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A NOTE ON DISCRIMINATING EQUALLY OPTIMAL SEMI-LATIN SQUARES FOR SIXTEEN TREATMENTS IN BLOCKS OF SIZE FOUR

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Abstract

A semi-Latin square for sixteen treatments in blocks of size four is like a 4 × 4 Latin square except that there exists four treatments in each cell and each of the sixteen treatments occurs once in each row and once in each column. In the literature, three of this class of squares has been found to be A-, D- and E-optimal while an analytic approach has been adopted to further distinguish these optimal ones with the view of identifying the best for experimentation. With this analytic approach the 'best' square was identified; however, it neither provided a common basis for the discrimination of the three squares nor the further classification of the other two good squares. In this paper, therefore, a numerical approach which basically involves the computation of the generalized inverses of the information matrices of these squares is adopted. Each of the generalized inverses satisfies the Moore-Penrose inverse properties. Thereafter, a square is considered most preferable among others if it has the maximum number of minimum variance of simple treatment contrasts as well as the minimum number of distinct pairwise treatment variances. Above all, a mini-league table for the three squares is ascertained.

Key Words: Semi Latin Squares

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TREATMENT OF NON NORMAL RESPONSES FROM DESIGNED EXPERIMENTS

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Abstract

Many experimental designs, most especially industrial designs produce non-normal response variables. The Least Squares method of modeling may therefore not produce efficient estimates. Models are built using -technique and Box-Cox methods of data transformation or by using the GLM to overcome the non-normality nature of the data. In this paper, these techniques are compared using the histograms of the estimated mean responses and by examining the length of the confidence interval about the mean responses.

It is observed that, -technique is the best method of data transformation but GLM provides an excellent alternative if the experimental design points are not replicated.

Key Words: -Technique, Robust Parameter Design, Generalized Linear Model

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ESTIMATORS OF LINEAR MODEL WITH AUTOCORRELATED ERROR TERMS AND TRENDED INDEPENDENT VARIABLE

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Abstract

Five estimators namely: Cochrane-Orcutt (COC), Hildreth and LU (HILU), Maximum Likelihood Method Grid (MIGRID), Maximum Likelihood (ML) and Ordinary Least Squares (OLS) estimators were used to obtain estimates of a linear regression model with autocorrelated error terms when the independent variable is trended. The performances of the estimators were evaluated based on some criteria namely: Sum of Bias (SBIAS), Sum of Variance (SVAR) and Sum of Root Mean Square Error (SRMSE) of both the intercept and slope coefficients of the model.

The results reveal that on the basis of SVAR and SRMSE properties, the OLS dominates COC and HILU both for small and large values of autocorrelation while MILGRID and ML dominate OLS as the degree of autocorrelation increases.

Key Words: Estimators, Autocorrelation, Trended.

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ESTIMATING THE AUTOCORRELATED ERROR MODEL WITH GNP DATA

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Abstract

A Monte Carlo study of the small sampling properties of five estimators of linear model with autocorrelated error terms was carried out. The estimators are Cochrane – Orcutt (COC), Hildreth and LU (HILU), Maximum Likelihood Grid Method (MLGRID), Maximum likelihood (ML) and Ordinary Least Squares (OLS). The independent variable was specified as a real life data which is trended. The estimators COC and HILU were found to perform worse than OLS while MLGRID and ML performed better than OLS.

Key Words: Autocorrelation, Monte Carlo, Estimator and GNP data.

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ANALYSIS OF CANCER DATA USING COX PROPORTIONAL HAZARDS MODEL

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Abstract

Cox proportional hazards model has been used to analyze a cancer dataset under two partial likelihood frameworks. Frailty term is also introduced into the model to determine if there exists any unobserved heterogeneity in the data that could possibly relax the restrictive independent and identical distribution assumption due to the data.

Key words: Survival time, Frailty, Relative risk.

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APPLICATION OF LOG LINEAR MODEL TO PRISON DATA

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Abstract

Data from two prisons, one in Ilorin, Kwara State, and the other in Wukari , Taraba State were analyzed. In each prison data on Age, Tribe, State of origin, Offence committed and the Jail terms of inn-mates were used. Log linear models, were used to study association between these categorical variables. The Pearson Chi-square test statistic was used to confirm interactions in the fitted models. Interaction between State and Tribe was observed in the models. There are also interaction between offence and Jail term as well as between Age, Offence and Jail term.

Key Words: Interaction, Log Linear Model, Backward Elimination

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NEGATIVE BINOMIAL MODEL AS AN ALTERNATIVE TO POISSON MODEL FOR POSITIVE CONTAGION-LIKE DATA

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Abstract

Positive contagion in the context of this paper refers to a situation when one event increases the likelihood of another, consequently increases the variance of the observed counts and leads to over dispersion. Positive contagion has two major adverse effects, first the summary statistics have a larger variance than anticipated under the simple model, and secondly, there is a possible loss of efficiency in using statistics appropriate for the assumed distribution. To take care of these effects we propose Negative binomial distribution which provides an example of a variance function containing an unknown parameter that is not a dispersion parameter. Negative binomial is used to measure positive contagion which leads to over dispersion. In comparison with Poisson model, we observed that Negative binomial has a better fit for data with positive contagion.

Keywords: ***Positive Contagion, over dispersion, Negative Binomial.***

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SIMPLIFIED VERSION OF THE MODIFIED FREEMAN–TUKEY STATISTIC FOR TESTING HYPOTHESIS ABOUT GOODNESS–OF–FIT OF MULTINOMIAL PROBABILITIES

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Abstract

The traditional version of the modified Freeman–Tukey statistic for testing hypothesis about goodness–of–fit of multinomial probabilities in one, two and multi– dimensional contingency table is simplified. The simplified version does not require calculation of expected frequencies. The version is easier and faster than the traditional one. Using the simplified version, we provide the statistic that approximates the modified Freeman–Tukey statistic. The computational terms in the first approximated version are reduced when compared with the simplified version. This eventually makes its usage much faster. In the numerical examples considered to illustrate their usages, the conclusion agreed perfectly with that of Pearson, Neyman and the likelihood ratio test statistic.

Key Words: Goodness–of–fit, Multinomial Probabilities, modified Freeman–Tukey statistic.