Thirty-Sixth Gregynog Statistical Conference — April 2000
Programme

All talks will take place in Seminar Room 1 (Floor 2, far end)

Friday	16.00	*Tea*
14 April	17.00	Professor Adrian Bowman (Glasgow)
		Smoothing Techniques for Data Analysis I: The basics.
	19.00	*Dinner*
	20.00	Dr Alan Kimber (Surrey)
		Random effects modelling in survival analysis.
Saturday	08.00	*Breakfast*
15 April	09.30	Professor Nancy Flournoy (American University)
		New Results in Up-and-Down Designs for Quantal Response Functions.
	11.00	*Coffee*
	11.30	Professor Adrian Bowman (Glasgow)
		Smoothing Techniques II: Issues of inference.
	13.00	*Lunch*
		Afternoon free (walks, etc)
	16.00	*Tea*
	17.00	Dr Caitlin Buck (Cardiff)
		Modern Statistical Approaches to Archaeological Data Interpretation.
	19.00	*Dinner*
Sunday	08.00	*Breakfast*
16 April	09.30	Professor Mel Hinich (Texas)
		Forecasting the Dynamics of a Linear system.
	11.00	*Coffee*
	11.30	Professor Adrian Bowman (Glasgow)
		Smoothing Techniques III: Some harder problems.
	13.00	*Lunch*
	14.00	Professor Mark Steel (Edinburgh)
		Bayesian Modelling of Catch in a Northwest Atlantic Fishery.
	15.30	*Tea and finish.*

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Abstracts

Smoothing Techniques for Data Analysis

Adrian Bowman, Dept. of Statistics, University of Glasgow

Session 1 - The basics

Smoothness is a general principle which underlies much of statistical modelling. Parametric models are usually smooth but with specific assumed forms of patterns and relationships. Nonparametric models retain the assumption of smoothness but do not make such strong assumptions on the form of the underlying model. This introductory session will describe some basic ideas of kernel-based smoothing techniques and illustrate them on examples from density estimation and nonparametric regression, including normal, binary and censored data responses. Both one and two-dimensional problems will be considered and there will be a strong emphasis on graphics and on the underlying ideas, with illustrations on quite a wide variety of examples. Some theoretical properties will be outlined as a prelude to inferential discussions in Session 2.

Session 2 - Issues of inference

The role of smoothing techniques in drawing conclusions from data will be discussed. In the context of density estimation simple problems include an assessment of Normal distributional shape or the comparison of densities constructed from different groups of data. In the context of regression interest often lies in assessing the presence of a covariate effect, detecting non-linearity or comparing curves from different groups.

The distributional calculations which are standard for Normal linear models have to be modified in the nonparametric setting. Some further issues arise with time series or repeated measurement data. The idea of additive models, in the sense of Hastie & Tibshirani, will be outlined as a general framework in which nonparametric modelling can be carried out.

Session 3 - Some harder problems

The modelling process usually requires different models to be compared and additive models proceed by drawing analogies with the usual normal linear model tools. A detailed analysis of the simple, but important, two covariate case will be discussed. This raises some important issues about how model comparison should be done. Where data have a geographical component it is common to assume the presence of spatial correlation and the variogram is a standard tool for exploring the nature of this. Smoothing techniques can play a useful role in assessing the evidence that spatial correlation is present at all.

On some occasions, such as in radiocarbon dating calibration, assumptions of non-linearity and smoothness are reasonable but attention also needs to be given to the question of whether the regression relationship is monotonic. The bootstrap can provide a useful answer here.

Finally, there are situations, especially in environmental problems, where it is discontinuities in a regression relationship which are of primary interest. The detection of change-points in a nonparametric setting will be discussed.

Bayesian Modeling of Catch in a Northwest Atlantic Fishery

Carmen Fernandez, School of Mathematics and Statistics, University of St.Andrews, U.K
Eduardo Ley, International Monetary Fund, Washington DC, U.S.A.
Mark F. J. Steel, Department of Economics, University of Edinburgh, U.K.

This paper deals with the issue of modeling daily catches of fishing boats in the Grand Bank fishing grounds. We have data on catches per species for a number of vessels collected by the European Union (EU) in the context of the Northwest Atlantic Fisheries Organization (NAFO). Many variables can be thought to influence the amount caught: a number of ship characteristics --such as the size of the ship, the fishing technique used, the mesh size of the nets, etc.--, are obvious candidates, but one can also consider the season or the actual location of the catch. In all, our database leads to 26 possible regressors, resulting in a set of 44 million possible linear regression models for the log of catch. In the treatment of categorical variables we avoid fixing the choice of a reference level under model uncertainty. Zero observations are treated separately through a probit model. Prediction of future catches and posterior inference will be based on Bayesian model averaging, using a Markov chain Monte Carlo approach.
Particular attention is paid to prediction of catch for single and aggregated observations.

Keywords: Bayesian model averaging; Categorical variables; Grand Bank fishery; Predictive inference; Probit model

Modern statistical approaches to archaeological data interpretation

Caitlin Buck

Exploratory statistical tools are widely used in archaeology and are now seen as part of the basic tool kit for data investigation and presentation. Model-based statistical methods are less widely used. Since the advent of modern simulation-based implementations of the Bayesian paradigm, however, considerable collaborative work between statisticians and archaeologists has begun to change this. In this presentation I describe recently developed models and prior definitions for a range of archaeological problems and illustrate them using real case studies.

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Participants

Speakers

Professor Adrian Bowman	University of Glasgow
Dr Caitlin Buck	University of Wales, Cardiff
Professor Nancy Flournoy	American University, Washington
Professor Mel Hinich	University of Texas
Dr Alan Kimber	University of Surrey
Prof. Mark Steel	University of Edinburgh

	Staff		Students	
Aberystwyth				
Dr John Basterfield	Mr Alan Jones		Mr Dafydd Morgan	
Dr John Lane	Prof Dennis Lindley			
Miss Sylvia Lutkins				
Bangor	Mr Chris Whitaker			
Bath			Mr Mark Gittoes	Mr Richard Sharp
Birmingham				
Prof Tony Lawrance	Prof Henry Daniels		~~Mr Demetrius Bagavos~~	
Dr Richard Atkinson	Dr R Hilliam			
Mr Alan Girling	Dr N Balakrishna			
Dr J Thompson				
Bristol	Alfred Stein		Ms Natalia Schofield	
Cardiff	Mr Terry Iles			
Nottingham Trent	Professor Neville Davies	+ Mrs Davies		
Staffordshire	Dr Emily-Jane Raeburn			
Swansea				
Prof Alan Hawkes	Dr John Pemberton			
Dr Mark Kelbert	Dr Alan Watkins			
Dr Alan Mayer				
University of Wales College of Medicine				
Dr Frank Dunstan	Dr Barry Nix			
Warwick				
Prof John Copas				

Marcos Perez	Carlos Corrabias
Ali Daeshkah	Luisarturo Castellanos
Konstantinos Triatafyllyopoulos	
Neil Parkin	Giovanni Montana
Antonio Lopez-Verlarde	
Raquel Voorduin	Veronica Saavedra
Liliana Figueroz	Theodosia Prodromou
Gabriel Matus-Velesco	

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~~24~~ staff, 18 students 6 speakers 1 guest