International Workshop
on
Stochastic Models in Data Science

organized by
Indian Society for Probability and Statistics
in association with
Indian Institute of Technology Tirupati

Venue: LHC-CR001, IIT Tirupati **Date: 20 February 2024**

Program Schedule

Session No	Time	Speaker	Title
	0930 - 1000	Inauguration	
1	1000 – 11.00	Prof. A. M. Mathai, McGill University, Canada	Recent Developments in Matrix-variate Distributions
	1100 - 1130	Tea Break	
2	1130 – 1230	Prof. Somesh Kumar IIT Kharagpur	A New Index for Comparing Relative Group Effects
3	1230 – 1330	Prof. Asha Gopalakrishnan, CUSAT	Stochastic Modelling in Survival Analysis.
	1330 – 1430	Lunch Break	
4	14.30-15.30	Prof. K. Muralidharan M. S. University, Baroda	On Consistent Asymptotic Normal Estimators
	1530 - 1545	Tea break	
5	15.45 – 16. 45	Prof. P. Vellaisamy IIT Bombay	The Unbiasedness Approach to Linear Regression Analysis
	1645 – 1700	Valedictory	

Abstracts of the Talks

Recent Developments in Matrix-variate Distributions

A.M. Mathai,

Emeritus Professor of Mathematics and Statistics, McGill University, Canada

Abstract: It is an overview of some recent developments in matrix-variate distributions and functions of matrix argument. These distributions are currently used in quantum physics, analysis of data from sonar and radar, engineering and communication problems etc., apart from making contributions to theoretical developments of Statistics. Some results of December 2023 will be mentioned. These distributions can also be considered as properties of functions of matrix argument thereby applications to applied real and complex analysis, fractional calculus and related areas. A recent paper in physics says that Quantum Mechanics is nothing but Bayesian analysis of Hermitian positive definite matrices in a Hilbert space. Hence, all the results on matrix-variate Bayesian analysis will be directly useful in Quantum Mechanics. Connections of matrix-variate distributions to Bayesian analysis, fractional calculus, scaling models, scalar and matrix texture models in communication theory, symmetric products and symmetric ratios of matrices etc., will be pointed out. With the emergence of huge data on scalar, vector, and matrix variables in the real and complex domains, and that too large dimensional data, the materials on matrix-variate distributions will be the future basis for developing statistical techniques to handle big data.

The Unbiasedness Approach to Linear Regression Analysis

P. Vellaisamy

Department of Mathematics, Indian Institute of Technology Bombay,
Powai, Mumbai-400076, India.

Abstract: The standard regression model requires several assumptions about the regressors and the error term. The regression parameters are estimated using the least-squares method. In this paper, we present a unified approach for the analysis of linear regression models with random regressors, based on the method of unbiasedness. An explicit expression for the regression parameters is obtained. The unbiasedness approach is used to estimate the regression parameters and the resulting unbiased estimator equals the least-squares estimator for the fixed design model. The usual properties of the unbiased estimator are established. The analysis of residuals and the regression sum of squares can be carried out in a natural way. Finally, an Application to AR(p) model and some numerical examples are also discussed.

A New Index for Comparing Relative Group Effects

Somesh Kumar

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Abstract: In experiments involving multiple groups it is a common problem to compare the measures between some or all pairs. We have introduced a new index which is useful for comparing group effects of individual treatments with those of the average distribution. Assuming the group distributions to be exponential with distinct scale parameters, we derive various point estimators and compare their performances. Confidence intervals are constructed and the problem of testing the homogeneity of the indices is also investigated in detail. All inference procedures are implemented on real data sets.

Stochastic Modelling in Survival Analysis.

G ASHA

Cochin University of Science & Technology, Cochin, Kerala.

Abstract: The talk will delve into the distinct aspects of time-to-event data, exploring the fundamental statistical approaches employed and clarifying why these approaches require specialized treatment from a statistical standpoint. This exploration will emphasize the specific statistical models applicable to such data, outlining their advantages, disadvantages, and the optimal inferential strategies associated with them. In particular, the talk will address models specifically designed for time-to-event data with a cure fraction, offering a comprehensive understanding of the statistical landscape for analyzing this type of dataset

On Consistent Asymptotic Normal Estimators

K. Muralidharan

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The Maharaja Sayajirao University of Baroda, Vadodara, 390 002 India.
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Abstract: Among various classical estimation procedures, a relatively better-known and easy-to-implement estimation is provided by Consistent Asymptotic Normal Estimators (CAN). The method of CAN provides estimators for parametric functions of regular and non-regular and degenerate families of distributions. In this article, we present CAN estimators for parametric functions of inlier-prone (a case of degenerate) distribution models. The estimates are also compared numerically with other competing estimators like UMVUE, percentile estimators and least square estimators.