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PhD (1983) in Statistics from the Indian Agricultural Research Institute, New Delhi
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Professor, Statistician, Quantitative Data Analyst; Statistical methodology for prediction modeling, forecast analysis, sample surveys, biomedical research, design and analysis, significance testing and sample size determination; Statistical training and HQP development.

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My Research Areas

[1] Copula based Statistics Applications: Modeling and analyzing relationship between explanatory and response variables is a fundamental activity encountered in statistics. Pearson's correlation, non-parametric correlations and multiple regressions are often applied to study association and relationship. Copulas are functions that join or couple multivariate distribution functions to their one-dimensional marginal distribution functions. Copulas are used to describe the dependence between random variables. Copulas allow to model and estimate the distribution of random vectors by estimating marginals and copula separately. There are several parametric copula families known which usually have parameters that control the strength of dependence. Questions of interest are: to investigate new families of copula functions as alternative dependence measures and simulation algorithms avoiding correlation shortcomings, to develop copulas based on divergence measures, to demonstrate the applications of copulas in analyzing and modeling dependence among binary / multiple responses.

[2] Information Measures and Image Processing: One important issue in statistics is finding appropriate probabilistic measure(s) of distance or difference or affinity between probability distributions. A number of divergence/information measures have been proposed and studied. The maximum-entropy principle and the minimum cross-entropy principle have been applied successfully in different scientific applications like in statistics, thermodynamics, spectral analysis, image reconstruction, pattern recognition, operations research, science and engineering. Our interest is in: generalizing divergence measures, developing new information divergence measures, characterizing probability models based on entropy principles, extending copula simulations in image and pattern recognition.

[3] Stochastic Models in Finance: Contingent claim models whose value depends on multiple sources of uncertainty have been developed for stock options in the finance literature. These models are useful for valuing real options having multiple sources of uncertainty. Often numerical procedures are used to approximate the stochastic process when there are multiple sources of uncertainties because analytical solutions are unavailable. Such numerical procedures include finite difference schemes, lattice approaches. However analytical solutions to the lattice models have several limitations, such as the probability expressions for estimating jump probabilities are only approximations which introduce an error in pricing

an option and sometimes probability estimates turn out to be negative values. Furthermore, the stretch parameter required to obtain a feasible set of probabilities is chosen arbitrarily. This arbitrary selection may impose an additional constraint since the probability values depend on the stretch parameter. We focus our research on: modeling a multi-stage investment as a compound real option when there are several un-correlated underlying assets and relaxing feasibility conditions and computational burden.

[4] Result Replicability and Statistical Significance: Result replicability is considered fundamental in scientific research methodology. Statistical significance does not evaluate result replicability. The p-value as a measure of significance dominates statistical analysis and decision making however it tells little about result replicability. Null hypothesis significance testing using the p value is still the primary inference making technique while analyzing data. It is not uncommon to observe that in one simulation of small number of repetitions of a typical experiment, p-value can vary over a large interval. Thus p value is a very unreliable measure. Any p value gives very vague information about what is likely to happen on replication, and any single p value could vary simply because of sampling variability. Questions which interest are: to investigate result replicability in statistical analysis especially in prediction models; to empirically investigate the likely replicability of research results; to study result replicability based on copulas.

[5] Applications of Mathematical Inequalities in Statistics: The fundamental inequalities such as Tchebyshev's integral inequality for synchronous (asynchronous) mappings, Holder's integral inequality, Cauchy-Buniakowski-Schwartz integral inequality, have been consistently applied in estimating some special functions and characterizing probability distribution functions. New estimations based on these inequalities have been obtained for gamma and beta functions and the moments and moment ratios of gamma and beta distributions. Our goal is to research: estimations of the general moments of the probability distributions and to characterize distribution functions or families of probability distributions.

SOME RESEARCH PUBLICATIONS

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