Bayesian analysis with JAGS and R

Kuala Lumpur, 4-10 March 2018

outline schedule

as at 21 Feb 2018

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.	
Sun 4 March Day 1 Preliminaries, Bayesian approach	1. Registration, collect name tags and materials, etc. 2. Workshop overview: "Bayes for Wildlife" 3. Introductions (PPT / round-the-room) 4. Housekeeping, times 5. Essentials of probability theory (and terminology) 6. History of probability concepts 7. Bayesian analysis of a simple model with one parameter. 8. Simple model analysis using JAGS (run from R) and MCMC (Markov Chain Monte Carlo). 9. Linear models for regression: JAGS code for regression, priors, checking output for convergence and effective sample size, diagnostic plots.	PPT, Vitamin C, plant Orangutan: sketch, comb method in Excel Orangutan with JAGS G&E ants.
Mon 5 March Day 2 JAGS; linear models	1. Logistic regression for binomial data: use of link functions, JAGS coding, priors 2. Multiple logistic regression; coding categorical variables in JAGS; interactions. 3. More on the MCMC process in JAGS: adaptation (tuning), burn-in; prior sensitivity. 4. Hierarchical or random-effects models: concept of a random effect; adding random effects to logistic models; JAGS code; priors. 5. Random intercepts and random slopes. 6. Visualising output of GLMMs.	Socks-in-box data

Tues 6 March Day 3 Occupancy modelling	1. Simple occupancy models: joint estimation of occupancy and detection parameters, exploration of likelihood and posterior probability surfaces, correlation among parameter estimates. 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. Species distribution maps from occupancy models.	Salamanders data Willow-tits data
Wed 7 March	Rest day	
Thurs 8 March Day 4 Spatially explicit capture-recapture (SECR)	1. 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. 2. SECR: principles of SECR; data requirements and survey design. 3. Example with rectangular state space: JAGS code; starting values; diagnostics; plotting activity centres. 4. Irregular habitat area: preparing a mask; adapting JAGS code; checking and plotting results. 5. Including covariates for traps and animals.	Kanha tiger data Fort Drum bears data
Fri 9 March Day 5 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	Swiss Breeding Bird Monitoring data
Sat 10 March Day 6 Community parameters from MSOMs	5. Species richness using data augmentation 6. Site similarity (beta diversity) and species similarity 7. Regional summaries and maps 8. Question and answer session. 9. Wrap up.	