Bayesian modelling with JAGS

Bhutan, 11 – 23 September 2018

outline schedule

as at 16 August 2018 : revised dates

Time slot	What we do	Comments
Before the workshop begins	Before the workshop participants are asked to: 1. **Complete an R Skills Review**. 2. Download and install the necessary software and R packages. 3. Download and preview the materials for Days 1-3. 4. Send in one PPT slide to introduce themselves; these are compiled and used for the "Introductions" session.	**Participants who need travel permits should get these in Thimpu on Mon 10 Sept.**
Tues 11 Sept **evening** ("Day 0") Preliminaries	1. Registration, collect name tags and materials, etc. 2. Workshop overview: "Bayes for Wildlife" 3. Introductions (PPT / round-the-room) 4. Housekeeping, times, code of conduct	
Wed 12 Sept Day 1 Bayesian approach	1. Cross the line activity 2. The Bayesian approach to data analysis and the role of prior information. 3. Essentials of probability theory (and terminology) 4. History of probability concepts 5. Bayesian analysis of a simple model with one parameter. 6. Simple model analysis using JAGS (run from R) and MCMC (Markov Chain Monte Carlo).	Orangutan
Thur 13 Sept Day 2 JAGS; linear models	1. Linear models for regression: JAGS code for regression, priors, checking output for convergence and effective sample size, diagnostic plots. 2. Logistic regression for binomial data: use of link functions, JAGS coding, priors 3. Multiple logistic regression; coding categorical variables in JAGS; interactions. 4. More on the MCMC process in JAGS: adaptation (tuning), burn-in; prior sensitivity.	G&E ants Socks-in-box data
Fri 14 Sept Day 3 Multi-level or hierarchical linear models (GLMMs)	1. Hierarchical or random-effects or partial-pooling models: concept of a random effect; adding random effects to logistic models; JAGS code; priors. 2. Random intercepts and random slopes. 3. Visualising output of GLMMs.	Sock-in-box data continued
Sat 15 Sept	Rest day.	

Sun 16 Sept Day 4 Occupancy modelling	1. Simple occupancy models: joint estimation of occupancy and detection parameters.. 2. Occupancy in JAGS: starting values for latent variable; JAGS model; priors; interpretation. 3. Simulating occupancy data. 4. Occupancy models with covariates: logistic linear predictors for occupancy and detection; standardizing covariates; choice of priors; missing values in covariates; colinearity. 5. Model selection with WAIC and LOO. 6. Species distribution maps from occupancy models.	Salamanders data Willow-tits data
Mon 17 Sept Day 5 Multi-year occupancy; data augmentation	1. Multi-year occupancy models: modelling extinction (or persistence) and colonisation; data requirements; JAGS code; priors; interpreting output. 2. Data augmentation: estimating number of animals or species never detected (all-zero detection histories); example with closed capture data; JAGS code; choice of priors; checking that augmentation is adequate.	Grand skinks data set Kanha tiger data
Tues 18 Sept Day 6 Spatially explicit capture-recapture (SECR)	1. SECR: principles of SECR; data requirements and survey design. 2. Example with rectangular state space: JAGS code; starting values; diagnostics; plotting activity centres. 3. Irregular habitat area: preparing a mask; adapting JAGS code; checking and plotting results. 4. Including covariates for traps and animals. 5. Model checking with posterior predictive simulations.	Fort Drum bears data
Wed 19 Sept	Rest day.	
Thur 20 Sept Day 7 Open SECR models	1. Relaxing SECR's closure assumption: modelling (a) entry/exit, (b) change in AC, (c) both. 2. CJS survival models with SECR-based recapture probabilities. 3. Abundance estimation with AC drift. 4. Abundance estimation with entry/exit. 5. Extending this to multi-year models with abundance and survival.	Ergon & Gardner 2014 Royle et al 2016 Green et al 2018

Fri 21 Sept Day 8 Multi-species occupancy models (MSOMs)	1. Concept of MSOMs; data requirements; data formatting. 2. Fitting occupancy models to observed species as a sample from some community (species as random effects) 3. Modelling species-specific effects 4. Models with habitat and detection covariates	
Sat 22 Sept Day 9 Community parameters from MSOMs	5. Species richness using data augmentation 6. Site similarity (beta diversity) and species similarity 7. Regional summaries and maps 8. Extensions of MSOMs: Dynamic community models, MSAMs.	
Sun 23 Sept Day 10	1. A la carte: review or extensions of topics covered or discussion of participants research projects. 2. General discussion and feedback 3. Closing	