507/E1

Estimating monthly precipitation in Sri Lanka using small area estimation techniques

P Hapuarachchi and C L Samarasekara*
Department of Statistics and Computer Sciences, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda

The proper management of rain water in Sri Lanka would give more benefits to the country because of its heavy dependence on rainfall. Extrapolating and mapping the precipitation help in making decisions in water management and in agricultural field management. This study aims at understanding the variability of monthly precipitation in Sri Lanka for the year 2011.

Rainfall data collected at 100 rain gauges were used to conduct the Small Area Estimation Procedure. A Multiple Imputation was carried out for each month of the year using the projected coordinates of the rain gauge locations and their elevation as predictors. Two methods were used in model building, namely, Generalized Linear Models (GLM) and Small Area Estimation (SAE). Three types of SAE models were fitted: (i) Unit Level models without area level variances, (ii) Unit Level models with area level variances, and (iii) General Linear Mixed Models (GLMM).

The GLMM was identified to be suitable to model all months except January by comparing the AIC values, root mean square errors and correlation coefficients between observed and predicted rainfall values. GLM was found to be suitable to represent the rainfall of January. Then the rainfall was extrapolated and mapped for other locations in Sri Lanka. Finally, it was noted that the proposed method is better than Kriging to estimate monthly precipitation.

Keywords: General Linear Mixed Models, Kriging, precipitation, rainfall, Small Area Estimation

chathu8911@yahoo.com Tel: 0714621052