

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Graph Decomposition

Speaker : Prof. Dr. Carsten Thomassen *
Department of Mathematics
Technical University of Denmark, Denmark

Date : 19 January 2011 (Wednesday)

Time : 3.00pm – 4.00pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

János Barát and I made the following conjecture: For every tree T , there is a natural number k_T such that every k_T -edge-connected graph of size divisible by $|E(T)|$ has an edge-decomposition into subgraphs each isomorphic to T . The conjecture is trivial when T has at most two edges. When we made the conjecture we could not prove it for one single tree with three or more edges. However, we showed that the conjecture holds for the claw (the star with three edges) provided Tutte's 3-flow conjecture is true. In fact, when restricted to the claw, our conjecture is equivalent to the weakening of Tutte's 3-flow conjecture, suggested by Jaeger, that every graph of sufficiently high (but fixed) edge-connectivity has an orientation such that each vertex has the same indegree and outdegree when these numbers are reduced modulo 3.

A few years ago, I verified the conjecture for the path with four vertices, and later for the path with three edges. I have now verified the conjecture for an infinite family of trees.

* **Research Group** : Discrete Mathematics

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : The automorphism group of separable states in quantum Information theory.

Speaker : Associate Professor Dr Yiu Tung Poon *

Department of Mathematics
Iowa State University
U.S. A.

Date : 17 January 2011 (Monday)

Time : 10:00 am – 11:00 am

Venue : MM3, INSTITUTE OF MATHEMATICAL SCIENCES

Abstract

We show that the linear group of automorphism of Hermitian matrices which preserves the separable states is generated by natural automorphisms: change of an orthonormal basis in each tensor factor, partial transpose in each tensor factor, and interchanging two tensor factors of the same dimension.

* **Research Group** : Algebraic & Analytic Methods in Mathematical Sciences

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : **The On the approximate frequentist validity of the posterior quantiles of a parametric function: results based on empirical and related likelihoods.**

Speaker : **Professor Rahul Mukerjee ***
(joint work with Hong Chang)
Indian Institute of Management Calcutta
Joka, Diamond Harbour Road, Kolkata, India

Date : **17 January 2011 (Monday)**

Time : 3:00 pm – 4:00 pm

Venue : **MM3, INSTITUTE OF MATHEMATICAL SCIENCES**

Abstract

With reference to a wide class of empirical and related likelihoods, we study priors which ensure approximate frequentist validity of the posterior quantiles of a general parametric function. It is seen that no data-free prior entails such frequentist validity but, at least for the usual empirical likelihood, a data-dependent prior serves the purpose. Accounting for the nonlinearity of the parametric function of interest requires special attention in the derivation. A simulation study is seen to provide support, in finite samples, to our asymptotic results.

* **Research Group** : Statistical Modeling and Computing

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : **The Optimal fractional factorials under baseline parameterization.**

Speaker : **Professor Rahul Mukerjee ***
(Joint work with Boxin Tang)

 Indian Institute of Management Calcutta
 Joka, Diamond Harbour Road, Kolkata, India

Date : **19 January 2011 (Wednesday)**

Time : 10:00 am – 11:00 am

Venue : **MM3, INSTITUTE OF MATHEMATICAL SCIENCES**

Abstract

We consider a baseline parameterization for factorial designs and observe that this can arise in many practical situations. Isomorphism under this parameterization differs from that under the more common orthogonal parameterization. Taking due care of this difference, we obtain optimal two-level fractional factorials under a minimum aberration type criterion.

* **Research Group** : Statistical Modeling and Computing

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : How to find a second Hamilton circuit?
Speaker : Professor Tommy R. Jensen *
Department of Mathematics
Kyungpook National University, Korea
Date : 21 January 2011 (Friday)
Time : 3 pm – 4 pm
Venue : MM3, INSTITUTE OF MATHEMATICAL SCIENCES

Abstract

It is a trivial decision problem to ask for the existence of a Hamilton circuit different from a given Hamilton circuit in a cubic graph. Indeed such a second Hamilton circuit always exists, as it was first shown by C.A.B. Smith in the 1940's. And yet the time complexity of searching for a second Hamilton circuit is an unsolved problem. This talk will consider three different algorithms, each of which solves this search problem. It turns out that for two of the algorithms, running both of them in parallel requires exponential running time in the worst case. Surprisingly for the third algorithm, it seems unknown whether its running time is linear as a function of the size of the input graph, perhaps with a small constant.

* **Research Group** : Discrete Mathematics

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Surjections on Grassmannians preserving pairs of elements with bounded distance

Speaker : Professor Ming-Huat Lim *
Institute of Mathematical Sciences
University of Malaya

Date : 26 January 2011 (Wednesday)

Time : 3 pm – 4 pm

Venue : MM3, INSTITUTE OF MATHEMATICAL SCIENCES

Abstract

Let m and k be fixed integers such that $m > k \geq 2$. Let V be a left vector space over a division ring with dimension at least $m + k + 1$. Let $G_m(V)$ be the Grassmannian consisting of all m -dimensional subspaces of V . We characterize surjective mappings T from $G_m(V)$ onto itself such that for any A, B in $G_m(V)$, $d(A, B) \leq k$ if and only if $d(T(A), T(B)) \leq k$ for any A, B in $G_m(V)$, where $d(A, B) := m - \dim(A \cap B)$. This characterization theorem generalizes a result in [A.Blunck, H.Havlicek, On bijections that preserve complementarity of subspaces, Discrete Math. 301 (2005) 46-56].

* **Research Group** : Algebraic & Analytic Methods in Mathematical Sciences

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : **Successfully publishing research articles in international journal**

Speaker : **Professor Shahjahan Khan ***
Department of Mathematics and Computing
Australian Centre for Sustainable Catchments
University of Southern Queensland, Australia

Date : **25 January 2011 (Tuesday)**

Time : 3 pm – 4 pm

Venue : **MM3, INSTITUTE OF MATHEMATICAL SCIENCES**

Abstract

Every research active academic requires publishing research outputs in good quality international journals. Often publishing in peer reviewed high impact journals require much more than valuable new results. Good writing and presentation skills and approaching to appropriate journal are often keys to success. This talk covers various issues related to selecting problems, preparing articles and tips to publishing in top rated international journals.

* **Research Group** : Applied Statistical Forecasting

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : **Increasing power of robust test through pre-testing in multivariate simple regression model**

Speaker : **Professor Shahjahan Khan ***
Department of Mathematics and Computing
Australian Centre for Sustainable Catchments
University of Southern Queensland, Australia

(with **Dr. Rossita M. Yunus**
Institute of Mathematical Sciences, University of Malaya)

Date : **31 January 2011 (Monday)**

Time : 3 pm – 4 pm

Venue : **MM3, INSTITUTE OF MATHEMATICAL SCIENCES**

Abstract

Robust procedures for testing the intercept vector of a multivariate simple regression model when it is a priori suspected that the slope vector have specified values are developed in this paper. Three robust tests, namely unrestricted test (UT), restricted test (RT) and pre-test test (PTT) based on M-estimation methodology are formulated. The asymptotic power functions of the tests are derived. Analytical and graphical comparisons of the performance (asymptotic size and power) of the tests are studied. A reasonable dominance of the PTT over the others is observed.

* **Research Group** : Applied Statistical Forecasting

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Introduction to group-based cryptography
Speaker : Professor Wong Peng Choon *
Institute of Mathematical Sciences
University of Malaya
Date : 9 February 2011 (Wednesday)
Time : 3 pm – 4 pm
Venue : MM3, INSTITUTE OF MATHEMATICAL SCIENCES

Abstract

This talk aims to introduce the “new” research area of group-based cryptography. The protocols, currently in used since the 1970's, in public-key cryptography such as RSA, depends on finite commutative groups. But with the advent of quantum computers in the future, there is the possibility that these cryptosystems can be broken by “brute force” analysis. Non commutative groups were introduced into public-key cryptography by Wagner and Magyarik [2] in 1985 but serious research work only started in 1999 due to the seminal paper by Anshel, Anshel and Goldfeld [1]. Since then there have been active research in this area and in this talk we will give a survey of the main results focusing on various algorithmic problems in combinatorial group theory and their complexity. No prior knowledge of public-key cryptography is assumed.

References

- [1] Anshel, I., Anshel, M. and Goldfeld, D., An algebraic method for public-key cryptography, *Math. Res. Lett.* **6**, (1999), 287–291.
- [2] Wagner, N.R., Magyarik, M.R., A Public Key Cryptosystem Based on the Word Problem. *Advances in Cryptology: Proceedings of CRYPTO 84, Lecture Notes in Computer Science* **196**, Springer, (1985), 19–36.

* **Research Group** : Mathematical Cryptography

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

- Title :** A multivariate generalization of the Möbius distribution on the disc
- Speaker :** Professor Kunio Shimizu
Department of Mathematics, Keio University
- Date :** 23 March 2011 (Wednesday)
- Time :** 3pm – 4pm
- Venue :** MM3, Institute of Mathematical Sciences

Abstract

We consider distributions with support in the interior of the interval $(-1, 1)$, circle, sphere or, more generally, hyper-sphere with unit radius and centre at the origin. In the 1-dimensional case, Seshadri (1991) applied a real univariate Möbius transformation to the symmetric beta distribution to get a beta-type distribution. The resulting distribution is a member of the generalized beta distribution. The Möbius distribution on the disc was proposed by Jones (2004), in which the inverse Möbius transformation from disc to itself was used. Uesu and Shimizu (2010) considered a multivariate generalization of univariate and bivariate work to the case of p -dimensional hyper-disc using a conformal mapping from hyper-disc to itself. The resulting distribution reduces to Seshadri's distribution if $p = 1$ and Jones' distribution if $p = 2$.

The conditional distribution of direction cosine given the length for the proposed distribution is the t -distribution on the sphere defined by Shimizu and Iida (2002). The marginal distribution of the length includes a special case of McDonald's generalized beta distribution of the first kind and a special case of Kumaraswamy's double-bounded distribution.

References

- [1] Jones, M.C. (2004). The Möbius distribution on the disc, *Annals of The Institute of Statistical Mathematics*, 56(4), 733-742.
- [2] Seshadri, V. (1991). A family of distributions related to the McCullagh family, *Statistics & Probability Letters*, 12, 373-378.
- [3] Shimizu, K. and Iida, K. (2002). Pearson type VII distributions on spheres, *Communications in Statistics-Theory and Methods*, 31, 513-526.
- [4] Uesu, K. and Shimizu, K. (2010). A family of skew distributions on the unit disc of arbitrary dimension, *The 1st Conference on Applied Probability and Statistical Methods; The 7th Conference on Multivariate Distributions with Applications*, Maresias, August 8-13, 2010, Brazil.

* **Research Group** : Statistical Modeling and Computing

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Cohen-Macaulay Edge Ideals

Speaker : Professor Siamak Yassemi *
Department of Mathematics, University of Tehran, Iran

Date : 16 March 2011 (Wednesday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

Let G be a finite simple graph on n vertices $V(G) = \{x_1, \dots, x_n\}$. One can then associate to G a quadratic square-free monomial ideal $I(G)$ in $R = k[x_1, \dots, x_n]$ by setting $I(G) = (x_i x_j \mid \{x_i, x_j\} \in E(G))$, where $E(G)$ is the edge set of G . A graph G is said to be *Cohen-Macaulay*, if the ring $k[x_1, \dots, x_n]/I(G)$ is a Cohen-Macaulay ring. A recent theme in commutative algebra is to understand how the properties of G appear within the properties of $R/I(G)$, and vice versa. One particular stream of research has focused on the question of what graphs G have the property that $R/I(G)$ is Cohen-Macaulay. In this talk we present a survey on some research on combinatorial commutative algebra. Some questions and further directions of research will be presented.

* **Research Group** : Algebraic & Analytic Methods in Mathematical Sciences

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Unit graphs associated with ring
Speaker : Professor Siamak Yassemi *
Department of Mathematics, University of Tehran, Iran
Date : 30 March 2011 (Wednesday)
Time : 3pm – 4pm
Venue : MM3, Institute of Mathematical Sciences

Abstract

Let R be a ring with nonzero identity. The *unit graph* of R , denoted by $G(R)$, has its set of vertices equal to the set of all elements of R ; distinct vertices x and y are *adjacent* if and only if $x + y$ is a unit of R . In this paper the basic properties of $G(R)$ are investigated and some characterization results regarding connectedness, chromatic index, diameter, girth and planarity of $G(R)$ are given.

* **Research Group** : Algebraic & Analytic Methods in Mathematical Sciences

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : On the Fourier series of distributions

Speaker : Professor Dr. Abdumalik Rakhimov *
Institute for Mathematical Research, Universiti Putra Malaysia

Date : 1 April 2011 (Friday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

In present talk, we consider problems of distribution's expansions in different topologies. One can consider expansions of singular distribution in classical sense in the domains where it coincides with locally integrable functions. If it coincides with very smooth function, then singularity of the distribution at the points outside of this domain effects on its Fourier coefficient very significantly.

Simple example is the Dirac delta function. It is well known that its partial sums is Dirichlet kernel and it is well known from classical analysis that a partial sums of Fourier series of delta function diverges at some point where it is equal zero. But according Fejer's theorem arithmetic means of this series converges at this point due regularizations.

In multidimensional case, the situation is more complicated. In present talk we consider sharp conditions for regularizations of partial sums of multiple Fourier series of distributions.

* **Research Group** : Algebraic & Analytic Methods in Mathematical Sciences

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : A distribution arising from a random walk on the plane

Speaker : Ms Sim Shin Zhu *
PhD Candidate, Institute of Mathematical Sciences,
University of Malaya

Date : 20 April 2011 (Wednesday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

A new distribution to model under, equi and over dispersion in count data is proposed. Some properties, test of hypothesis for equi-dispersion, simulation study of power, parameter estimation by maximum likelihood and a squared distance method based on the probability generating function are considered.

The proposed distribution is compared with existing distributions like the COM-Poisson and generalized Poisson for modelling dispersion. In addition, two new bivariate distributions are derived from proposed distribution as the alternative bivariate discrete distributions by applying the convolution of two bivariate distributions and the classical trivariate reduction method.

It is found that the new bivariate distributions permit more flexibility in modelling and less limitation on the correlation between the two random variables. The characteristic and the estimation of the parameters of the new bivariate distributions are provided. Furthermore, the statistical inference for the COM-Poisson distribution and computational issues are studied. Test for equi-dispersion, study of statistical power and parameter estimation by maximum likelihood are developed. Besides that, a probability generating function-based divergence statistic for parameter estimation is considered.

The performance and robustness of the proposed statistic in parameter estimation is studied for the negative binomial distribution by Monte Carlo simulation, especially in comparison with maximum likelihood and minimum Hellinger distance estimation.

* **Research Group** : Statistical Modeling and Computing

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Grinberg's Criterion Applied to Some Non-Planar Graphs *

Speaker : Prof. Dr. Chia Gek Ling **
Institute of Mathematical Sciences, University of Malaya
(with Carsten Thomassen, Department of Mathematics, Technical
University of Denmark, Denmark)

Date : 27 April 2011 (Wednesday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

Robertson (1968) and independently, Bondy (1972) proved that the generalized Petersen graph $P(n, 2)$ is non-hamiltonian if $n \equiv 5(\text{mod } 6)$, while Thomason (1982) proved that it has precisely 3 hamiltonian cycles if $n \equiv 3(\text{mod } 6)$. The Hamiltonian cycles in the remaining generalized Petersen graphs were enumerated by Schewenk (1989). In this note we give a short unified proof of these results using Grinberg's theorem.

* This seminar is given as a partial fulfillment for receiving financial support from the University of Malaya to present the talk given at the China-Japan Joint Conference on Computational Geometry, Graph and Applications (CGGA2010, 3-6 Nov. 2010), Dalian, PR China.

** **Research Group** : Discrete Mathematics

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : On Finite Arithmetic Groups

Speaker : Dr. Dmitry Malinin *
Department of Mathematics, Universiti Teknologi Malaysia

Date : 26 April 2011 (Tuesday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

Let K/F be a Galois extension of finite degree of the field of rationals \mathbf{Q} , let O_K and O_F be the maximal orders of K and F , and let Γ be the Galois group of K/F . We study the realization fields $K = F(G)$ obtained via adjoining to F all matrix coefficients of all matrices $g \in G$ for some finite subgroup $G \subset GL_n(K)$.

The following theorem was proven using the results for finite flat group schemes over \mathbf{Z} , the ring of rational integers, annihilated by a prime p , by V. A. Abrashkin and J.- M. Fontaine:

Theorem. Let K / \mathbf{Q} be a normal extension with Galois group $\Gamma = \text{Gal}(K/\mathbf{Q})$, and let $G \subset GL_n(O_K)$ be a finite Γ -stable subgroup. Then $G \subset GL_n(O_{K_{ab}})$ where K_{ab} is the maximal abelian over \mathbf{Q} subfield of K . Moreover, $\mathbf{Q}(G) = \mathbf{Q}(\zeta_t)$ for some root ζ_t of 1.

Similar results for totally real extensions and CM-fields K/\mathbf{Q} are interesting for classification problems of quadratic and Hermitian lattices, and also for Galois cohomology.

For instance, the theorem above implies that for definite arithmetic groups $G \subset GL_n(O_K)$ the kernel of the natural cohomology map $H^1(\text{Gal}(K/\mathbf{Q}), G) \rightarrow \prod_v H^1(\text{Gal}(K_v/\mathbf{Q}_v), G_v)$ is trivial.

* **Research Group** : Mathematical Cryptography

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Point Processes with Spatially Dependent Marks: A Case Study in Fingerprint Analysis

Speaker : Prof. Sarat Dass *
Department of Statistics and Probability,
Michigan State University East Lansing, MI

Date : 20 May 2011 (Friday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

Fingerprint individuality refers to the extent of uniqueness of fingerprints and is mainly governed by the distribution of fingerprint features, termed minutiae, in a population. Observed minutiae, consisting of their location and orientation information, can be thought to be realizations from a marked point process with two important characteristics: (1) the point pattern distribution is able to represent clustering tendencies in the spatial domain, and (2) the marks are able to exhibit strong correlation depending on the spatial closeness of the associated points. The reliability of a measure of fingerprint individuality depends on how well elicited statistical models capture the two minutiae characteristics. This paper develops a class of flexible models and the associated methodology for the analysis of such processes. Inference is carried out in a Bayesian MCMC framework, where a dimension-changing Reversible Jump step is incorporated to update the number of clusters of the spatial point pattern. The proposed class of models is fitted to fingerprint images in the NIST Special Database 4 to demonstrate the flexibility of fit to different kinds of fingerprint feature patterns. Evidence of a Paired Impostor Correspondence (EPIC) is developed as a measure of fingerprint individuality and its value is obtained using a simulation procedure based on the fitted marked point process models.

* **Research Group** : Statistical Modeling and Computing

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : On Harmonic Mappings

Speaker : Prof. S. Ponnusamy *
Indian Institute of Technology Madras, India
Currently a Visiting Professor at Universiti Sains Malaysia

Date : 24 May 2011 (Tuesday)

Time : 11.00am – 12.00noon

Venue : MM3, INSTITUTE OF MATHEMATICAL SCIENCES

* **Research Group** : Algebraic & Analytic Methods in Mathematical Sciences

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Uniformly Convex and Uniformly Starlike Functions

Speaker : Prof. V. Ravichandran *
University of Delhi, India
Currently a Visiting Professor at Universiti Sains Malaysia

Date : 25 May 2011 (Wednesday)

Time : 2.30pm – 3.30pm

Venue : MM3, INSTITUTE OF MATHEMATICAL SCIENCES

Abstract

A normalized univalent function is uniformly convex if it maps every circular arc in the open unit disk with center also in it to a convex curve. In this talk, we survey some of the recent results about the class of uniformly convex functions and an analogous class of uniformly starlike functions.

* **Research Group** : Algebraic & Analytic Methods in Mathematical Sciences

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Probability models for dependent variables with applications to reliability and financial data

Speaker : Prof. Ashis SenGupta *
Applied Statistics Unit, Indian Statistical Institute-Kolkata, India

Date : 23 June 2011 (Thursday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

Construction of probability models for dependent data under constraints are enhanced in this work. There abound many probability models for positively correlated / dependent random variables. Unfortunately, still there is a paucity of such models for negatively correlated / dependent random variables, in spite of many important emerging real-life problems involving such data. In the first problem, probability models for negatively correlated data are obtained for the cases where both the variables are positive as also where one is positive and the other has support on the entire real line. The E-M algorithm is presented for obtaining the estimates of the parameters of the models. Applications of these models to Stress-Strength or Accelerated Life Testing (ALT) problems are illustrated. We next consider the situation where the underlying variables have infinite variances and their probability density functions are not available, e.g. as for stable and Linnik random variables. We show how dependency between such variables can be modeled as well as joint probability density function of an equivalent bivariate random variable may be obtained by relating their characteristic functions to distributions on the torus and represent it in terms of double Fourier series. Applications of such distributions to modeling data on several real-life problems, including high volatility real-life financial data, are demonstrated.

* **Research Group :** Statistical Modeling and Computing

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Emerging statistical techniques in bioinformatics: paradigms, novel uses and misuses

Speaker : Prof. Ashis SenGupta *
Applied Statistics Unit, Indian Statistical Institute-Kolkata, India

Date : 24 June 2011 (Friday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

Recent methodological advances in gene discovery and mapping have resulted in data sets which are not only prohibitively large in size but also exhibit characteristics which cannot be analyzed using standard statistical approaches. The problems of small sample size with a large number of possibly dependant variables as in microarray data analysis, comparison of phase differences in gene expression levels over several tissues, determination of dependency between peak times of biological events, classification of cancer patients according to the stages of cancer using circadian data, are just to mention a few. On one hand novel statistical methods including those involving circular or directional data have emerged to deal with some of these problems. On the other hand, it is alarming that severe misuse of statistical techniques are also being made vitiating and misleading researchers with wrongly inferred results. This talk will present a panoramic view, with some solutions, of this challenging scenario of modern research in Bioinformatics.

* **Research Group** : Statistical Modeling and Computing

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Gaps between Observations –What can one learn from them?
Speaker : Professor Dr. S. Rao Jammalamadaka
(University of California, Santa Barbara, USA.)
Date : 7 July 2011 (Thursday)
Time : 3pm – 4pm
Venue : MM3, INSTITUTE OF MATHEMATICAL SCIENCES

Abstract

This talk will provide an overview of some of the main ideas in the theory of spacings, i.e. the gaps between successive observations. After reviewing some basic properties of spacings, their use in testing statistical hypotheses and in estimating parameters, will be discussed. Two-sample tests based on “spacings-frequencies” and their relationship to locally most powerful rank tests will be explored, as are some possible extensions to observations in higher dimensions.

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

- Title :** Approximation by normal distribution for a sum functions of uniform s-spacings.
- Speaker :** Professor Dr. Sherzad Mirakhmedov
(GIK Institute of Engineering Sciences and Technology.Pakistan
Institute of Mathematics and Information Technologies.
Tashkent. Uzbekistan. Email: shmirakhmedov@yahoo.com)
- Date :** 13 July 2011 (Wednesday)
- Time :** 3pm – 4pm
- Venue :** MM3, INSTITUTE OF MATHEMATICAL SCIENCES

Abstract

Let $U_{1,n} \leq U_{2,n} \leq \dots \leq U_{n-1,n}$ be the order statistics of a sample from the Uniform [0, 1] distribution and $D_{m,s} = U_{ms,n} - U_{(m-1)s,n}$ $m = 1, 2, \dots, N'$, $D_{N'+1,s} = 1 - U_{N',s,n}$ be their non-overlapping s-spacings with the notation $U_{0,n} = 0$, $U_{n,n} = 1$, and $N' = \lfloor n/s \rfloor$ is the largest integer that does not exceed n/s . We consider statistics of the form

$$T_N = \sum_{m=1}^{N'} f_m(nD_{m,s}).$$

Limit theorems for the statistics of such form have been studied by a huge number of authors due to its wide applications, for example in goodness of fit tests (last is a topic of the other presentation). In this presentation a problem of approximation of the distribution of random variable T_N through normal distribution is discussed. Namely, it will be given a weakest condition of asymptotical normality, Berry-Esseen type boundary, Edgeworth type asymptotic expansion and the probability of large deviation results.

The statistic T_N is the sum of specific dependent random variables. The area of limit theorems for dependent random variables is broad and complex with no unifying methodology. In the proposed presentation we show the method developed by author. This method is based on a well know property of the vector of uniform spacings viz. the vector of uniform spacings “distributional equivalent” to the vector of independent standard exponential random variables given their sum. Using this we obtain an integral formula (which is called Bartlett type formula) for the characteristic function of the statistic T_N trough characteristic function of a sum of independent two dimensional random vectors. Such formula gives idea, for example, who one can be construct asymptotic expansion for characteristic function of the spacings-statistics. It will be demonstrate also who the Bartlett type formula can be applied to develop the probability of large deviation results.

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

- Title :** Asymptotic efficiencies of the goodness of fit tests based on spacings-statistics
- Speaker :** Professor Dr. Sherzad Mirakhmedov
(GIK Institute of Engineering Sciences and Technology.Pakistan
Institute of Mathematics and Information Technologies.
Tashkent. Uzbekistan. Email: shmirakhmedov@yahoo.com)
- Date :** 18 July 2011 (Monday)
- Time :** 3pm – 4pm
- Venue :** MM3, INSTITUTE OF MATHEMATICAL SCIENCES

Abstract

The goodness of fit tests is testing whether a sample X_1, \dots, X_{n-1} has come from a uniform $[0,1]$ distribution. We consider the family of sequence of alternatives $H_1: P_n(x) = x + L_n(x)\delta(n)$, where constant $d > 0$, $L_n(x)$ are “sufficiently smooth” functions such that $L_n(0) = L_n(1) = 0$, $\delta(n)$ is depend on n only.

Let $X_{1,n} \leq X_{2,n} \leq \dots \leq X_{n-1,n}$ be the corresponding order statistics. For an integer $s \geq 1$ the non-overlapping s -spacings are defined as $W_{k,s} = X_{ks,n} - X_{(k-1)s,n}$, $k = 1, 2, \dots, N'$, $W_{N'+1,s} = 1 - X_{N's,n}$, with the notation $X_{0,n} = 0$, $X_{n,n} = 1$, and $N' = \lfloor n/s \rfloor$ is the largest integer that does not exceed n/s . We assume that $s = s(n)$ may increase along with n and $s(n) = o(n)$. For a given real function f defined on the non-negative real axis, define

$$R_N(W) = \sum_{k=1}^{N'} f(nW_{k,s}).$$

Our attention is focused on the asymptotic properties of the tests based on statistics

of $R_N(W)$ type. We define F_{alt} as the family of alternatives H_1 that do not approach the null, i.e. $\delta(n)$ is a constant; this family is considered due to both Bahadur's and the Hodges-Lehman concepts of asymptotic efficiencies. Another extreme situation form the family of Pitman's alternatives P_{alt} when $\delta(n) = (ns)^{-1/4}$, this rate is necessary to keep $\alpha_n \rightarrow \alpha$, $\beta_n \rightarrow \beta$, $0 < \alpha < \beta < 1$, as $n \rightarrow \infty$, where β_n is the power of a test of the size α_n . We define also J_{alt} as family of all alternatives with $\delta(n) \rightarrow 0$, $\sqrt{ns}\delta^2(n) \rightarrow \infty$; $J_{1/6}$ as the subfamilies of J_{alt} satisfying condition $\sqrt{ns}\delta^2(n) = o((n/s)^{1/6})$. These are the intermediate (between P_{alt} and F_{alt}) family of alternatives.

It is proposed to discuss on "asymptotic quality" of the said tests on the basis of two approaches: comparison of the asymptotic powers viz. most powerful and second order efficient tests, and asymptotic efficiencies in the senses of Pitman's, Bahadur's and intermediate between Pitman's and Bahadur's concepts.

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Testing Isotropy and a related Random Walk problem
Speaker : Professor Dr. S. Rao Jammalamadaka
(University of California, Santa Barbara, USA.)
Date : 20 July 2011 (Wednesday)
Time : 3pm – 4pm
Venue : MM3, INSTITUTE OF MATHEMATICAL SCIENCES

Abstract

One comes across directions as the observations in a number of situations. The first inferential question that one should answer when dealing with such data is, "Are they isotropic or uniformly distributed?" The answer to this question goes back in history which we shall retrace a bit and provide an exact and approximate solution to this so-called "Pearson's Random Walk" problem.

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Applications of Functions to Real Life Problems

Speaker : Prof. Zafar Ahsan *
Department of Mathematics, Aligarh Muslim University, India

Date : 21 July 2011 (Thursday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

In daily life, we often come across with objects which are paired together, for example, a person has a name, a hockey player has a number on his uniform, a student is given a grade in a subject, etc. In science, engineering and business also, a number is associated with another number, for example, the amount of a radioactive substance determines the rate of decay; the interest paid on an investment depends upon the duration (time) of investment. Such pairing of objects leads to the concept of a function.

Functions are useful in describing many situations involving two variables because each value of one variable corresponds only to only one value of the other variable. The key to mathematical analysis of a geometric and scientific situation is the is the recognition of relationships between the variables that describe the situation. Such a relationship may be a formula that expresses one variable as the function of another variable.

In this talk, with the help of a number of simple examples we shall develop the concept of a real function; which is followed by the definitions of frequently occurring functions. A number of applications of linear, quadratic, greatest integer, exponential and logarithmic functions to real life problems, in different braches of study, have been given.

* **Research Group** : Algebraic & Analytic Methods in Mathematical Sciences

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Why We Work in Higher Dimensions?

Speaker : Prof. Zafar Ahsan *
Department of Mathematics, Aligarh Muslim University, India

Date : 26 July 2011 (Tuesday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

Pure mathematicians have the habit of working with n (higher) dimensions, while only three dimensions are visible – why is it so? With the help of tensor calculus and a little bit general theory of relativity, we shall try to find a genuine physical reason that why the higher dimensions are necessary to work for..

* **Research Group** : Algebraic & Analytic Methods in Mathematical Sciences

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Statistical problems on fractional power distributions

Speaker : Prof. Si Si *
Faculty of Information Science and Technology,
Aichi Prefectural University, Japan

Date : 27 July 2011 (Wednesday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

We shall investigate random complex phenomena, the probability distributions are subject to the fractional power distributions.

First we recognize the power α of the fractional power distribution is an important characteristic of the random complex phenomena in question from the view point of the theory of stable processes. We propose a new method of estimation of the power α from the actual data obtained by the observation.

Next we come to some favorable cases where the given stationary distribution has some history. Namely, this is the case where the random evolution can be recognized. Then, we can apply the theory of stable processes and find some method of identifying the given evolutionary phenomena and consider prediction of the future.

We have dealt with the actual data from which we can tell some statistical properties. One of the successful cases we are concerned with is the traffic accidents. Problems of identification have been discussed.

* **Research Group** : Statistical Modeling and Computing

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Bounded distance preserving surjective mappings on
Block triangular matrix algebras

Speaker : Dr Chooi Wai Leong *
Institute of Mathematical Sciences
University of Malaya, Malaysia

Date : 3 August 2011 (Wednesday)

Time : 3pm – 4pm

Venue : MM3, INSTITUTE OF MATHEMATICAL SCIENCES

Abstract

In this talk, we characterize surjective mappings ψ preserving bounded distance in both directions on block triangular matrix algebras over an arbitrary field with at least three elements by showing ψ are bijective mappings preserving adjacency in both directions.

* **Research Group** : Algebraic & Analytic Methods in Mathematical Sciences

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Rank one preservers between spaces of Boolean matrices

Speaker : Prof. Ming-Huat Lim *
Institute of Mathematical Sciences, University of Malaya
(Joint work with Sin-Chee Tan)

Date : 24 August 2011 (Wednesday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

This talk is concerned with characterizations of (i) linear transformations from one space of Boolean matrices to another that send pairs of distinct rank one elements to pairs of distinct rank one elements and (ii) mappings from one space of Boolean matrices to another that send rank one matrices to rank one matrices and preserve order relation in both directions. Both results are proved in a more general setting of tensor products of two Boolean vector spaces of arbitrary dimension.

* **Research Group** : Algebraic & Analytic Methods in Mathematical Sciences

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Freeness of certain torsion-free Abelian groups

Speaker : Ngu Min Hui *
MSc Candidate, Institute of Mathematical Sciences,
University of Malaya

Date : 6 September 2011 (Tuesday)

Time : 10am – 11am

Venue : MM3, Institute of Mathematical Sciences

Abstract

It is still remain a mystery of why a torsion-free abelian group is not free. This problem has been attacked by many mathematicians for many years but no satisfactory answer has emerged yet. In this talk, we will learn about torsion-free abelian group, as well as the recent development of abelian group theory on this subject. Later on, we will present some result obtain recently.

* **Research Group :** Mathematical Cryptography

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Panel data models: A robust approach for estimations and inferences

Speaker : Nurul Sima Mohamad Shariff *
PhD Candidate, Institute of Mathematical Sciences,
University of Malaya

Date : 7 September 2011 (Wednesday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

This study focuses on the issue of cross sectional dependence (CD) and outliers in panel data. To address the problems of incorrect test statistics and parameter estimates in the presence of CD and outliers, this talk will focus on two main parts. In the first part, robust versions of CD tests are proposed to investigate the presence of CD and outliers in both the pure static and dynamic models. The asymptotic behaviours and simulation study of power for the finite sample behaviour based on Monte Carlo simulation study are considered.

For the second part of the work, we propose a robust version of Common Correlated Mean Group, namely RCMG, for estimating parameters in the pure static model. Some properties, test of hypothesis and construction of the confidence intervals for the parameter are also considered. For the dynamic framework, we explore the unit root tests for testing stationarity and based on the robust estimators, a robust version of Pesaran's (2007) CIPS, is introduced. The performance and robustness of the proposed method in parameter estimation is discussed and comparisons are made to some existing approaches in the literatures.

In this study, we found that the proposed CD test, particularly the RPCD is more powerful than the PCD test in that it is able to detect the presence of mild CD that exist among cross-sectional units when other commonly used methods failed. The robust estimators RCMG also provide alternatives to CMG in the presence of outliers. RCIPS outperform other used unit root tests in term of power especially for small N and T ; however suffer slightly from size distortion in the absence of outliers.

* **Research Group** : Centre of Statistical and Mathematical Modeling

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : A characterization of real hypersurfaces in complex space forms in terms of a commutative condition on the holomorphic distribution

Speaker : Loo Tee How *
Institute of Mathematical Sciences, University of Malaya

Date : 14 September 2011 (Wednesday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

One of the research problems in the theory of real hypersurfaces in a nonflat complex space form is to classify the real hypersurfaces under certain additional geometric properties. Many results have been obtained in the past few decades on which the real hypersurfaces being classified appeared to be subclasses of Hopf hypersurfaces with constant principal curvatures and ruled real hypersurfaces.

In contrast, other classes of real hypersurfaces have been very little investigated up to this point. In this talk, we shall discuss a construction of a class of real hypersurfaces in a complex space form and characterize it under a commutative condition on the holomorphic distribution when the ambient space is complex Euclidean space or complex projective space.

* **Research Group** : Algebraic & Analytic Methods in Mathematical Sciences

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Comparison of treatments and data-dependent allocation for circular data from a cataract surgery

Speaker : Prof. Atanu Biswas *
Applied Statistics Unit, Indian Statistical Institute,
Kolkata, India

(Joint work with Somak Dutta, Arnab Kumar Laha, Partho Bakshi)

Date : 15 September 2011 (Thursday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

Circular data is a natural outcome in many biomedical studies, e.g. some measurements in ophthalmologic studies, degrees of rotation of hand or waist, etc. With reference to a real data set on astigmatism induced in two types of cataract surgeries we carry out some two-sample testing problems including the Behren-Fisher type of test in the circular set up. Response-adaptive designs are used in phase III clinical trials to allocate a larger proportion of patients to the better treatment. There is no available work on response-adaptive designs for circular data. Here we provide some response-adaptive designs where the responses are of circular nature, first an ad-hoc allocation design, and then an optimal design. Detailed simulation study and the analysis of the data set, including resigning the cataract surgery data, are carried out.

* **Research Group** : Statistical Modeling and Computing

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Unbalanced and Partial Group Sequential Methods for Normal Responses in Clinical Trials

Speaker : Prof. Atanu Biswas *
Applied Statistics Unit, Indian Statistical Institute,
Kolkata, India
(Joint work with Shirsendu Mukherjee and KyungMann Kim)

Date : 21 September 2011 (Wednesday)

Time : 10am – 11am

Venue : MM3, Institute of Mathematical Sciences

Abstract

Group sequential methods for a two treatment clinical trial with normal responses are discussed. First we consider the case where the sample sizes for two treatments are possibly unequal between the treatments due to an unequal randomization. Then we discuss group sequential design in the context of a historical-control study, that is, under the partial sequential sampling scheme, in which the samples on one treatment, say control, are available at the outset, and the samples on the other treatment, say experimental, are obtained in the group sequential way. We discuss the cases of known and unknown variance for both unbalanced and partial group sequential set up. All the procedures are discussed with numerical studies.

* **Research Group** : Statistical Modeling and Computing

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Measuring gain in efficiency and sample size reduction using surrogate end-points

Speaker : Mr. Buddhananda Banerjee *
Applied Statistics Unit, Indian Statistical Institute,
Kolkata, India

(Joint work with Atanu Biswas)

Date : 21 September 2011 (Wednesday)

Time : 11am – 12noon

Venue : MM3, Institute of Mathematical Sciences

Abstract

Surrogate end-points are used when the true end-points are costly or time-consuming. In a typical set up we observe a fixed proportion of true-and-surrogate responses, and the remaining proportion is only-surrogate responses. It is obvious that the inclusion of such only-surrogate end-points increase the efficiency of associated estimation. In this present paper we want to quantify the gain in efficiency as a function of the proportion of available true responses. Also we obtain the expression of the gain in true sample size at the expense of surrogates to achieve a fixed power, as a function of the proportion of true responses. We present our discussion in the two-treatment set up in the context of odds ratio. We illustrate the procedure using some real data set.

* **Research Group** : Statistical Modeling and Computing

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Applications of Metaheuristics in Combinatorial Optimization Problems

Speaker : Ms. Huda Zuhrah bt Ab Halim *
MSc Candidate, Institute of Mathematical Sciences,
University of Malaya

Date : 27 October 2011 (Thursday)

Time : 2pm – 3pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

Metaheuristic algorithms such as Particle Swarm Optimization, Variable Neighborhood Search, Genetic Algorithm, Ant Colony Optimization and harmony search are very powerful methods for solving many hard optimization problems. Here, we consider two metaheuristics method, Genetic Algorithm (GA) and Variable Neighborhood Search (VNS) in solving two different types of problems: the Point to Multipoint Routing Problem (PMRP) and Integrated Inventory Routing Problem (IRP). PMRP and IRP both represent were known as very large NP-hard combinatorial problems. PMRP is involved in the design of a telecommunication network. It attempts to find an optimal route that routes a set of requests from one source node (point) to several destination nodes (multipoint) by duplicating the message when it reaches the intermediate node(s). The IRP, on the other hand, seeks to determine simultaneously an optimal inventory and distribution strategy that minimizes the total cost. The resulting inventory and transportation policies usually assign suppliers to routes and then determine the replenishment intervals and collection sizes for each supplier. It is an important and critical

factor especially in vendor managed inventory.

The first study involves solving the PMRP where we propose the algorithm based on GA and VNS to solve the problems. The first part of the algorithm involves solving the Steiner tree problem which comprise of solving the minimum spanning tree and the shortest path problem. We propose the Kou Markowsky Berman method to find the optimal or near optimal Steiner tree solutions with the Kruskal's algorithm to solve the minimum spanning tree and Dijkstra's algorithm to determine the shortest path. VNS also embeds swap, invert and *Or-opt* as Local Search (LS). We tested both algorithms on small, medium and large data sets consisting of 4, 8 and 20 requests, respectively. We then compare GA and VNS in terms of best results and cpu time. VNS produces better results for large case compared to GA, at the expense of a slightly higher cpu time.

The second part of the study focuses on the IRP, where we consider a *many-to-one* distribution network consisting of a depot, an assembly plant and N geographically dispersed suppliers. Each supplier supplies a distinct product to the assembly plant to meet the demand in each period. The problem addressed here is based on a finite horizon, multi-period, multi-supplier, single assembly plant, where a fleet of capacitated vehicles, housed at a depot, transports products from the suppliers to meet the demand specified by the assembly plant. The selection of neighborhood structure is very crucial in VNS and we define the neighborhood as a distance function, that is the cardinality of the symmetric difference between any two solutions V_1 and V_2 written as $\rho(V_1, V_2) = |V_1 \setminus V_2|$. We embed GENI insertion Type I as a local search in VNS and later to create the neighborhood structure. The VNS performs better compared to GA for all the 14 cases considered.

* **Research Group** : Centre of Statistical and Mathematical Modeling

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Commutator estimates in W^* -algebras and applications

Speaker : Prof. Fedor Sukochev *
Department of Mathematics, University of New South Wales,
Australia

Date : 2 November 2011 (Wednesday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

Let \mathcal{M} be a W^* -algebra and let $Z(\mathcal{M})$ be the center of \mathcal{M} . Fix an element $a \in \mathcal{M}$ and set $\delta_a(\cdot) := [a; \cdot]$. Obviously, δ_a is a linear bounded operator on $(\mathcal{M}; \|\cdot\|_{\mathcal{M}})$, where $\|\cdot\|_{\mathcal{M}}$ is a C^* -norm on \mathcal{M} . It is well known (see e.g. [3, Theorem 4.1.6]) that there exists $c \in Z(\mathcal{M})$ such that the following estimate holds: $\|\delta_a\| \geq \|a - c\|_{\mathcal{M}}$. In view of this result, it is natural to ask whether there exists an element $y \in \mathcal{M}$ with $\|y\| \leq 1$ and $c \in Z(\mathcal{M})$ such that $|[a; y]| \geq |a - c|$?

The following estimate easily follows from our main result (joint work with A. Ber (Tashkent)): for every self-adjoint element $a \in \mathcal{M}$ there exists an element $c \in Z(\mathcal{M})$ and the family $\{u_\varepsilon\}_{\varepsilon > 0}$ of unitary operators from \mathcal{M} such that

$$(1) \quad |\delta_a(u_\varepsilon)| \geq (1 - \varepsilon)|a - c|, \quad \forall \varepsilon > 0.$$

The estimate above is actually sharp and, with its aid, we shall easily show that every derivation δ on \mathcal{M} taking its values in a (not necessary $\|\cdot\|_{\mathcal{M}}$ -closed) two-sided ideal $I \subset \mathcal{M}$ has the form $\delta = \delta_a$, where $a \in I$. Further restatements yield complements to classical results of J. Calkin [1] and M.J. Hoffman [2].

Analogous results continue to hold in the setting of the theory of non-commutative integration initiated by I.E. Segal [5]. In this general setting, the W^* -algebra \mathcal{M} is replaced with a larger algebra of “measurable” operators affiliated with \mathcal{M} and the ideal I in \mathcal{M} is replaced with an ideal of measurable operators. The estimate (1) continues to hold in the classical algebra of all locally measurable operators $LS(\mathcal{M})$ which is the most general algebra in noncommutative integration to date (see [4]). Time permitting, we state some results for “symmetric ideals of measurable operators”..

References

- [1] J. Calkin, *Two-sided ideals and congruences in the ring of bounded operators in Hilbert space*, Ann. of Math. **42** (1941), 839–873.
- [2] M. J. Hoffman, *Essential commutants and multiplier ideals*, Indiana Univer. Math. J. **30** (1981), No. 6, 859–869.
- [3] S. Sakai, *C^* -algebras and W^* -algebras*, Springer-Verlag, New York, 1971.
- [4] S. Sankaran, *The W^* -algebra of unbounded operators*, J. London Math. Soc. **34** (1959) 337–344.
- [5] I.E. Segal, *A non-commutative extension of abstract integration*, Ann. of Math. **57** (1953) 401–457.

* **Research Group** : Mathematical Cryptography

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Modeling of overdispersion in count data

Speaker : Low Yeh Ching *
PhD Candidate, Institute of Mathematical Sciences
University of Malaya

Date : 21 November 2011 (Monday)

Time : 3pm – 4pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

Count data usually exhibit overdispersion, that is, the occurrence of extra variation, when modelled by a Poisson distribution. Various solutions have been proposed for the problem of overdispersion. These solutions may be classified into three broad categories: (a) ad hoc solutions which do not assume an explicit proper distribution for the response variable (use of pseudo likelihood,(extended) quasi-likelihood), (b) discretization of continuous distributions (construction of discrete distributions from continuous ones) and (c) observational level random effects models (mixture models) which can only model dispersion. By considering the approach in the third category, a new four-parameter distribution, the generalized Sichel distribution is introduced to model overdispersed count data. This distribution is obtained by allowing the parameter of the Poisson distribution to follow the extended generalized inverse Gaussian (EGIG) distribution, and includes the three-parameter Sichel distribution as a special case.

The proposed distribution is a very flexible model for modelling overdispersed count data. Some of the theoretical properties of the distribution were derived and the variations in the form of the distribution for the different parameter values were studied. The distribution's goodness-of-fit on overdispersed data sets was also examined and compared with other existing models. The distribution serves as an alternative for modelling overdispersed data.

* **Research Group** : Statistical Modeling and Computing

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : Maps preserving adjacency

Speaker : Professor Dr. Peter Šmerl
Department of Mathematics, University of Ljubljana
Slovenia

Date : 7 December 2011 (Wednesday)

Time : 3:00 pm – 4:00 pm

Venue : MM3, Institute of Mathematical Sciences

Abstract

We will recall classical Hua's theorems on geometry of matrices and discuss possible improvements, proof techniques and applications.

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

- Title :** Statistical Methodology for Meta-Analysis of Ordinal Categorical Data
- Speaker :** Professor Shahjahan Khan
Department of Mathematics and Computing
University of Southern Queensland, Toowoomba, Australia
(with Md Belal Hossain)
- Date :** 8 December 2011 (Thursday)
- Time :** 3:00 pm – 4:00 pm
- Venue :** MM3, Institute of Mathematical Sciences

Abstract

Meta-analysis combines results from various independent studies such as randomised controlled trails (RCTs) to improve power of statistical methods by increasing the sample size. Meta-analysis with ordinal data has not been considered as frequently as with binary outcomes (two categories). Ordinal data are naturally in ascending or descending order with multiple categories. It is important to estimate the effect size without any loss of information without merging categories or restricting by any model assumptions. Any good effect measure should be applicable for any number of comparison groups. In this presentation the aim is to estimate the effect size of any study with ordinal categorical outcomes without any loss of information either by merging categories or under any model assumption. We use the generalised odds ratio (GOR) (Agresti, 1980) as an effect measure in meta-analysis of ordinal categorical outcomes from RCTs, and develop general fixed and random effects models using GOR under independent multinomial distribution.

The method includes a well defined variance estimate, weights for individual study and combined estimate, constructing confidence intervals and addressing some of the issues of meta-analysis. We also propose a quasi-empirical Bayes method (QEBM) using GOR for heterogeneous ordinal categorical outcomes in meta-analysis.

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : **Successfully publishing research articles in international journals**

Speaker : **Professor Shahjahan Khan
Department of Mathematics and Computing,
University of Southern Queensland, Toowoomba, Australia**

Date : **15 December 2011 (Thursday)**

Time : **3:00 pm – 4:00 pm**

Venue : **MM3, Institute of Mathematical Sciences**

Abstract

Every research active academic and students under research training programs require publishing original research outputs in high impact, good quality international journals. Often publishing in peer reviewed journals require much more (art) than valuable new results or findings. Good writing and presentation skills and approaching to appropriate journal are often keys to success. This talk covers various issues related to conducting research, preparing articles and tips to publish in top rated international journals. Practical tips on research collaboration, journal ranking, journal search and selection as well as submission and review processes are provided.

SEMUA DIJEMPUT HADIR

**INSTITUT SAINS MATEMATIK
UNIVERSITI MALAYA
SIRI SEMINAR KUMPULAN PENYELIDIKAN**

Title : **Successfully publishing research articles in international journals**

Speaker : **Professor Shahjahan Khan
Department of Mathematics and Computing,
University of Southern Queensland, Toowoomba, Australia**

Date : **15 December 2011 (Thursday)**

Time : **3:00 pm – 4:00 pm**

Venue : **MM3, Institute of Mathematical Sciences**

Abstract

Every research active academic and students under research training programs require publishing original research outputs in high impact, good quality international journals. Often publishing in peer reviewed journals require much more (art) than valuable new results or findings. Good writing and presentation skills and approaching to appropriate journal are often keys to success. This talk covers various issues related to conducting research, preparing articles and tips to publish in top rated international journals. Practical tips on research collaboration, journal ranking, journal search and selection as well as submission and review processes are provided.

SEMUA DIJEMPUT HADIR