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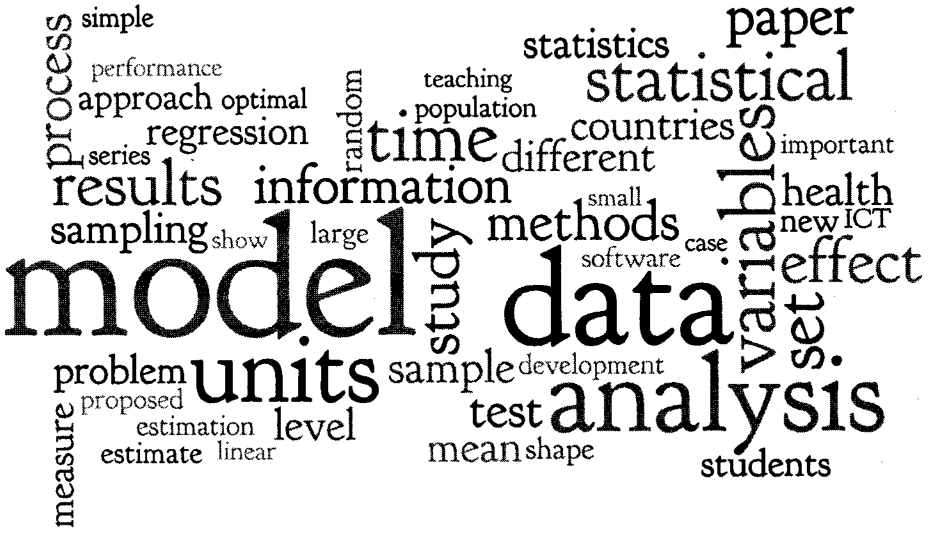
PROGRAM and ABSTRACTS



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Mathematical Statistics

Optimal Parameters of EWMA Designs by Integrating Closed Form Formulas and Numerical Integral Equations Methods

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Typically, the performance of control chart is frequently measured by Average Run Length (ARL) and Average Delay Time (ADT) when processes are in-control state and out-of-control state, respectively. Using of Statistical Process Control (SPC) charts play a vital role for detecting small changes, i.e. Exponentially Weighted Moving Average (EWMA), particularly, in disorder and surveillance problems. The objective of this paper is to enhance the numerical algorithm for finding optimal parameters of two-sided Gaussian EWMA procedure by integrating the closed form formulas based on martingale technique and numerical integral equations with Gauss-Legendre rule. However, the proposed numerical algorithm is developed from Sukparungsee and Areepong (2009) is robust to optimal parameter of two-sided Gaussian EWMA chart. The numerical results are compared with the results obtained from Monte Carlo simulation which they perform in good agreement in accuracy terms but the latter is very time consuming.

Explicit Expression of Average Run Length for Exponential CUSUM

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The Cumulative SUM chart (CUSUM) is widely used in a great variety of practical applications such as finance and economics, medicine, engineering, psychology, signal processing, and in other areas. A common characteristic used for comparing the performance of control charts is Average Run Length (ARL) - the expected number of observations taken from an in-control process until the control chart falsely signals out-of-control. An ARL will be regarded as acceptable if it is large enough to keep the level of false alarms at an acceptable level. A second common characteristic used for comparing performance is traditionally called Average Delay (AD) time - the expected number of observations taken from an out-of-control process until the control chart signals that the process is out-of-control. Ideally, the AD time should be small as possible. The ARL is usually computed via Markov chain, Monte Carlo simulations or numerical integral equations approaches. In not many cases the solution for the ARL can be found in closed form. In this paper we use the integral equation method to derive analytical solutions for the ARL when CUSUM is employed. We derive the ARL for CUSUM chart assuming that the random observations are iid exponentially distributed. Checking the accuracy of results, we found an excellent agreement between numerical solutions and the closed form expressions.

Biased Estimation of Process Capability Indices Using Bootstrap and Jackknife Methods

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In this paper, two resampling techniques known as the bootstrap and the jackknife methods are used to estimate the bias of estimators of process capability indices (PCIs). It has been proven that several widely used estimators of indices produce biased estimates. Due to the fact that a large bias indicates a poor performance of an estimator, it is of interest in this study to estimate the magnitude of the bias incurred particularly when the estimates are used to assess the performance of non-normal processes. It is known that the process capability indices are designed to evaluate the process performance under the assumption that the underlying process is normally distributed. In practice, however, this assumption is often violated. The indices are frequently estimated using non-normal or skewed process data. To investigate the effect of non-normally distributed processes and sample sizes on the bias of estimators, a simulation study was carried out using six distributions, a normal and five non-normal—Beta distribution, some bell-shaped (e.g., Student's t and Weibull) and right-skewed (e.g., Gamma and Chi-square) distributions at various sample sizes. Results from the simulation study show that when the underlying processes are non-normal and sample sizes are small, the bias of estimators is significant. Nevertheless the bias is substantially reduced when large sample sizes are used.

The Performance of Forecasting Model for Non Stationary data: Case study: Beer Assumption Model

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This paper has aimed to compare the forecasting performance for Non Stationary data. The volume of Beer assumption in Thailand was use for model test. The monthly data from January 2000 to November 2009 were corrected by Thai national bank are samples of this research. I was focused to compare the performance of forecasting model with 4 methodologies are Autoregressive (AR), Seasonal Integrated Autoregressive (SAR), Autoregressive Conditional Heteroscedasticity (ARCH) and Generalized Autoregressive Conditional Heteroscedasticity (GARCH). Beer assumption data was tested by Unitroot Stationary Data test. The result has shown that beer assumption model is non-stationary. Dot plot, linear plot, ACF, PACF and Mean Square Error (MSE) were used as comparison tools of the performance's forecasting model by R programming. The results has found that, SAR (2) is the best performance forecasting model (MSE= 526.6885).

Comparison of Pairwise Comparison Methods Under Three Different Variance Levels

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In order to expanding the knowledge of the controlling the normal populations which have variance differ at the three levels; small, medium and large, by the value of noncentrality parameter criteria by Game, Winkler and Robert (1972). At each level of different variance, this study also compares the probability of Type I error and the power of test of the four pairwise comparison methods: Tamhane's T2, Dunnett's T3, Games-Howell and Dunnett's C, by varying the sample sizes : 10, 15, 20, 25, 30, 35, 40, 45 and 50, and the difference of the mean of the controlling normal population: 0% 10%, 30% and 50%. Monte Carlo methods were used again to generate responses based on the sample size and also the difference of the mean 1,000 times. Hypothesis testing in each case was conducted at 0.01 significant level. Every response was confirmed difference of samples variance by Levene's test. In each of the cases of the three different variance levels, it was found that every test was under the capability controlling type I error by using Binomial test. To be concerned about the probability of type I error estimations, small samples had slightly higher trend than the large and medium variance levels at their highest. Games-Howell's test had get quite a bit of fluctuation and Dunnett's C's test had get the least. In the case of probability of the power of the test, they were varied by sample sizes. Whole cases, Games-Howell's test had the highest power of test and Dunnett's C's test had get the lowest in each case. In each case the mean difference and the difference variance level were correlated with the power of the test. Whole sample size cases of the 10% mean difference case, the power of the test of the four methods had been less than 0.9 in the small different variance level and was less than 0.4 in the medium and the large. Very large sample size should be taken for testing in small mean difference and large difference variance levels.