2018 CBEES-BBS PORTO CONFERENCE ABSTRACT

2018 International Conference on Mathematics and Statistics (ICoMS 2018)

2018 2nd International Conference on Bio-Signal and Image Processing (ICBSIP 2018)

Porto, Portugal

July 15-17, 2018

Sponsored by

CBEES
www.cbees.org

BBS
Biology and Bioinformatics Society

U.PORTO

Published and Indexed by

ICPS
Published by ACM

JOIG
Journal of Image and Graphics

IJAPM
ISSN 2010-362X

ACM DL DIGITAL LIBRARY

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Oral Session

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2018 Porto Conference Introduction

Welcome to 2018 CBEES-BBS Porto conference, which is sponsored by Hong Kong Chemical, Biological & Environmental Engineering Society (CBEES) and Biology and Bioinformatics Society (BBS), and co-sponsored by University of Porto. The objective of the Porto conference is to provide a platform for researchers, engineers, academicians as well as industrial professionals from all over the world to present their research results and development activities in Mathematics and Statistics, Bio-signal and Image Processing.

2018 International Conference on Mathematics and Statistics (ICoMS 2018)

Papers will be published in one of the following conference proceedings or journals:

Option A. Publication in **ACM International Conference Proceedings (ISBN: 978-1-4503-6538-3)**, which will be archived in the ACM Digital Library, indexed by EI Compendex and SCOPUS, and submitted to be reviewed by Thomson Reuters Conference Proceedings Citation Index (ISI Web of Science).

Option B. Publication in **International Journal of Applied Physics and Mathematics (IJAPM) (ISSN: 2010-362X),** which will be indexed by EI (INSPEC, IET), Index Copernicus, CAS ect.

Conference website and email: http://www.icoms.org/; icoms@cbees.net

2018 2nd International Conference on Bio-Signal and Image Processing (ICBSIP 2018)

Papers will be published in one of the following conference proceedings or journals:

Option A. Publication in **ACM International Conference Proceedings (ISBN: 978-1-4503-6453-9)**, which will be archived in the ACM Digital Library, indexed by EI Compendex and SCOPUS, and submitted to be reviewed by Thomson Reuters Conference Proceedings Citation Index (ISI Web of Science).
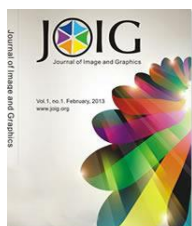
Option B. Publication in **Journal of Image and Graphics (JOIG) (ISSN: 2301-3699),** which will be included in Ulrich's Periodicals Directory, Google Scholar, Crossref, Engineering & Technology Digital Library and Electronic Journals Digital Library.

Conference website and email: http://www.icbsip.org/; icbsip@cbees.net

Presentation Instruction

Instruction for Oral Presentation

Devices Provided by the Conference Organizer:

Laptop Computer (MS Windows Operating System with MS PowerPoint and Adobe Acrobat Reader)
Digital Projectors and Screen
Laser Sticks

Materials Provided by the Presenters:

Power Point or PDF Files (Files should be copied to the Conference laptop at the beginning of each session.)

Duration of each Presentation (Tentatively):

Regular Oral Presentation: about **12** Minutes of Presentation and **3** Minutes of Question and Answer
Keynote Speech: about **35** Minutes of Presentation and **5** Minutes of Question and Answer
Invited Speech: about **15** Minutes of Presentation and **5** Minutes of Question and Answer

Instruction for Poster Presentation

Materials Provided by the Conference Organizer:

The place to put poster

Materials Provided by the Presenters:

Home-made Posters
Maximum poster size is A1
Load Capacity: Holds up to 0.5 kg

Best Presentation Award

One Best Presentation will be selected from conference presentations, and the Certificate for Best Presentation will be awarded at the dinner banquet on July 16, 2018.

Dress code

Please wear formal clothes or national representative of clothing.

Keynote Speaker Introduction

Keynote Speaker I

Prof. Carlos A. Braumann

University of Évora, Portugal

Carlos A. Braumann is Professor at the University of Évora (UE), Portugal, where he has been Vice-Rector in 1987-94 and Rector in 2010-14. He is also an institutional evaluation expert for A3ES (the Portuguese Agency for Evaluation and Accreditation of Higher Education). His publications are mostly on Stochastic Differential Equations and its applications in several areas (population dynamics, fisheries, animal growth, demography, finance). He got his Ph.D. in 1979 at the Stony Brook University and his habilitation in Stochastic Processes at the UE in 1988. He is an elected member of the International Statistical Institute since 1992, a former President of the European Society for Mathematical and Theoretical Biology (2009-12) and of the Portuguese Statistical Society (2006-09 and 2009-12), and a former member of the European Regional Committee of the Bernoulli Society (2008-12).

Topic: "Some Biological Applications of Stochastic Differential Equations"

Abstract—The dynamics of some biological phenomena are affected by random environmental fluctuations and can be described by stochastic differential equation (SDE) models. We will present a few applications of these models, some developed with the co-authors Patrícia A. Filipe, Clara Carlos and Nuno M. Brites:
a) Models for the growth of animal populations, including the qualitative behavior of general models (in what concerns extinction and existence of a stationary density) and the effect of using approximate models.
b) Harvesting models and optimization of the fishing effort, including the comparison of optimal (but inapplicable) variable effort fishing policies with sustainable constant effort policies.
c) Models for individual growth of an animal and extension to mixed models for several animals, with applications to profit optimization of bovine growers.

Keynote Speaker II

Prof. João Tiago Praça Nunes Mexia
Universidade Nova de Lisboa, Portugal

Prof. João Tiago Praça Nunes Mexia was born in Lisbon in June of 1939. The most part of his career was as Full Professor at the FCT/UNL-Faculty for Sciences and Technology of the New University of Lisbon. At that time he supervised the teaching of Statistics at FCT/UNL and directed the Research Center in Mathematics of the University (CMA-Center for Mathematics and its Applications) from 1999 to 2009. In 2009 he became Emeritus Professor. Until now he supervised 19 Ph.D. and co-supervised 12 Ph.D. His research is centered on Linear Statistical Inference, having almost 100 papers published in International Journals.

Topic: "Dialectics Model x Observations in Statistics"

Abstract—We start by stressing the interplay between model and observations in statistical inference. While the model expresses what we know before collecting observations, the statistical inference uses it to extend information from the observations. In developing the models, probability concepts are used. We also stress in the first part the role played by duality in unifying parameter estimation and hypothesis testing. This approach is followed in the second part in which we apply it to Normal Mixed Models.

Keynote Speech III

Prof. Bártfai György
University of Szeged, Hungary

Studies:

1995 Acquisition of the title Dr. med. habil

1974 Specialization in Obstetrics and Gynaecology

Academic qualifications:

1999 Doctor of the Hungarian Academy of Science

1984 Ph.D. Degree

Professional assignments:

2014- Emeritus Professor

2000-2014 Professor

Professional memberships and awards:

2008- Head of the working group of the "Reproductive Health" at the Secretariat of the South-Hungarian Regional Committee of the Hungarian Academy of Sciences

2008- Honorary member of the Society of the Serbian Obstetricians & Gynaecologists

2008- Honorary member of the Society of the Romanian Obstetricians & Gynaecologists

2010- European Society of Contraception, member of the Board of Directors

2012- President of the ESC Internal Scientific Committee

2013 Doctor Honoris Causa, Arad University

2013 Batthyány-Strattmann Award by the Ministry of Education and Heath, Hungary

Other activities:

President of the Egon and Ann Diczfalusy Foundation (at present)

World Health Organisation (WHO) obligations:

Temporary Advisor and Principal Investigator in the following multicentre studies:

Multicenter IUD trials

Cardiovascular diseases & hormonal contraception

Emergency postcoital contraception

Vaginal Ring study B300

Pericoital contraception with Levenorgestrel

Topic: "The Role of Telemedicine in the Medical Practice, Special Emphasis on E-Learning and Monitoring the Patient"

Abstract— Nowadays using mobile phone is rather popular all over the word. However, it is under utilised in the medicine. The computer technique and the mobile phone application will revolutionaries the learning-teaching process in the medicine as well as the distance monitoring and diagnosis. Telemedicine by definition is a kind of service in the healthcare during which the patient and the healthcare provider do not meet personally. The contact realise through info-communication data transfer system. Thus specialists change information remote in favour of the better health care of a patient. The major fields of telemedicine are e-learning, distance monitoring the patient robotic operating technique, distance diagnosis, remote consilium and distance diagnosis. This presentation will focus on the following fields: Online evaluation of the cartiotocographic (CTG) traces lay emphasis on e-learning. Monitoring of the pregnancies with diabetes using mobile phone. Infertility work up: evaluation, home monitoring, helping therapeutic decision. Online diagnosis in the obstetrical and gynaecological ultrasound and evaluation of the onco-cytologic smears in cervical cancer screening.

Keynote Speaker VI

Prof. Swanhild Bernstein
TU Bergakademie Freiberg, Germany

Prof. Swanhild Bernstein studied from 1982 to 1987 Mathematics at the TU Karl-Marx-Stadt (nowadays Chemnitz, Germany) and finished her studies with the Diploma in Mathematics. After that she moved to Freiberg, Germany, and got a Ph.D. at the TU Bergakademie Freiberg in 1993. She continued working the university and was awarded a Feodor Lynen Fellowship of the Alexander von Humboldt foundation for the years 1998/99 which she spent at the University of Arkansas at Fayetteville, USA. Then she moved to the Bauhaus University in Weimar, Germany, and continued working in mathematics and applied topics. Finished her Habilitation in 2001 at the TU Bergakademie Freiberg and 2003 at Bauhaus University Weimar. Since 2013 she is a professor at TU Bergakademie Freiberg for Harmonic analysis and its applications. Her research interests are function theory, hypercomplex analysis, wavelets and approximation theory. She is an associated editor for Advances in Applied Clifford Algebras.

Topic: "Quasi-Monogenic Functions and Riesz-Hilbert Transforms"

Abstract— Clifford analysis is a higher dimensional function theory that generalizes the function theory of one complex variable and a refinement of harmonic analysis. It involves the study of monogeic functions.   A monogenic function is the solution if the equation

$$Du = \sum_{i=1}^{n}\sum_{k=1}^{n}\frac{\partial u_k}{\partial x_i}\ e_i e_k\ = 0$$

where $D = \sum_{i=1}^{n}\frac{\partial}{\partial x_i}e_i$ denotes the so-called Dirac operator and $u = \sum_{k=1}^{n}u_k e_k$ is a Clifford-valued (vector) function.

The classical Dirac operator D in $\mathbb{R}^n$ decomposes as $D = |D|\mathcal{H} = \mathcal{F}^{-1}(|\omega|\frac{-i\omega}{|\omega|})$, , where

$\mathcal{H} = \mathcal{F}^{-1}(\frac{-i\omega}{|\omega|})$ is the Riesz-Hilbert transform and $\mathcal{F}^{-1}$ the inverse Fourier transform.

The Hilbert-Riesz transform is a singular integral operator, i.e. a Fourier multiplier in $L^p, 1 < p < \infty$, and its Fourier transform is a homogeneous polynomial of degree zero.

We consider a generalized Riesz-Hilbert transforms and quasi-monogenic functions related to a generalized Dirac operator D_m defined in Fourier domain by $\mathcal{F}(D_m) = |\omega| \sum_{i=1}^{n} m_i(\omega)$.

The generalized Riesz transforms build the generalized Riesz-Hilbert transform

$$\mathcal{H} = \sum_{j=1}^{n} R_j e_j, \text{ where } R_j f = \mathcal{F}^{-1}\left(m_j(\omega)\hat{f}(\omega)\right)$$

We prove that all R_j are Fourier multipliers and singular integral operators. The main result is concerned with boundary values of quasi-monogenic functions and the space $H^1(\mathbb{R}^n)$. We will prove that the several sets

span the space $H^1(\mathbb{R}^n)$.

Keynote Speaker V

Prof. Wiro Niessen
Delft University of Technology, The Netherlands

Wiro Niessen is full professor in Biomedical Image Analysis at Erasmus MC, Rotterdam where he leads the Biomedical Imaging Group Rotterdam (www.bigr.nl) and at Delft University of Technology. His interest is in the development, validation and implementation of quantitative image analysis methods in clinical practice and biomedical research, in linking imaging and genetics data, radio(geno)mics, and image guided interventions. Focus areas are improved diagnosis and prognosis of neurodegenerative and cardiovascular disease, and treatment guidance in oncology, by developing and using advanced medical image analysis and machine learning methods. He has published over 250 journal articles in these areas. He is member of the Netherlands Royal Academy of Arts & Sciences, fellow and president of the Medical Image Computing and Computer Assisted Interventions Society (MICCAI), director of the Biomedical Image Analysis Platform of the European Institute of Biomedical Imaging Research (EIBIR), and member of the International Society of Strategic Studies in Radiology (IS3R). In 2012 he founded the spin-off company Quantib, which develops methods to automatically extract relevant information from medical imaging data, and he is currently Chief Scientific Officer of Quantib.

Topic: "Biomedical Imaging and Genetic (BIG) Data Analytics in Dementia and Oncology"

Abstract— The large scale analysis of biomedical, genetic, clinical and -omics data are dramatically increasing the possibilities for prevention, cure and care, and changing the landscape of the healthcare system. In this presentation I will show examples of possible large benefits of large scale analysis of imaging and genetic data in dementia and oncology.
With the ageing society, there is an urgent need to develop new preventive and therapeutic strategies for common age-related diseases, such as Alzheimer's disease, the most common form of dementia, and cancer. In Alzheimer's disease, neuroimaging plays an increasingly important role, as it helps in understanding disease etiology and diagnosing different forms of dementia. In this presentation I will show how large scale data analytics in longitudinal population neuroimaging studies, especially when combining imaging with other clinical, biomedical and genetic data, provides a unique angle to study the brain, both in normal ageing and disease. I will also show how it can be the basis of new methods for disease detection,

diagnosis, and prognosis in clinical practice. I will also discuss some of the promises and challenges of using deep learning in the field of image analysis and imaging genetics in dementia. In oncology, I will discuss how radiomics and deep learning techniques can be employed to improve cancer diagnostics and therapy planning.

Keynote Speech VI

Assoc. Prof. Alexander Plakhov
Universidade de Aveiro, Portugal

Alexander Plakhov is Associate Professor at the University of Aveiro, Portugal and Leading Researcher (without pay) at the Institute for Information Transmission Problems, Russia. His research interests focus on dynamical systems, optimization, billiards, optimal mass transport, Newton's problem of minimal resistance, Kakeya problem, and classical geometry. Possible applications of his research include invisibility, retroreflectors, and aerodynamics of highly rarefied media. He got his Ph.D. in 1986 at the Moscow State University and his habilitation at the University of Aveiro. Alexander Plakhov was supervisor of the research projects PTDC/MAT/72840/2006 (2007 – 2010, Portugal) and PTDC/MAT/113470/2009 (2011 – 2013, Portugal) and is now a co-supervisor of the Royal Society International Exchanges Award IE160503 (2016 – 2018, UK). He is a member of the research group Optimization, Graph Theory and Combinatorics at CIDMA (Center for Research & Development in Mathematics and Applications) at the University of Aveiro.

Topic: "New Trends in Newton's Problem of Minimal Resistance"

Abstract—Isaak Newton posed this problem more than 300 years ago in his Mathematical Principles of Natural Philosophy. It is as follows. A body moves in a highly rarefied medium of point particles, and the particles reflect elastically when colliding with the body's surface. It is required to find the shape of the body that minimizes the force of aerodynamic resistance of the medium. Starting from 1993, new interest in mathematical community to Newton's problem has been raised. The problem proved to be highly interdisciplinary, and various aspects of it were studied using methods borrowed from multidimensional variational analysis, theory of billiards, optimal mass transport, Kakeya needle problem, and theory of convex bodies. Interesting connections of the problem with Geometric Optics were found, including retroreflectors, invisibility, and the problem of camouflaging. A review of the state of art in this area will be given.

Invited Speaker
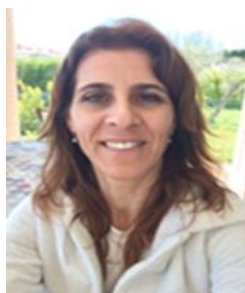
Assist. Prof. Sandra S. Ferreira
University of Beira Interior, Portugal

Sandra S. Ferreira is Assistant Professor at the University of Beira Interior (UE), Portugal. Her publications and current research interests focus on statistical inference for estimable functions and variance components, in linear mixed models with commutative orthogonal block structure (COBS). She completed her Ph.D. in 2006 at the University of Beira Interior, where she teaches courses in basic statistics, quantitative methods, hierarchical linear models and multivariate analysis. She is member of the working group (WG) CMStatistics (this WG focuses on all computational and methodological aspects of statistics) and member of IEOM Society and serves as an editorial board member of several journals.

Topic: "Additive Models and Cumulant Generating Function"

Abstract—In this talk, we first explain why the cumulant generating function is important. The cumulant generating function and the cumulants change in simple, easy to understand ways when their underlying probability density function is changed, and they are easy to define on most spaces. Then, a well-known property of cumulant generating function is used to obtain unbiased estimators for the first four order moments, which allow us to estimate the skewness and kurtosis. In this way we go beyond to the estimation of mean values and variances. As a consequence of this new approach, we no longer require the symmetry of densities as well as kurtosis similar to that of normal distribution in perform inference considering mixed models.

Brief Schedule for Conference

Tips: Please well notice that registration venue and conference venue are different, and arrive at the conference room 10 minutes before the oral session begins to upload PPT into the laptop.

Day 1	**July 15, 2018 (Sunday)**　　10:30~16:00 **Venue: Lobby of HF Tuela Porto Hotel** Participant Onsite Registration & Conference Materials Collection
Day 2	**July 16, 2018 (Monday)**　　9:00~17:45 Participant Onsite Registration, Keynote Speech and Conference Presentation
	Morning Conference **Venue: FC1 0.30, Mathematic Department**
	Opening Remarks 9:00~9:05 (Prof. João Nuno Tavares, University of Porto, Portugal)
	Keynote Speech I　　9:05~9:45 **Topic: "Some Biological Applications of Stochastic Differential Equations"** (Prof. Carlos A. Braumann, University of Évora, Portugal)
	Keynote Speech II　　9:45~10:25 **Topic: "Dialectics Model x Observations in Statistics"** (Prof. João Tiago Praça Nunes Mexia, Universidade Nova de Lisboa, Portugal)
	Coffee Break & Group Photo Taking　　10:25~10:50
	Keynote Speech III　　10:50~11:30 **Topic: "The Role of Telemedicine in the Medical Practice, Special Emphasis on E-Learning and Monitoring the Patient"** (Prof. Bártfai György, University of Szeged, Hungary)
	Keynote Speech IV　　11:30~12:10 **Topic: "Quasi-Monogenic Functions and Riesz-Hilbert Transforms"** (Prof. Swanhild Bernstein, TU Bergakademie Freiberg, Germany)
	Lunch 12:10~13:30 Venue: Clube Restaurant
	Afternoon Conference **Venue: FC1 0.30, Mathematic Department**
	Keynote Speech V　　13:30~14:10 **Topic: "Biomedical Imaging and Genetic (BIG) Data Analytics in Dementia and Oncology"** (Prof. Wiro Niessen, Delft University of Technology, The Netherlands)
	Keynote Speech VI　　14:10~14:50 **Topic: "New Trends in Newton's Problem of Minimal Resistance"** (Assoc. Prof. Alexander Plakhov, Universidade de Aveiro, Portugal)
	Invited Speech　　14:50 ~ 15:10 **Topic: "Additive Models and Cumulant Generating Function"** (Assist. Prof. Sandra S. Ferreira, University of Beira Interior, Portugal
	Coffee Break　　15:10~15:30
	Oral Session　　15:30~17:45 **Topic: "Mathematical Statistics and Data Analysis"**—9 presentations
	Poster Session—4 posters　　9:00~17:45
	Dinner 18:00 Venue: Madureiras Campo Alegre

Detailed Schedule for Conference

July 16, 2018 (Monday)

Venue: FC1 0.30, Mathematic Department

9:00~9:05		**Opening Remarks** Prof. Jo ão Nuno Tavares University of Porto, Portugal
9:05~9:45		**Keynote Speech I** Prof. Carlos A. Braumann University of Évora, Portugal Topic: "Some Biological Applications of Stochastic Differential Equations"
9:45~10:25		**Keynote Speech II** Prof. Jo ão Tiago Pra ça Nunes Mexia Universidade Nova de Lisboa, Portugal Topic: "Dialectics Model x Observations in Statistics"
10:25~10:50	**Coffee Break & Group Photo Taking**	
10:50~11:30		**Keynote Speech III** Prof. B ártfai Gy örgy University of Szeged, Hungary Topic: "The Role of Telemedicine in the Medical Practice, Special Emphasis on E-Learning and Monitoring the Patient"
11:30~12:10		**Keynote Speech IV** Prof. Swanhild Bernstein TU Bergakademie Freiberg, Germany Topic: "Quasi-Monogenic Functions and Riesz-Hilbert Transforms"
12:10~13:30	**Lunch (Venue: Club restaurant)**	
13:30~14:10		**Keynote Speech V** Prof. Wiro Niessen Delft University of Technology, The Netherlands Topic: "Biomedical Imaging and Genetic (BIG) Data Analytics in Dementia and Oncology"

14:10~14:50		**Keynote Speech VI** Assoc. Prof. Alexander Plakhov Universidade de Aveiro, Portugal Topic: "New Trends in Newton's Problem of Minimal Resistance"
14:50~15:10		**Invited Speech** Assist. Prof. Sandra S. Ferreira University of Beira Interior, Portugal Topic: "Additive Models and Cumulant Generating Function"
15:10~15:30	**Coffee Break**	
15:30~17:45	**Oral Session** Topic: "Mathematical Statistics and Data Analysis" 9 presentations	
9:00~17:45	**Poster Session** 4 posters	
18:00	**Dinner(Venue: Madureiras Campo Alegre)**	

Note: (1) The registration can also be done at any time during the conference.

(2) The organizer doesn't provide accommodation, and we suggest you make an early reservation.

(3) One Oral Best Presentation will be selected from each oral presentation, and the Certificate for Best Oral Presentation will be awarded at the dinner banquet on July 16, 2018.

Oral Session

Afternoon, 16 July, 2018 (Monday)

Time: 15:30~17:45

Venue: FC1 0.30, Mathematic Department

9 presentations- Topics: "Mathematical Statistics and Data Analysis"

Session Chair: Assoc. Prof. Estaner Claro Romão

S1002 Presentation 1 (15:30~15:45)

Numerical Simulation by High-Order Explicit Finite Difference Method to Solve the Burgers Equation

Letícia Helena Paulino de Assis and **Estaner Claro Romão**

University of São Paulo, Brazil

Abstract—This paper aims to apply the Explicit Finite Difference Method to solve the Burgers Equation in many orders in time (first, second, third and fourth), changing the order on space twice (second and fourth). Thereby, it was compared the results and it was found the best refinement.

Oral Session

Afternoon, 16 July, 2018 (Monday)

Time: 15:30~17:45

Venue: FC1 0.30, Mathematic Department

9 presentations- Topics: "Mathematical Statistics and Data Analysis"

Session Chair: Assoc. Prof. Estaner Claro Romão

S0001 Presentation 2 (15:45~16:00)

Lognormal Distribution in Health Insurance: Interval Estimation Methods for the Average Cost and Correction of Truncated Values

Marli Amorim Ferreira, Joana Fernandes and Teresa Alpuim

Multicare - Health Insurer, Portugal, Lisbon

Abstract—Among the diseases with high treatment costs, oncologic and cardiovascular diseases are nowadays the main causes of death in Portugal as in many other high income per capita countries. This situation is a challenge for health insurance companies and financial institutions. Although there is currently some affordable health insurance in case of severe diseases, such as cardiovascular disorders or cancer, the available capital is easily depleted. The study of costs associated with many serious diseases shows that very often lognormal distribution fits well to the costs distribution. Therefore, a simulation study was made to compare different interval estimation methods of the average cost of a lognormal distribution. This work compares bootstrap parametric and non-parametric methodologies with Cox and large sample normal based methods and the results were applied to a breast cancer Portuguese dataset. Furthermore, for the lognormal distribution, a correction to the truncated values of costs following capital depletion is proposed, and the impact of this correction illustrated via its application to a heart failure dataset.

Oral Session

Afternoon, 16 July, 2018 (Monday)

Time: 15:30~17:45

Venue: FC1 0.30, Mathematic Department

9 presentations- Topics: "Mathematical Statistics and Data Analysis"

Session Chair: Assoc. Prof. Estaner Claro Romão

S1006 Presentation 3 (16:00~16:15)

Combining Models

Carla Santos, Célia Nunes, Cristina Dias and João Tiago Mexia

New University of Lisbon, Portugal

Abstract—In this work we study a special class of linear mixed models - models with orthogonal block structure. Imposing a commutativity condition on them, we get a new class of mixed models, called models with commutative orthogonal block structure, COBS. This commutativity condition of COBS is a necessary and sufficient condition for the least square estimators, LSE, to be best linear unbiased estimators, BLUE, whatever the variance components.
We present a review of three techniques that enable us to analyze complex models, designed from simpler ones, emphasizing the conditions of applicability of each of them, their limitations and advantages. The techniques, that consist in models crossing, models nesting and models joining, rests on the algebraic structure of the models and binary operations on commutative Jordan Algebras of symmetric matrices. Since crossing, nesting or joining COBS we obtain new COBS, the good properties of estimators hold for the resulting models.

Oral Session

Afternoon, 16 July, 2018 (Monday)

Time: 15:30~17:45

Venue: FC1 0.30, Mathematic Department

9 presentations- Topics: "Mathematical Statistics and Data Analysis"

Session Chair: Assoc. Prof. Estaner Claro Romão

S2009 Presentation 4 (16:15~16:30)

Degree-one Models and Cross Product Matrices

Cristina Dias, Carla Santos and João T. Mexia

New University of Lisbon, Portugal

Abstract—Degree-one models can be applied to cross products matrices and Hilbert-Schmidt scalar products matrices. The latter have an important role in the first stage (inter-structure) of STATIS methodology, while the former matrices (in particular the $\mathbf{AA}^t$ and $\mathbf{A}^t\mathbf{A}$ crossproducts, which have the same non-null eigenvalues) have an important role in inference.

The case of rank one is interesting since the first eigenvector of matrix $\mathbf{XX^t}$ may be used to describe the behavior of the variables corresponding to the columns of $\mathbf{X}$. We now consider the estimators of the pair (λ, α) and testing that the mean matrix as rank one. We apply our results to cross product matrices $\mathbf{XX}^t$, given an numerical example.

Oral Session

Afternoon, 16 July, 2018 (Monday)

Time: 15:30~17:45

Venue: FC1 0.30, Mathematic Department

9 presentations- Topics: "Mathematical Statistics and Data Analysis"

Session Chair: Assoc. Prof. Estaner Claro Romão

S3010 Presentation 5 (16:30~16:45)

Inference for the Evolution in Series of Studies

Aníbal Areia, João Mexia and Manuela Oliveira

Polytechnic Institute of Setúbal Setúbal, Portugal

Abstract—Studies will be matrix triplets (X,D_p,D_n), where the matrix X has a row per object and a column per variable, while D_p and D_n are weight matrices for objects and variables, respectively.

Given a series of studies (X$_i$,D_p,D_n),*i=1,…,k,* we condense the matrix triplets into the $A_i = X_i D_p X_i^T D_n$, and use spectral analysis of matrix $S = [S_{ij}], i,j = 1, …, k,$ with

$S_{ij} = tr(A_i A_j^T)$ to study the series evolution.

When we have a series of studies for each treatment of a basis design we carry out an ANOVA-like inference to study the action of the factors in the base design on the evolution of the series associated to the differents treatments.

Oral Session

Afternoon, 16 July, 2018 (Monday)

Time: 15:30~17:45

Venue: FC1 0.30, Mathematic Department

9 presentations- Topics: "Mathematical Statistics and Data Analysis"

Session Chair: Assoc. Prof. Estaner Claro Romão

S3011 Presentation 6 (16:45~17:00)

Nonparametric Classification of Satellite Images

Romans Dinuls and Ints Mednieks

Institute of Electronics and Computer Science, Riga, Latvia

Abstract—The task of classifying the objects on a satellite image into predefined categories is the topic of the article. The problems arising while designing a practicable classifier are discussed. The general conditions for robustness of a classifier are provided. To solve the problems mentioned, a robust classification approach is proposed aiming at completely nonparametric unsupervised clustering with consequent association of the clusters with target categories using multiple sources of the testing and training data. The nonparametric clustering used is primarily based on ranking and grouping. Completely nonparametric cluster union and cleaning procedures are presented; theoretical basics for other parts of the approach are provided. The software implementation and complexity of the methodology are discussed. The approach aims at getting the highest possible classification accuracy under real conditions for images with more than 100 million pixels.

Oral Session

Afternoon, 16 July, 2018 (Monday)

Time: 15:30~17:45

Venue: FC1 0.30, Mathematic Department

9 presentations- Topics: "Mathematical Statistics and Data Analysis"

Session Chair: Assoc. Prof. Estaner Claro Romão

S0022 Presentation 7 (17:00~17:15)

Exponential Autoregressive Conditional Duration Approach to Testing VaR

Marta Małecka

University of Łódź, Poland

Abstract—As laid out by the current Basel III accord and the Basel IV agreements, financial risk model evaluation remains based on the VaR measure. However, existing VaR backtesting methods are repeatedly criticized due to unsatisfactory power properties. Our contribution to the debate is the exploration of the properties of the exponential autoregressive conditional duration (EACD) model in the context of backtesting VaR. We show that the EACD test, although exhibiting strong power, suffers from size distortions when the true parameter is near or at the boundary of the parameter space. To remedy this problem we suggest asymptotic p-value computation with the use of the mixture of the chi square distributions. We obtain a procedure that is both accurate and computationally effective. We show that it has the potential to improve effectiveness of detecting incorrect risk models.

Oral Session

Afternoon, 16 July, 2018 (Monday)

Time: 15:30~17:45

Venue: FC1 0.30, Mathematic Department

9 presentations- Topics: "Mathematical Statistics and Data Analysis"

Session Chair: Assoc. Prof. Estaner Claro Romão

P0014 Presentation 8 (17:15~17:30)

Enhanced Disparity Depth Recognition for improved Object Reconstruction by Stereovision

Antony Mansi and **Walid Hussein**

The British University in Egypt, Egypt

Abstract—whenever there is photogrammetry or computer vision, image processing techniques take place; since both of sciences depend on extract information from an image. Moreover, it is essential to apply these image processing techniques to obtain the depth information of the scene objects and then construct their 3D view. Researchers have been working in the stereovision technique to reconstruct a 3D object with different approaches, some were for specific applications, and others were improvements in the method itself.
In this paper, an enhanced stereo imaging technique is proposed to increase the accuracy in the 3D object construction. Starting from the image acquisition to the rectification process, then passing through stereo matcher between the two stereo images to produce a robust disparity map which is put into a refinement process for improvements. Finally, the depth view is constructed with a superior accuracy in comparison to the commonly applied stereo imaging approaches.

Oral Session

Afternoon, 16 July, 2018 (Monday)

Time: 15:30~17:45

Venue: FC1 0.30, Mathematic Department

9 presentations- Topics: "Mathematical Statistics and Data Analysis"

Session Chair: Assoc. Prof. Estaner Claro Romão

S2008 Presentation 9 (17:30~17:45)

GQL versus CML Estimation in BINAR (1) Process with Poisson Innovations

Vandna Jowaheer, Yuvraj Sunecher and Naushad Mamode Khan

University of Mauritius, Reduit, Mauritius

Abstract—This paper introduces a Generalized Quasi-Likelihood (GQL) method to estimate the parameters of the first-order bivariate integer-valued autoregressive (BINAR (1)) model with Poisson innovations. The performance of this novel estimation approach is tested using simulated data with different level of correlation. The results demonstrate that GQL yields consistent estimates with fewer non-convergent simulations and asymptotically equally efficient as Conditional Maximum Likelihood Estimation (CMLE). The model is applied to analyze a real-life series of day and night accidents in Mauritius from the period January 2010 to October 2016.

Poster Session

July 16, 2018 (Monday)

Time: 9:00~17:45

Venue: FC1 0.30, Mathematic Department

S1001 Poster 1
Maximum Domain of Attraction of the Conditional Exponential-Weibull Distribution

Xiumin Li, Cunman Wang and Xia Cai

Hebei University of Science and Technology, China

Abstract—In this paper, the maximum domain of attraction of the three-parameter conditional Exponential-Weibull distribution is studied. The conditional Exponential-Weibul distribution is confirmed and proven to belong to the maximum domain of attraction of the Gumbel distribution, and the expressions of the corresponding normalizing constants are derived. Numerical simulations are conducted to investigate the performance of the proposed normalizing constants.

Poster Session

July 16, 2018 (Monday)

Time: 9:00~17:45

Venue: FC1 0.30, Mathematic Department

S0009 Poster 2
Estimation of Three-Parameter Weibull Distribution Based on Artificial Fish-Swarm Algorithm

Xiangpo Zhang

Army Engineering University of PLA, China

Abstract—Three-parameter Weibull distribution (TPWD) plays an important role and is widely used in failure distribution modeling in reliability studies, which makes the estimation of its parameters very important and a hot study topic. In this paper, a new method of TPWD parameters estimation is proposed by integrating the artificial fish-swarm algorithm (AFSA) with the maximum likelihood estimation (MLE) method. In contrast to the existing methods, where the maximum log-likelihood value is obtained by solving the maximum likelihood equations set, the log-likelihood maximization is achieved directly using AFSA in the proposed method. And then the parameters of TPWD can be obtained according to the maximum likelihood value. The case study shows that the new method proposed in this paper is easy to be processed and has a good precision. It provides a new and highly efficient way to estimate the parameters of TPWD, and therefore provides a new way to evaluate the reliability and life distribution of products whose life distributions are considered as typical TPWD.

Poster Session

July 16, 2018 (Monday)

Time: 9:00~17:45

Venue: FC1 0.30, Mathematic Department

S0010 Poster 3
An Easily Engineering–Based Multi-Dimensional Archimedean Copula Construction Method

Xiangpo Zhang

Army Engineering University of PLA, China

Abstract—Copula theory and method have been wildly used in the dependence research in many fields. To meet the demand of multi-dimensional copula construction, an easily engineering –based multi-dimensional Archimedean copula construction method has been proposed in this paper. Specific construction procedures, proof and construction examples are given. From these, the method proposed takes the advantages of NEA method and PCC method and could describe the relevancy relationship among the different dependent structures. Besides, it is simple and easy to use in the engineering applications where copula methods are used.

Poster Session

July 16, 2018 (Monday)

Time: 9:00~17:45

**Venue: FC1 0.30, Mathematic Department**

S0023 Poster 4

Multiple Regression Design for a Full Factorial Base Model Associated with a Commutative Jordan Algebra

Sandra Oliveira, Elsa Moreira, Miguel Fonseca and Jo ão T.Mexia

Universidade Nova de Lisboa, Portugal

Abstract—If for each treatment of a base model we consider a multiple linear regression on the same variables (dependent and independent) a multiple regression design (*MRD*) is obtained. If the number of observations per regression is equal, the *MRD* is balanced, otherwise it is unbalanced. The purpose of this work is to show that is possible to extend the study of the full factorial design of fixed effects and the *MRD* associated to these designs to the unbalanced cases, combining the linear model associated with a commutative Jordan algebra (*CJA)* and the **L**-Model theory. The structure of the factorial design used in this work is based on linear spaces on *Galois* fields as well as on the relationship between a linear model and a *CJA*.
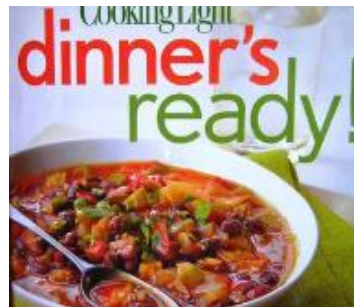
Dinner	
18:00	**Madureiras Campo Alegre**

One Day Tour

9:00~17:00 July 17, 2018 (Tuesday)

Final destinations and schedule will be fixed on site based on the real situation!

Conference Venue

Registration Venue (July 15)

Lobby of HF Tuela Porto Hotel

Addr.: Rua Arquiecto Marques da Silva, 200, 4150-483 Porto

Phone :(+351) 226 004 747

Website: https://www.hfhotels.com/hoteis/hf-tuela-porto-pt

Map:

Conference Venue (July 16)

Mathematic Department, Faculty of Science in University of Porto

Addr.: Departamento de Matemática Faculdade de Ciencias da Universidade do

Porto Rua do Campo Alegre, 687 4169-007 Porto

Maps:

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