
Statistics and Ecology

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Modelling and Prediction for Clustered Count Data with Excess Zeros

Clustered counts with many zeros are typical of data on endangered species, particularly in marine environments, but are difficult to model with available methods. Here we present a general formulation of a mixed effects hurdle model where a novel approach to introducing random effects allows extensions beyond the usual multivariate normality assumption and facilitates inference about dependence between the two parts of the model. We develop empirical best predictors of the random effects and other cluster specific targets and assess their variability via a fast bootstrap. Our research is illustrated using data on critically endangered sharks in the North Atlantic.

SUBHASH LELE, University of Alberta

Population Viability Analysis in the Presence of Observation Error: Consequences and Statistical Inference

Population Viability Analysis (PVA) is used to quantify extinction risk to study populations. These risk calculations strongly depend on the choice of the population growth model and the inclusion of demographic and environmental stochasticity. Another component that is critical is the observation error in the data. We show that inclusion of observation error can be critical in order to conduct proper model selection and PVA. We use data cloning to conduct likelihood based PVA in the presence of observation error, demographic and environmental stochasticity. Extinction risks predicted by with and without observation error models are quite different.

THIERRY DUCHESNE, Université Laval

Statistical Analysis of Animal Movement

A good understanding of the determinants of animal movement is crucial for predicting the spatial organization of animals, for instance to plan animal species reinsertion programs or to steer vaccine drop campaigns to counter disease spread. With the development of tools associated with geographic information systems, substantial information on animal movement has become available and statistical methods to extract this information must be fine-tuned. In this talk we compare two statistical approaches for inference on the determinants of animal movement, one based on conditional logistic regression and the other based on regression models for angular data.