data). One application that deserves special separate mention is his work published in "Point process modelling of the Afghan War Diary" from the Proceedings of the National Academy of Sciences which won the Cozzarelli Prize for outstanding scientific excellence and originality in 2013.

The most interesting aspect to Andrew's talk is that he managed to, on the one hand, go into some pretty deep mathematical material relating to the positive-definiteness of various covariance and cross-covariance functions but on the other hand keep the talk accessible, engaging and entertaining. It is very difficult to be able to move from deep theory to concrete applications so smoothly and keep it all accessible to a very mixed audience, but he did so effortlessly. The talk provoked much discussion, related to both the applications and the technical details and the dialogue continued on to a fine dumpling feast afterwards. Andrew is indeed a rising star and we are all very fortunate to have him here with us.

### **Michael Stewart**

### 2016 Australian Statistical Conference

This year the Australian Statistical Conference was held in Canberra during early December. By all accounts the conference was a raging success, and the variety of talks on offer (including the applied statistics talks), was enough to satisfy the more obscure theorists of the society!

To bolster the younger attendees numbers, The NSW Branch each year offers support to budding young statisticians to attend the conference. This year, Shila Ghazanfar and Charles Au were awarded the grants. They each provided conference attendance reports as follows:

Shila Ghazanfar Thank you to the Statistical Society of Australia New South Wales Branch for awarding me a Travel Grant to attend the Australian Statistical Conference held on 5-8 December 2016. Combined with AusDM and OZCOTS, the week-long statistical festival was full of highlights, including great social events and interesting research. ASC2016 had a diverse range of topics, including bioinformatics, missing data, environmental statistics, robust statistics, Bayesian computation, official statistics and statistical modelling just to name a few. The conference theme Big Data: Mining, Analysing and Teaching was evident through the vast array of presentations, and it was great to see a large proportion of talks coming from students and early career researchers.



The keynote talks were intriguing and impactful; my personal highlights included Moran Medal winner Prof Sue Wilson on genetics and omics, Prof Xue Li on the data mining of opinions, and an engaging talk on adaptive MCMC by Prof Jeffrey Rosenthal. The parallel talk sessions were very well organised and executed, thanks to the large number of delegates also chairing sessions. I attended a number of sessions outside my field, and learnt something new from every talk, especially the sessions on statistical modelling and graphical models.

My talk in the Bioinformatics and Genetics stream was titled 'Statistical approaches to address unique challenges of single cell RNA-Sequencing data'. This work introduced the use of a gamma-normal mixture model to identify cells and genes with a high expression status, addressed various statistical issues arising with these datasets, as well as some biological observations stemming from its application to mouse neuronal datasets. The talk generated some insightful discussion and feedback.

The social aspect of ASC2016 was lively and exciting. Following the well-attended welcome reception, old and new friends ventured to the nearby Kingston foreshore for dinner. The following evening was a huge highlight: the Young Statisticians dinner held at the affectionately named Kingo (Kingston Hotel) where we caught up with friends and met many other young people from across Australia who are also passionate about statistics.

Other highlights included the inaugural AMSI 3 Minute Thesis competition for which I was happy (read: terrified) to present my thesis topic in a mere 180 seconds. All six presentations were highly polished, motivating and engaging.

Finally the conference ended with a preview of ASC2018: International Society for Clinical Biostatistics and Australian Statistical Conference in Melbourne on 26-30 August 2018. All in all the ASC2016 was a great experience and I'm very grateful to the SSAI NSW Branch for supporting my attendance.

**Charles Au** The Statistical Society of Australia supported my travel to the Australian Statistical Conference 2016 (ASC 2016), held between 5<sup>th</sup> December and 9<sup>th</sup> December at Hotel Realm, Canberra. This conference was held jointly with two other conferences – the Australasian Data Mining Conference (AusDM) and the Australian Conference on Teaching Statistics (OZCOTS). This conference was attended by over 300 delegates and showcased a wide variety of topics in statistics and data mining.

As a young statistician, I enjoyed this wonderful opportunity to attend this conference. I attended some of the talks on Bayesian statistics, spatio-temporal models, biostatistics, and data mining. For me, one of the highlights of this conference was the talk "Opinion Search Engine" given by one of the keynote speakers, Professor Xue Li of the University of Queensland (UQ). I have always been interested in the analysis of text data, particularly analysis of opinions on the social media. The primary focus of his talk was on the Opinion Search Engine his UQ team developed, and the application of the software to predicting the outcome of the 2016 US presidential election using opinion data from the social media. I found his talk extremely fascinating. I also got to listen to other interesting presentations on applications of data mining techniques to the social media. These talks were timely, as big data is becoming more prominent nowadays. Overall, there was a good mix of topics in this conference.

The title of my presentation was "Application of a modified multivariate skew-t distribution to regression modelling". I proposed the use of a modified version of the multivariate skew-t distribution to seemingly unrelated regression (SUR) models. The aim is to allow for flexible modelling of the skewness and heavytailedness of the marginal distributions of the multivariate skew-t distribution – that is, the degrees of freedom parameters of its marginal distributions can be different from each other. An SUR model with the modified multivariate skew-t error distribution can be useful for several related variables that are heavytailed to various extents. For statistical inference, Bayesian Markov chain Monte Carlo (MCMC) techniques are used. I showed an application of this model to the weekly sales data for frozen juice brands, and this model achieved a better model fit to the data than the SUR model with skew-normal or skew-t errors. After my talk, I received some useful feedback on my work from the audience.

I am very grateful for the travel grant provided by the Statistical Society of Australia to present my talk at ASC 2016. Participating in this conference was an intellectually rewarding experience.

### J.B. Douglas Award 2016

The 17th Annual J.B. Douglas Award was held on the 23rd of November 2016 at the University of Technology, Sydney. The J.B. Douglas award seeks to provide an annual platform for promising postgraduate university students to present their work within the broader NSW statistical community. University departments are encouraged to nominate their most promising student to compete for the Award (and a cash prize!).

We had postgraduate students from seven NSW universities presenting their research in 2016. Their names and titles of talks are listed below:

SPEAKER	DETAILS
Daniel Barker	Cross sectional stepped wedge cluster randomised trials with binary outcomes: Are approximations leaving us short on power?
Luke Hartigan	Testing for symmetry in weakly dependent time series
Lin Han	Price and volatility spillovers in Australian electricity markets
Emily Bird	The performance of orthogonal arrays with adjoined or unavailable runs
Arshad Mehar	Advances in Clustering based on Inter-Cluster Mapping
Kristy Robledo	New method for fitting semi parametric variance regression models
Thomas Porter	A higher order criticism of higher criticism
Thais Rodrigues	Quantile pyramids for regression
James Dawber	Capturing random-effects in categorical models using expectiles

Our judges for the evening were Ian Edwards (SAS Institute), Distinguished Professor Louise Ryan (UTS), and Professor Jean Yang (University of Sydney). They had a very hard time choosing a winner from amongst the excellent student presenters. But in the end they chose UNSW student, Thais Rodrigues. We thank various School and Department Heads for their enthusiastic support and the nomination of their students. We also recognised and thanked the sponsors for their generosity in supporting this event. Their logos can be seen on the background of the photo below.



The 2016 J.B. Douglas speakers. Congratulations to you all!

Following the Award ceremony was the Annual Lecture, delivered by Professor Jean Yang. Professor Jean Yang is an NHMRC Career Development Fellow in the School of Mathematics and Statistics at the University of Sydney. The title of her talk was "Integrated single cell data analysis for understanding mechanisms of neuronal diversity". The talk could be broadly summed-up by the simple sentence, 'small scale, big data'. Professor Yang talked us through some technological advances leading to large scale single cell transcriptome profiling. The new technique allows for RNA sequencing at the single cell level, useful for identifying genes with high levels of expression. Working with data at this level leads to interesting statistical models and biological hypotheses. With such a price-premium for generating data for a single cell, new methods are required, as well as new computational techniques to crunch the data. The talk was motivated by a collaborative project involving neuronal single cell data. Please reach-out to Professor Jean Yang directly for more detailed information.

The Annual Dinner following the talk was held at the Aerial UTS Function Centre. We had about 60 people attending the dinner, including many students. The food was good and plentiful and the wine/beer flowed freely. The dinner entertainment this year was an absolute blast. Organised by Louise Ryan, a hilarious game of 'match the baby photo to a celebrity statistician' was enjoyed by all. While some would argue the true winners were robbed of their victory, the simple truth is this: never let a bunch of statisticians decide on the 'fair' and 'robust' win metric. Lies, damn lies, and statistics.

The night would not have been so successful without the amazing coordination of Ms Lucia Kralova, ACEMS Project Admistrator (UTS Node), and the whole SSAI NSW Branch Council for organizing the night. Overall, we received excellent feedback from participants, and importantly, had record numbers still enjoying themselves as 'last-drinks' were called. As with many, I am certainly looking forward to 2017!

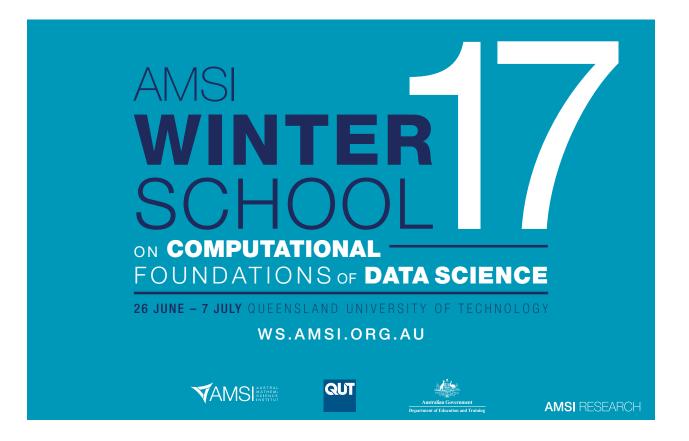
Stephen Wright



and Nan Laird

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# **QLD BRANCH**

# Big Data: does it have anything to do with me?

The Queensland branch Christmas meeting involved a thought provoking presentation on how data from social media is being used to predict events. Dr Xue Li is a Professor in DKE (Data and Knowledge Engineering) Division, School of Information Technology, the University of Queensland in Australia. He obtained a BSc in Computer Science in Chongging University, China in 1982, a MSc in the University of Queensland in 1989, and a PhD in Information Systems in QUT in 1997. His research interests are in data mining, intelligent information systems, and social computing. He was recognized as one of the Top-50 "Most Powerful People in Australia" in 2015 by Australian Financial Review. He is currently a Chief Investigator for three ARC (Australian Research Council) Funding Projects.

In his talk Professor Li explored his experiences with analyzing data from social networks. In current online platforms, people share their information, feelings, and experiences with or without their true online identities. For the last 10 years, we have experienced many problems such as spamming, cyberbullying, and misusage of social media causing problems such as the London Riots. One key question is about whether we are OK to associate our true identity with the cyber identity. In social network connected services such as Uber and Airbnb, people are using their traceable identities in the cyberspace where all transactions are protected by insurance companies or by law. So the question is: if people are willing to use their true identity online in order to share services and values, how can we make social networks a trust-worthy place?

Professor Li talked about the many challenges of analyzing data from social media sources, including the US election. One of very few people to get it right, he used Twitter and regression models to predict Trump's victory. Professor Li's presentation introduced the concept of the spiral of silence, where people say things on the internet that they will not say face to face. This requires modeling of the data to consider the silent majority, and not just use positive and negative tweets. The presentation certainly inspired many conversions about data privacy, life and politics, which were continued over wine and dinner.

To view Professor Li's presentation on YouTube click below https://youtu.be/N6cZtdhIFNw

Lee Jones



# **SA BRANCH**

Professor Stephen McDonald presented his talk on "Statistics at the sharp end - the Australia and New Zealand Dialysis and Transplant Registry" in the SSA South Australia Branch meeting in October 2016.

He is the Director of Dialysis at the Central Northern Adelaide Renal and Transplantation Service, Clinical Director of Renal Services for Country Health SA and Executive Officer of the Australia and New Zealand Dialysis and Transplant Registry (ANZDATA). Along with clinical expertise, his research interest is currently focused on the epidemiology of renal disease, and in particular the use of Registry data to analyse trends and outcomes of those receiving renal replacement therapy. Prof McDonald oversees dialysis services through central and northern Adelaide, and renal services throughout country South Australia. His clinical interest and skills span the breadth of nephrology, including care of acute and chronic kidney disease, severe hypertension, electrolyte disturbances and dialysis and kidney transplant patients.

Professor McDonald's talk presented his ambitious thoughts about generating new ideas and innovations in the way the ANZDATA functions. He described both dialysis and kidney transplantation; those have origins as heroic "lifesaving" procedures, however, the reality is that they have become commonplace resource intensive procedures. Activities and outcomes of dialysis and transplantation are tracked by the Adelaide based ANZDATA Registry throughout Australia and New Zealand. Professor McDonald also highlighted the Transplant Waiting List data from the Australian National Organ Matching System (NOMS) and ANZDATA. This information has led to the creation of a large observational dataset. Increasingly sophisticated statistical techniques have been used to address various issues, especially in the area of survival and time-to-event analyses. These were summarised in the presentation, along with some of the major areas of current endeavor, and unresolved issues. Professor McDonald welcomed Clinicians, Researchers, Collaborators and Stakeholders to step forward and take the opportunities to solve these issues.

Although Professor McDonald illustrated some of the key features of ANZDATA and statistical analytical approach, more information about the Registry can be found on the website (http://www.anzdata.org.au/).

### **Shahid Ullah**



# **November meeting of SA Branch: Vineyard** assessment and how it relates to wine quality

The speaker for the November meeting of the SA Branch was James Hook, an agronomist specialising in viticulture. James talked about his current Masters project on the topic of predicting grape quality, which he is studying at Adelaide University.

There is high variation in the quality and price paid for grapes, so predicting grape quality is an important problem in viticulture. A better understanding of factors affecting grape quality will guide growing best practice, including the interventions which could be performed at critical stages.

The data for the project comes from a four-year trial conducted between 2014 and 2017. The trial considers two grape varieties (Shiraz and Vitis Vinifera) grown at 30 sites within the McLaren Vale and Langhorne Creek wine growing districts in South Australia.

The major innovation of the project is supplementing traditional vineyard measurements (e.g. soil depth, air quality) with new types of measurements enabled by a smartphone app called VitiCanopy. The app computes measures from photos taken at ground level within the vines, allowing researchers to obtain a volume of data not previously feasible. Two important measurements from the app are the extent of leaf coverage (Leaf Area Index) and the amount of light which gets through the vines (Canopy Porosity). Up to 35 explanatory variables were obtained overall for each vine, with some variables relating to the same aspect measured at different points during the growing season. The 'grape quality' outcome variable for the study is a quality assessment performed by industry experts.

James discussed how he has used multiple linear regression to model the data separately from each year (vintage). Distinct models have been studied to address different research questions. A 'Harvest model' uses all measurements taken to predict grape quality, while a 'Growing Season model' restricts the explanatory variables to measurements taken before veraison (the onset of ripening), typically around 45 days prior to harvest. It is hoped the significant explanatory variables of the Growing Season model will indicate how grape quality can be improved by adapting growing conditions and canopy properties within season.

Leaf area and canopy porosity measures derived from the app were significant explanatory variables. Most interestingly, in the models based on some vintages, the veraison measure of canopy porosity is positively associated with grape quality whereas an earlier time measure of canopy porosity is negatively associated. This suggests grape quality improves when there is substantial vine growth in the period leading up to veraison.

An area for research for the fourth year of the study is investigating whether making interventions in the canopy structure can influence grape quality.

**Motivation:** Modifying vineyard growing practices to improve grape quality.

What's New: An app which provides a large volume of new measures of vine canopy structure during the growing season.

Statistical analysis technique applied for study: Multiple linear regression.

What's Next: Studying the impact on grape quality of deliberate interventions to growing conditions.

**Julian Whiting** 



# VIC BRANCH

In 2016, SSA Vic provided some financial support to help two young statisticians, Georgia Tsambos and Robert Mahar, attend the Australian Statistical Conference (ASC) in Canberra on the 5th to 9th of December. Both gave great talks, with Georgia receiving an honourable mention from the judges awarding the EJG Pitman Prize. We asked them to provide some quick insights into their experiences and below is what they had to say.

Georgia: "I am very grateful to the SSA for hosting and supporting my attendance at the Australian Statistical Conference last year. This was the first time I'd ever attended and spoken at a conference, and as a Masters student, I feel lucky to have had an opportunity to do so. I learnt a lot - not just about statistics, but also about effective ways to communicate my work to others. It was also great to meet other researchers who worked in similar areas to me. As a soon-to-be PhD student, I'm confident that this experience has given me a good head start."

Rob: "Late last year I was lucky enough to scrape together the resources to present at the Australian Statistical Conference in Canberra (thanks to ViCBiostat and SSA Vic for their contributions!). My presentation was on the 'Model based estimation of the lung clearance index', which I had a lot of fun delivering. The conference was one of my first and it was a really great opportunity to gain some exposure to the broader Australian statistical community, in particular the really strong cohort of Young Statisticians. I'm looking forward to the next one!"

It is clear that young statisticians reap great reward form being given the opportunity to attend conferences like the ASC. It is also a great opportunity for established researchers, who were young once too, to meet those who will be at the forefront of statistics in Australia in the coming years. I therefore think it is very important that our branches continue to support our young statisticians to attend events like the ASC.

Following the SSA Vic AGM in March, I will be stepping down as President of the branch. I must say that, to quote Bill and Ted, I have had a most excellent adventure. To regularly meet and get to know our members has been very rewarding. Due to the hard work of our council members, branch events have continued to grow and this has been exemplified by back-to-back record breaking attendance numbers for the 2015 and 2016 Belz Lectures (although our speakers, David Balding and Louise Ryan had a say in that too). So I am extremely thankful to all of those who have been on council for the past two years.

Our new incoming president is Dr Jessica Kasza. Jessica is a research fellow in biostatistics at Monash University, in the Department of Epidemiology and Preventive Medicine. After receiving her PhD from the University of Adelaide in 2010, she spent some time at the University of Copenhagen, before returning to the University of Adelaide. She has been at Monash since 2013, and is a member of the Victorian Centre for Biostatistics. Her research interests include cluster randomised trials, causal inference, and the comparison of health care provider performance. She is looking forward to getting to know statisticians from all around Victoria (and Australia!) over the next couple of years in her role as president of the Victorian branch. Jess was very actively involved in the branch in 2016 and she is truly an excellent choice to lead the branch for the next two years. I am sure everyone will make her feel welcome.

Take care everyone,

**Luke Prendergast** 



# FROM THE OFFICE

It was very impressive to see how many members renewed their membership recently.

Until 2008 our memberships all ended at the end of the calendar year and the last couple of months of the year were spent printing off and sending out hardcopy renewal notices. We had a part-time office assistant then who was solely responsible for sending out the renewal notices and then processing the flood of renewal forms that arrived.

In 2008 we introduced a 12-month membership irrespective of when you sign up with the Society and while membership anniversaries now happen throughout the year, the bulk of them still occurs over the summer. However, these days it all happens automatically and generally smoothly. Members can even sign up for several years and avoid possible fee increases.

It's been great to see the good response rate we had to the automated renewal notices. Provided they keep their email address up to date, members should start receiving renewal reminders from three months before the expiry date of their membership. Only ten years ago, your only option to renew was to return the renewal form or call the office with your credit card details. These days you can renew online, by logging into your membership account, you can still use the renewal form, you can call me, or you can set up direct debit through Ezidebit, and then forget about renewals until you decide to terminate your membership...far, far down the track.

For those of you who have forgotten: Your username is your email address. However, if your email address changes and you update it in the database, this will not automatically update your username. When you get a new email address, it's a good idea to contact me to let me know, and I will make sure that your username gets updated as well. Your password is set to your membership number by default, but once you are logged in, you can change it to the password of your choice.

We hope to make the renewal process as easy for you as possible, and we are always on the look-out for ways to make it even better. If you encounter any problems, I'm more than happy to help. Just call me on 02 62513647 or send me an email (eo@statsoc.org.au) and I'll sort things out for you.

I'll be on leave from 24 March until 17 April 2017, but I look forward to assisting members who need help after my return.

### Marie-Louise Rankin

**Executive Officer**