M 1

Kernel weighted local regression surface technique for detection of outliers

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Outlier detection and robust estimates are integral part of data mining and has attracted much attention recently. A data driven method is proposed to identify the outliers for application in spatial regression analysis. The method involve first fitting a robust nonparametric regression surface following *iterative kernel weighted local regression surface technique* and analyzing the residuals for identifying the outliers or extreme observations. The method is illustrated through both simulated and live data. On application of this method with cocoa yield data, it was observed that the location effect is eliminated and thereby enabled identification of high potential trees in an orchard, which is useful for the breeding programs.

M 2

Theoretical explanation of divisibility verification methods in vedic mathematics

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This paper proposes a theory, which is useful to verify the divisibility of a number by a two digit number ending with the digits 1, 3, 7 or 9. Vedic Mathematics deals with a particular technique for testing the divisibility by a number ending with 9 or 1, but there is no theoretical support behind it. This paper discusses the theory of the divisibility technique used in Vedic Mathematics, based on congruence relations in Number Theory.

M 3

Latent variable approach for measures of association between variables

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Measures of association between variables are of much importance in any field of research. Pearson's correlation coefficient is one of those measures, which is most widely used and often misused as well. Its application is restricted with data satisfying assumptions such as linearity, normality and homoscedasticity thus limiting its application only to continuous variables. When these assumptions are not satisfied, Pearson's rank correlation is suggested. This measure can also be used for variables that are in ordinal scale. When variables are binary or nominal or

variables of different scales, the statistics of association is derived following latent variable approach. One such measure is polychoric correlation. It is formulated as square of the correlation between the underlying latent variables (of observed variables) and the common latent variable: Thresholds to trait level to yield a categorical rating has been decided as the point maximizing the correlation. In this case it is assumed that the common latent variable follow a normal distribution. As part of National Agricultural Innovation Project on Strengthening Statistical Computing for NARS, a macro programme has been developed in SAS software for application of polychoric correlation. Results from the macro can also be used as input for factor analysis procedure with categorical variables.

M 4

Imprecise Beta model dynamic Bayesian network

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Signaling pathways are dynamic events that take place over a given period of time. The dynamics of the system under study, could not be taken into account when using a Bayesian Network(BN) to model an evolutionary pathway. BNs are effective when there are no cyclic dependencies among data. The limitations of BNs may be over come by Dynamic Bayesian Networks(DBN), which model the stochastic evolution of a set of random variables over time. The advantages of DBNs include the ability to model stochasticity, to incorporate prior knowledge, and to handle hidden variables and missing data in a principled way. More over, in DBNs the acyclicity constraint is relaxed. We propose here a method based on Bayesian Imprecise Beta Model and set-based weighted graphs to construct DBNs.

M 5

On a summation theorem with an application

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The aim of this note is to establish a well known Gauss's summation theorem which was independently re-discovered by Ramanujan. As an application, one interesting summation due to Ramanujan is derived.