

PHILIPPINE STATISTICAL ASSOCIATION, INC.
PROFESSORIAL CHAIR IN STATISTICS

An Estimation Procedure for a Spatio-Temporal Model with Sparse Spatial Autoregressive Error

by Stephen Jun Villejo

Spatio-temporal modelling is essential yet complicated due to the dependence structure across space and time. Realizations close in time are correlated while entities close together in space are also similar. The assumption of independent error terms, which tremendously simplifies modelling, is violated in data sets indexed by space and time. Landagan and Barrios (2007) proposed an additive model accounting for temporal and spatial dependencies. The estimation procedure is based on the backfitting algorithm proposed by Hastie and Tibshirani (1990), and is embedded with the Cochran-Orcutt procedure. The development of the model and the estimation procedure was primarily motivated by modelling agricultural yield in the Philippines. The proposed method gave superior forecasts than some common approaches. Moreover, Pace and Barry (1997) proposed a sparse spatial autoregression model as an alternative to other statistical methods such as simultaneous autoregressions and conditional autoregressions which may be computationally impractical for large data sets due to a large number of potential explicit relations. The goal of the presentation is to augment the spatio-temporal model of Landagan and Barrios (2007) with the sparse spatial autoregressive model of Pace and Barry (1997). An estimation method of the hybrid model as well as a test on the parameters is illustrated using agricultural data in the Philippines.

UNIVERSITY OF THE PHILIPPINES STATISTICAL
CENTER RESEARCH FOUNDATION, INC.
PROFESSORIAL CHAIR IN STATISTICS

Revisiting Ranked Set Sampling: An Application to Agricultural Data

by Kevin Carl P. Santos

Undeniably, sampling is one of the primary concerns in data collection and in making statistical inferences. The selected sample should be a representative of the target population to obtain accurate inferences. Although simple random sampling (SRS) is easy to implement, it is not always an appropriate sampling design, particularly, when the population is heterogeneous with respect to the target variable. When the measurement of the characteristic of interest is expensive or time-consuming, oftentimes, researchers want to obtain a sample that keeps their expenses at low levels but achieves accurate inferences. To address this, McIntyre (1952) introduced ranked set sampling (RSS), a data collection method that makes use of the sampler's judgment of relative sizes of potential sample units. RSS has been shown to yield more precise estimators than SRS. Despite the increasing research work done in RSS literature, the area is still unfamiliar to most sampling statisticians. The objective of this presentation is to discuss the foundations of RSS including how it can be utilized in survey sampling setting. In addition, the performance of RSS and SRS will be demonstrated using the 2012 Census of Agriculture dataset.