



Grupo de Probabilidades e Estatística
CENTRO DE INVESTIGAÇÃO E DESENVOLVIMENTO EM MATEMÁTICA E APLICAÇÕES
Departamento de Matemática
Universidade de Aveiro

CIDMA]10
2009-2019

VII Workshop of Probability and Statistics group — Interdisciplinarity and applications —

Sousa Pinto room, Department of Mathematics, University of Aveiro

13th - March - 2019

Program:

14:00 – 14:40 **The importance of statistics to support road safety analysis**

Margarida Coelho

DMec & TEMA, University of Aveiro



14:40 – 15:20 **A Cusp Catastrophe Model for Satisfaction, Conflict, and Conflict Management in Teams**

Isabel Dórdio Dimas

ESTGA & GOVCOPP, University of Aveiro



15:20 – 15:40 Coffee break

15:40 – 16:20 **Highlighting outliers in econometric data**

Manuela Souto de Miranda

CIDMA, University of Aveiro



16:20 – 17:00 **Parameter estimation of INAR models under censoring using ABC**

Isabel Pereira

Department of Mathematics & CIDMA, University of Aveiro



This workshop is free for anyone who is interested in applied statistics. Only a quick registration is required. For registration please send an email to adelaide@ua.pt providing your name and filiation. Official languages: English and Portuguese (all slides will be in English)



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The importance of statistics to support road safety analysis

Margarida Coelho

Abstract:

Road crashes are among the leading cause of death, disability and costs for society. More than one million people lose their lives every year in road crashes and 20 to 50 million people are injured (WHO data, 2015). In particular, pedestrians and cyclists are considered vulnerable road users (VRU), since they can suffer the most severe consequences in collisions. In 2017, 21% of fatalities in European Union's roads were pedestrians and 8% were cyclists (European Commission, 2017). The paradigm of safety between vulnerable road users increase with the efforts to promote them since they are sustainable mobility modes and bring environmental and health benefits. In this seminar, the use of statistical methodologies and statistical analysis software packages will be discussed, with the main objective to assess crash severity, temporal and spatial distribution of crashes, and risk factors that affect the severity of a crash involving two motor vehicles or a VRU when involved in a motor vehicle crash.

Margarida Coelho finished her PhD at Instituto Superior Técnico (IST) in 2005, within a partnership between IST and the Institute for Transportation Research and Education, of North Carolina State University, USA. She is an Assistant Professor at the Department of Mechanical Engineering of the University of Aveiro, Vice-Director of Centre for Mechanical Technology and Automation and the scientific coordinator of the research on transportation at this Centre. Her research interests are: impacts of transportation systems (namely, traffic congestion, energy consumption, pollutant emissions and road safety), connected and automated mobility, life cycle assessment and active mobility. Margarida Coelho has more than 50 scientific papers published (or in press) in international journals (such as the International Journal of Hydrogen Energy, Science for Total Environment, Transportation Research Part D: Transport and Environment, International Journal on Sustainable Transportation, Atmospheric Environment, Transportation Research Record, and Journal of Nanoscience and Nanotechnology), besides other publications in book chapters and proceedings of scientific conferences. Finally, Margarida Coelho has had extensive participation in transport related projects: she is the PI of R&D Projects funded by the Portuguese Science and Technology Foundation (FCT) and the Luso-American Foundation / United States National Science Foundation; she is also a participating member in several projects funded by FCT, SUDOE and INTERREG Europe Programme.



A Cusp Catastrophe Model for Satisfaction, Conflict, and Conflict Management in Teams

Isabel Dórdio Dimas

Abstract

Teams are now a structural feature in organizations, and conflict, which is recognized as an inescapable phenomenon in the team context, has become an area of increased research interest. While the literature shows contradictory results regarding the impact of conflicts on teams, the strategies used to manage them have shown that can help to explain the differentiated effects of conflict situations. Adopting a non-linear dynamic system perspective, this research tests a cusp catastrophe model for explaining team members' satisfaction, considering the roles of conflict and of conflict management. In this model, the conflict type is the asymmetry variable and conflict-handling strategies are the bifurcation variables. The sample is composed of 44 project teams, and data was collected at two points (half-way through and at the end of the project). The presence of a cusp catastrophe structure in the data was tested through both the dynamic difference equation modeling approach, which implements the least squares regression technique, and the indirect method, which uses the maximum likelihood estimation of the parameters. The results suggest that the cusp model is superior to the linear model when the bifurcation variables are passive strategies (in particular, when the strategy of obliging is considered), while less clear results were found when active strategies are considered (integrating and dominating). Thus, the findings show a tendency for a non-linear effect of passive strategies on members' satisfaction. Accordingly, this study contributes to the small-group research literature by presenting passive conflict-handling strategies in a bifurcation role, which suggests that beyond a certain threshold of the use of these kind of strategies, teams might oscillate between two attractors.

Isabel Dórdio Dimas is an assistant professor of Organizational Behavior and Social Sciences at the University of Aveiro (School of Technology and Management of Águeda, Portugal) and a researcher at GOVCOPP – Research Unit in Governance, Competitiveness and Public Policies. She is also a collaborator at the University of Coimbra, namely in the European Master on Work, Organizational, and Personnel Psychology (WOP-P) – Erasmus Mundus Programme. She earned her Ph.D. in Organizational Psychology and her degree in Psychology from the University of Coimbra. Her current research interests include workgroups, group dynamics, intragroup conflict, leadership, effectiveness, and emotions in the group.



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Highlighting outliers in econometric data

Manuela Souto de Miranda

Abstract

Econometric data is often analysed through multivariate models like the Simultaneous Equations Model. That type of model assumes dependence relations between equations, thus worsening the well-known problems of detecting outliers in multivariate models. We present a method that identifies anomalous data points as outliers of the Simultaneous Equations Model and that provides a simple visualization. We illustrate the procedure with a real econometric data set. This process allowed us to highlight suspicious observations that were not previously confirmed as atypical.

Manuela Souto de Miranda developed her professional career at the Department of Mathematics of the University of Aveiro, having been responsible by several courses in the areas of Probability and Statistics. She joined the Centre for Research & Development in Mathematics and Applications (CIDMA) from its beginning, currently being a collaborator of the centre. Her main research interests are robust statistics and multivariate data analysis, particularly in geostatistics, regression and simultaneous equations models.



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Parameter estimation of INAR models under censoring using ABC*

Isabel Pereira

Abstract

Data resulting from censoring are frequently encountered in diverse fields including environmental monitoring, medicine, economics and social sciences. Censoring occurs when observations are available only for a restricted range, e.g., due to a detection limit. The analysis of time series under censoring has received little attention in the literature. Neglecting censoring in the time series hinders meaningful statistical inference, leading to model misspecification, biased parameter estimation and poor forecasts. This work considers the analysis of time series of counts under censoring based on first order integer autoregressive (INAR) models. Since the INAR(1) under censoring is not conditional linear autoregressive and presents an intractable likelihood we resort to Approximate Bayesian Computation (ABC) methodology for estimating the model. The results are illustrated with simulated data.

* Joint work with M. Eduarda Silva.

Isabel Pereira is currently an Assistant Professor at the Department of Mathematics of the University of Aveiro (DMat – UA) and member of the Centre for Research & Development in Mathematics and Applications (CIDMA). She holds a Ph.D. degree in Mathematics from the University of Aveiro. It can be highlighted the following activities: Programme Director of Master in Mathematics and Applications from 2008 to 2015; Coordinator of Probability and Statistics Group of CIDMA since 2015; Vice-President of the Portuguese Statistics Society since 2015 and Member of the General Council of University of Aveiro since 2017. She has decades of experience in teaching experience at B.Sc, M.Sc and PhD levels in Mathematics and Statistics and as scientific adviser of M. Sc and PhD thesis. Her current research interests are the following topics: Bayesian statistics, modeling and prediction in nonlinear time series and time series of counts.