# Regional Newsletter, June 2017

## In this issue

ROLAND LANGROCK

Welcome to the June 2017 issue of the newsletter of the British and Irish Region (BIR) of the IBS. This issue includes several reports on recently held meetings organised or co-organised by the BIR, most notably the Channel Network Conference in Hasselt, Belgium. We hope that you will enjoy these reports, and we'd love to hear from you if you have items you'd like to share with the society in future newsletters. To get in touch, just send a message to roland.langrock@uni-bielefeld.de.

## President's corner

MARTIN RIDOUT

The British and Irish Region was well-represented at the recent Channel Network Conference (CNC) held in Hasselt, Belgium, and everyone I spoke to enjoyed the event. Even the weather was benign relative to the forecast, apart from a brief downpour that forced the planned outdoor conference photograph to retreat indoors. Amongst the younger biometricians who attended, Hannah Ensor (BioSS) and David Hughes (University of Liverpool) were awarded bursaries funded jointly by the BIR and the Fisher Memorial Trust.

My thanks especially to Daniel Farewell, who did a really good job as Chair of the Scientific Committee. Daniel's report on the meeting appears below. The proposal is that the next CNC will be held in 2019 in Rothamsted, to coincide with the centenary of the start of Fisher's period at Rothamsted.

Aside from the CNC, there are reports below of two other meetings, one on exploiting publicly available genetic data and the other on statistical image analysis in medicine and biology. As someone who is not a specialist in either area, I found both meetings accessible and interesting. I do encourage members to come along to as broad a range of meetings as possible, despite the pressures nowadays to be 'focused', to reap the full benefits of membership. For example, I learnt things about developments in variable selection in regression from both of these meetings.

For our next couple of meetings, we are planning an event focusing on the work of young biometricians (at the time of writing, the closing date for the Young Biometrician Award has just passed) and one on refinements of the bootstrap that are useful for practical applications. Look out for details soon. In addition, the Committee is always pleased to receive suggestions for future meetings.

## Reports on the Channel Network Conference in Hasselt

DANIEL FAREWELL, HANNAH ENSOR & DAVID HUGHES

### Report by Daniel Farewell

The charming Belgian city of Hasselt recently played host to the 6th Channel Network Conference, a meeting of four regions of the International Biometric Society. From 24-26 April 2017, over 160 biometricians gathered on the Diepenbeek campus of Hasselt University to share their latest research in fields ranging from genetics to ecology, and from joint models to causal models. The stimulating contributed programme was punctuated with five plenary invited sessions: three themed sessions covering High-Dimensional Bayesian Variable Selection (organised by Alex Lewin), Neuroimaging (organised by John Aston) and the Analysis of Human Growth (organised by Sophie Swinkels), and two longer invited presentations given by Peter Diggle and Rebecca DerSimonian.



*Impression from the CNC in Hasselt*

Particular highlights of the conference include the lightning poster presentation (individuals giving two minute pitches on why people should come and see their poster, which led to a very dynamic poster reception), and the conference dinner (asked to "surprise us" by the conference organisers, the restaurant exceeded all expectations, providing five courses of fine food and drink that fuelled lively conversation).



*Best Presentation winners at CNC*

Poster winners Han Bossier, Stéphanie van der Pas, and Matthijs Vynck received 100 Euro Amazon vouchers, while Best Presentation winners Gustavo Amorim, Theodor Adrian Balan and Sean Yiu were awarded travel grants for next year's IBC in Barcelona. Congratulations to them all, and thanks to the local organisers for a most enjoyable conference!

## Report by bursary winner Hannah Ensor

I was delighted to be awarded a bursary from the BIR to attend the IBS CNC 2017 conference in Hasselt. I particularly enjoyed the invited speaker's talks and those focusing on bioinformatics as this is an area I am likely to become more involved in over the coming years. I work for Biomathematics and Statistics Scotland (BioSS) which is an organisation undertaking research, consultancy and training in mathematics, statistics and bioinformatics as applied to agriculture, the environment, food and health. BioSS is predominantly funded by the Scottish Government's Rural and Environment Science and Analytical Services Division (RESAS). I work in the Animal Health and Welfare group and find that many of the data generated by researchers I collaborate with are genomic in nature. From the conference I noted the emphasis on the issue of multiple testing which will be something I will

bear in mind when considering the best methodology for application in the future.

My background is in clinical trials and my PhD was on surrogate evaluation. Surrogates are early measures of treatment effect that can be used to predict treatment effect on a later primary outcome of interest. A valid surrogate can be used in place of a primary outcome and a clinical trial can therefore be shortened with resultant ethical and economic advantages. Since treatments can act through many different pathways surrogate evaluation is not straightforward and many statistical approaches have and are being developed.

This topic was part of the conference program and I was happy to contribute a presentation, based on the work of my thesis, to the session on "Surrogates and Clinical Trials". Several people commented to me that they had enjoyed this and it sparked some interesting discussions with those who approached me afterwards. These discussions mostly concerned the appropriateness of the use of surrogates in clinical trials and on some of the finer points of my presentation. It was also fantastic to see other developments in the area and engage with colleagues.

Surrogacy continues to be an area of interest for many methodological researchers, myself included. I am currently determining the best means of applying this methodology to research questions in my new role at BioSS. The University of Hasselt is home to a group of researchers working in surrogate and biomarker evaluation and travelling to Hasselt allowed me to meet with them. We discussed current methodological developments (which might be applicable in my current role) and the potential to form a collaboration on studies involving metagenomics data. Metagenomics certainly seems to be an area that is attracting a lot of attention in the institutes I work with as part of my role at BioSS. This suggested direction of research will take me a long way to fulfilling my aim of applying surrogacy methodology to questions of interest in animal health. Furthermore, I hope that any such collaboration would strengthen my methodical endeavours at BioSS and benefit my collaborators in Scotland.

The IBS CNC conference was very interesting and informative on a scientific level and I very much enjoyed it. It furthered my understanding of my area of interest and allowed me to build links to researchers developing methodology in this area; I will endeavour to use these links to enhance my research. This bursary made it possible for me to attend the conference, which, for all the

above reasons, was a very positive experience and has opened opportunities to me that I could not have cultivated otherwise.

## Report by bursary winner David Hughes

I was able to attend the recent Channel Network Conference in Hasselt thanks to the generous support of a bursary from the British and Irish Region of the Biometric Society and the Fisher Memorial Trust. The conference was well attended and a very interesting meeting.

Over the three days of the conference, a wide variety of statistical topics were discussed, with a good mixture of theoretical and applied talks. The conference began with a fascinating talk by Peter Diggle, about his work in disease mapping in Africa. The talk was interesting since it showed how this work has developed over many years and how increasingly novel statistical analysis has been able to make a contribution to treatment programmes involving the World Health Organisation in a number of African countries.

During the conference there was a wide range of contributed talks covering areas such as genetics, network analysis, causal modelling and growth models. The session on Joint Modelling was particularly useful for my own research interests. I came away from the conference with an increased appreciation of the breadth of areas in which statisticians are applying novel statistical methodology.

Invited sessions on High-Dimensional Bayesian Variable Selection, Neuroimaging and Analysis of Human Growth gave excellent overviews of the current research in these areas, and highlighted current challenges in these fields. Both variable selection, and neuroimaging data are increasingly common challenges we are faced with here in Liverpool, so it was good to get an overview of available methods and tools to bring back and apply in my own work.

The first day concluded with a poster session, in which I was able to present a poster detailing some of my work on longitudinal discriminant analysis. Prior to the poster session, a lightning session was held in which poster presenters were able to have two minutes to describe their poster and encourage the audience to come and see it for more information. This was the first time I had been involved in a session like this, and, for myself, I thought it worked really well. It was very interesting to hear presenters describe their work in such a short period of time, and it certainly encouraged me to go and look at some of the posters in more detail, and helped put a

face to the name on the poster. The poster session went well, with a lot of discussion around many of the posters, with interesting conversations lasting for a long time.



*Impression from the CNC in Hasselt*

Overall, the conference was really useful, both in terms of learning about topics close to my own areas of research and having a chance to discuss ideas with experts in these fields, but also in getting a sense of the range of work going on in other statistical areas. I am grateful to the local hosts for organising the conference and also to the Biometric Society for kindly giving me the bursary to attend the conference.

## Joint meeting with SEGEG on "Exploiting publicly available genetic data"

MARTIN RIDOUT

Over 160 people attended this meeting, which was organised jointly with SEGEG (South of England Genetic Epidemiology Group) by Doug Speed and Paul O'Reilly.

Jonathan Marchini (Oxford) got the meeting off to a fine start by providing an excellent introduction to the UK Biobank genetic data set. This amazing resource has data from half a million males and females aged 40-69 at sign-up, and includes health information, physiological data and biological samples stored for future analysis, as well as genetic data in the form of single-nucleotide polymorphisms (SNPs), of which about 800K are recorded. Because of the mechanisms of recruitment, the individuals are somewhat more related than one would expect from a random sample of the population, which has advantages for some types of study.

Jonathan described two of the key processing steps that have been applied to the collected SNP data. In both cases, a major challenge has been scaling up methods to work with the very large sample size. The first step is phasing, which attempts to resolve the genotype data that is collected into haplotypes. The second is imputation, which extends the recorded SNPs to a much larger number using an imputation process that matches the recorded SNPs to denser maps that are available (for much smaller samples). Using this technique, the original 800K SNPs have been boosted to 93 million.

Anyone (academic or commercial) can apply to access the data by outlining the use they intend to make of it. Currently data for a subset of 150K individuals is available, but the full sample of 500K individuals will soon be released. Such is the anticipated demand and expected competition to exploit the data, that the plan is to release the data initially in encrypted form, and only release the key when everyone has had a chance to download. The next two talks showcased applications that have used Biobank data for genome-wide association studies (GWAS). Louise Wain (Leicester) talked about the BiLeve project that has looked at SNPs associated with smoking behaviour and FEV1 (a measure of lung function). Helen Warren (QMUL) described association studies of blood pressure. Both studies identified numerous new associations, as well as (often) confirming associations identified in earlier studies. These associations can help to identify at-risk individuals and perhaps offer targets for drug therapy.

The final two talks after tea focused on methodological issues. First, Paul Newcombe (MRC Biostatistics Unit, Cambridge) gave us JAM – software for Joint Analysis of Marginal effects. Association studies typically work marginally, considering one SNP at a time, and often in meta-analyses this is all that is possible. However, as study sizes increase this can result in many correlated SNPs being apparently associated with the trait of interest. JAM uses Bayesian variable selection techniques to carry out a multivariate analysis, using only the univariate summary statistics along with an estimate of the SNP-SNP correlation matrix from a reference data set, to identify the SNPs that are 'truly' associated with the trait. Several examples showed the effectiveness of this technique. Finally, Hugues Aschard (Pasteur Institute, Paris) continued the theme of utilising summary statistics by explaining how it was possible to estimate genetic correlations and perform multi-trait tests of association; the latter can improve power to detect causal variants by harnessing the fact that many phenotypes have overlapping genetic architectures. He also discussed some of the technical issues when relying on third-party data, providing methods for recovering sample sizes (as often that information is not provided in the summary statistics) and allowing for noise when estimating linkage disequilibrium from a reference population.

# Meeting on "Statistical Image Analysis in Medicine and Biology"

Tom Nye

The idea behind this meeting was to present a range of statistical theory and applications focussed on the analysis of images. Experimental and technological innovations in recent years have resulted in a increase in the type and scale of imaging techniques available to medical practitioners and biologists. The meeting brought together four speakers who presented a cross-section of recent work in this area.

Two speakers, John Aston and Ian Dryden, specifically presented work on neuro-imaging, an area of research which is gaining increasing attention. John Aston is co-director of the EPSRC Centre for Mathematical and Statistical Analysis of Multimodal Clinical Imaging Data, Cambridge University, and spoke first at the meeting. His talk described functional data analysis to capture variation in 3-dimensional structures such as human hip-bones and brain folds.

Adrian Bowman, University of Glasgow, spoke about data analysis on manifolds, in particular digitized 3-dimensional images of human faces. Geometrical ideas lie at the heart of these approaches, for example, to automate extraction of registration points. Applications are in quantifying the success of facial surgery and in understanding developmental issues with associated facial shapes.

Ian Dryden, University of Nottingham, described statistical methodology for the analysis of magnetoencephalography (MEG) data. MEG focuses on the small magnetic fields resulting from the naturally occurring electrical currents during brain activity, and gives high-temporal resolution information about brain activity. Model fitting can be formulated as an inverse problem with many more parameters than data measurements, with various sparse regression methods used for regularization.

The final talk by Ian Jermyn, Durham University, concerned identification of cell nuclei from microscope images. These images can contain many cells with differing morphology. Cells can pile up on top of each other with intensities from superposed nuclei being additive. The model adopted used a level-set approach for the boundaries of nuclei, favouring circular shapes but allowing slight variations around this.

In combination, the four talks gave the audience an excellent overview of the current state of statistical methodology and applications in image analysis.

## Secretary's Corner

Sue Welham

Writing this at the peak of the June heatwave makes the cooler rainy autumn weather and the BIR AGM feel like something to look forward to! In addition to the officers, the BIR committee has 6 regular members, each serving three-year terms with two retiring and replaced each year at the AGM. Unfortunately Lisa Hampson, elected to the committee last autumn, has had to stand down and so this year we are looking for 3 new committee members. The role involves attending two committee meetings each year (one each in spring and autumn) either in person or by phone or internet (we are currently exploring new options for this). In addition, we hope that each committee member will take the lead on organising one of our scientific meetings during their term – an opportunity to gather together the speakers you've always wanted to hear on your topic of interest! If you are interested in joining the committee then please get in touch (email Sue Welham via stats4biol@gmail.com). If you have ideas for meetings you would like to happen but don't want to join the committee then still let us know and we will see what we can do.

I hope that members noticed the recent edition of the new IBS Journal Club, an initiative of the Education Committee of the international society. The IBS is keen to enable events of interest to members so please feed through any ideas to your committee and we can pass these on.

## International Biometric Conference in 2018

The XXIXth International Biometric Conference (IBC2018) will be held from 8-13 July 2018 at the Barcelona International Convention Centre, Barcelona, Spain. The BIR will again be awarding bursaries to help career-young biometricians attend the IBC to present their work. The scheme is cofunded by the BIR and the Fisher Memorial Trust. For information on the conference, see http://2018.biometricconference.org/.



## Obituaries

## Geoff Clarke

Martin Ridout

We are sorry to have to report the recent death of Geoff Clarke. Geoff was a very long-standing member of the BIR. He worked for many years at Long Ashton Research Station, before moving to University of Sussex. His research interests were in the design and analysis of experiments, a subject that he continued to teach to MSc students at University of Kent long into retirement. He wrote several textbooks, including the popular 'A Basic Course in Statistics', co-authored with Dennis Cooke. Geoff was passionate about statistical education in Africa, and contributed particularly to the Eastern Africa Statistical Training Centre in Tanzania. He was also very active in the Institute of Statisticians and the Royal Statistical Society, and was awarded the Society's Chambers Medal in 2001. A fuller obituary will appear in JRSS A.

## Geoff Freeman

Andrew Mead

We are sorry to have to report the recent death of Geoff Freeman. Geoff was an active participant in the society for many years, serving as British Region President in 1981-82, as IBS President and Vice-President from 1985 to 1988, and as chair of the International Programme Committee for the 10th IBC in Brazil in 1979. He also served

the British Region as a member of the Fisher Memorial Trust Committee for a number of years. After studying at Cambridge, Geoff first worked at East Malling Research Station from 1951-60, with a strong focus on the construction of row-column designs for fruit trials. He then spent 10 years in Africa, firstly at the West African Cocoa Research Institute in Nigeria, and then for the East African Agriculture and Forestry Research Organisation in Nairobi, Kenya. He returned from Africa in 1969 to become Head of the Statistics Section at the National Vegetable Research Station, as a replacement for John Nelder, before "retiring" to the University of Warwick in 1985 as head of the Statistical Consultancy Unit. He had a life-long interest in the design of experiments, but with a strong focus on applied statistics, and in using good design to make the best possible use of resources.