CHAPTER 56

STATISTICS

Doctoral Theses

01. CHARANJIT KAUR
Some Contributions to Fertility Models and its Determinants in Context of India.
Supervisor : Dr. Ranjita Pandey
Th 23484

Abstract
(Not Verified)

Fertility is an essential component to be studied but generally ignored or less importance is given compared to other vital componentssuch as mortality, morbidity or migration. Traditional regression techniques are not suitable to analyse fertility composition, trend andbehaviour. Present thesis tries to fill this gap and add to the existing stock of knowledge on the subject.Chapter 2 uses different statistical distributions and mathematical functions to analyses the fertility behavior. Model result suggests thatfor NFHS-3, Hadwiger function is the model of best fit while for the NFHS-1, Curve I is the best fit model. Polynomial models, for boththe rounds, are also presented which suggests that polynomial model of degree 4 and 5 is explaining the data appropriately. Extending themodel to study effect of covariates (in chapter 3) suggest that the non homogeneity in the fertility curve is primarily explained by social,cultural and economic factors, namely, religion, caste, education, economic characteristics of households.As number of births is a count event, count regression model is used in chapter four and five to model the fertility of Indian women usingfirst and third round of National Family of Health estimation result based on Poisson regression to indicate that probability of Indianwomen with two children is high in comparison to the rest of the birth counts. Further, findings from multinomial regression suggest thatsocial and cultural factors incorporates increase in the count of birth though, female's education and its participation in the labor forcealong with the economic status of households also determines family size at two. Result also exhibits presence of state, state-sector,sector-religion etc. interaction effect. Using the concept of concentration ratio (CR) and D-statistic study (chapter 6) depicts presence ofspatial and spatial temporal effect in the births.

Contents

1. Fertility scenarion in India: An introduction 2. Identification of patterns in smoothed fertility data 3. Impact of some selected predictors on the patterns of fertility curve 4. Application of count regression models for modelling fertility: A categorical approach. 5. Non linear approach to model multiple categorical response(s) 6. Spatial fertility models.List of published research work. Appendix. Bibliography.

02. GARIMA PRIYADRSHINI
Some Contributions to the Construction of Cross-over Designs.
Supervisor: Prof. Poonam Singh and Mithilesh Kumar Jha
Th 23744

Contents

1. Introduction 2. Partially balanced cross-over designs with two-associate class association schemes 3. Partially balanced cross-over designs based on some higher order association schemes 4. Cross- over designs for factorial experiments 5. Cross-over designs for a model with self and mixed carryover effects 6. Nested cross-over designs. References.

03. GOEL (Komal)
On the Estimation of Cure Rate Along With Identification of Significant Prognostic Factors of Cancer Patients.
Supervisor : Prof. Gurprit Grover
Th 23483

Abstract
(Not Verified)

Progress in the treatment of cancer has led to a spate of statistical research to develop curemodels. Cure rate models are survival models consisting of a cured fraction (those who do notexperience the event of interest for a long period of time) and an uncured fraction (those whoexperience the event of interest within a short period of time). These models are basicallydeveloped to estimate the proportion of patients cured in a clinical trial. This proportion becamean important and a very useful measure in obtaining the trends in the survival of patients sufferingfrom cancer. These are the only models which provide an estimate for proportion of curedpatients and studying the causes of failure of the treatment in the uncured group of patients.These models are very useful in investigating heterogeneity between long term and short termsurvivors. The main interest of such models is in estimating the proportion of long term survivorsand studying the causes for the failure of the treatment in the uncured group of patients. Astraightforward way to identify whether a particular data set might have a subset of long-termsurvivors (cured patients) is to look at the survival curve. If the survival curve has a plateau at theend of the study, then a cure model may be an appropriate and useful way to analyze that data.

Contents

1. Introduction 2. Multistate markov modeling for disease progression of breast cancer patients based on ca 15-3 marker 3. Estimation of number of involved lymph nodes in breast cancer patients using Bayesian regression approach 4. Mixture and non-mixture cure fraction models based on generalized gompertz distribution under Bayesian approach 5. Estimating the cure fraction among cancer paitents by using promotional time cure rate model with negative binomial distribution. 6. Application of univariate frailty models in modeling survival data with a cured fraction 7. Conclusions and future perspectives.List of research publication. Bibliography. Appendix.

04. KAMAL NAIN
Some Contributions to Order, Generalized Order and Record Statistics.
Supervisor : Prof. Jagdish Saran
Th 23485

Abstract
(Not Verified)

The study in this thesis mainly deals with explicit expressions for moments of generalized and dual

generalized order statistics, recurrence relations for single and product moments of order statistics and ofrecord values, and recurrence relations for marginal and joint moment generating functions of generalizedorder statistics (GOS) from some specific and general classes of distributions. Chapter 1 gives briefintroduction to different models of ordered random variables. In Chapter 2, we define p orderexponential distribution (POED) as an extension of the exponential distribution and its truncated form.Chapter 3 deals with moments of k upper record values arising from POED, doubly truncated POED,generalized Weibull and doubly truncated generalized Weibull distributions. In Chapter 4, by assuming theunderlying distribution of failure times as left truncated logistic distribution (LTLD), we shall establish somerecurrence relations for moments of the corresponding progressive Type - II right censored order statisticsand also derive the best linear unbiased estimates (BLUEs) of scale and location - scale parameters.Chapter 5 deals with moments of GOS from extreme value distribution and doubly truncated POED. InChapter 6, we have established some recurrence relations for moment generating functions of GOS fromPOED, LTLD, extreme value distribution and from class of Pareto distributions. Chapter 7 deals with theexplicit expressions for moments of GOS from a new class of exponential distributions whose specialcase is Frechet-type extreme value distribution. Burkschat et al. (2003) introduced the concept of lower(or dual) GOS so as to enable a common approach to descendingly ordered random variables likereversed order statistics and lower record values. In Chapter 8, we shall make use of this definition toobtain explicit expressions for moments of lower GOS from class of exponential distributions. We shallalso give characterization result for this class of distributions.

Contents

1. Introduction 2. Recurrence relations for single and product moments of ordinary order statistics from P^{th} order exponential distribution. 3. Recurrence relations for single and product moments of kth record values from pth order exponential and generalized weibull distributions. 4. Recurrence relations for single and product moments of progressive type-II right censored order statistics from left truncated logistic distribution. 5. Recurrence relations for single and product moments of generalized order statistics from some specific continuous distributions. 6. Recurrence relations for marginal and joint moment generating function of generalized order statistics from some specific continuous distributions. 7. Explicit expressions for single and product moments of generalized order statistics from a new class of exponential distributions and characterization 8. Explicit expressions for single and product moments of lower generalized order statistics from a class of exponential distributions and characterization. Appendix. Bibliography.

05. MALHOTRA (Ananya)
Inferential Procedures for Some Reliability models based on Records.
Supervisor : Prof. AjitChaturvedi
Th 23486

Abstract
(Not Verified)

A family of lifetime distributions is considered. Point estimation and testing procedures are developedfor two measure of reliability functions, namely, R(t)=P(X>t)and P=P(X>Y), based on record values. Inorder to obtain these estimators, a major role is played by the estimators of the powers of theparameter. Two types of point estimators are developed - uniformly minimum variance unbiasedestimators (UMVUES) and maximum likelihood estimators (MLES) for various parametric functions.Testing procedures are developed for the various hypotheses related to different parametric functions.Real example is used to illustrate the results. Assuming we are aware of some prior guess value ofthe parametric functions, Shrinkage estimators are developed for the powers of parameter, R(t) andP based on records. Simulation studies are conducted to judge the performance of these newestimators.For a generalized inverted scale family of distributions, a proportional hazard ratemodel, exponentiated family of distributions and

a three parameters Burr distribution, point andinterval estimation procedures are developed for the parameters, R(t) and P based on records.UMVUES and MLES have been obtained for various parametric functions. Numerical techniques areadopted to obtain the MLES of the parametric functions in the case where all the parameters areunknown. A comparative study of different methods of estimation is done through simulation studiesand asymptotic confidence intervals of the parameters are constructed. Testing procedures are also developed for the parametric functions of the distribution. A real life data is used to illustrate the results.Next, a family of lifetime distributions by Moore and Bilikam (1978) has been considered for which Preliminary test estimators and confidence intervals of the parametric functions areproposed based on record values. The bias and mean square error of the proposed estimators are derived.

Contents

1. The Apperception and augmentation of inferential reliability 2. Estimation and testing procedures for the reliability functions of a family of lifetime distributions based on records 3. Inference on the parameters and reliability characteristics of generalized inverted scale family of distributions based on records 4. Inference on the parameters and reliability characteristics of the proportional hazard rate model based on records 5.Inference on the parameters and reliability characteristics of exponentiated family of distribution based on records 6.Inference on the parameters and reliability characteristics of three parameters burr distribution based on records 7.A family of lifetime distributions by more and bilikam and related inferential procedures for the reliability characteristics based on records 8. Preliminary test estimators and confidence intervals for the parametric functions of the moore and bilikam family of lifetime distributions based on records 9. Shrinkage estimators of the reliability of a family of lifetime distribution based on records References.