Writing Bayesian Hierarchical Models

ESS 575 Models for Ecological Data

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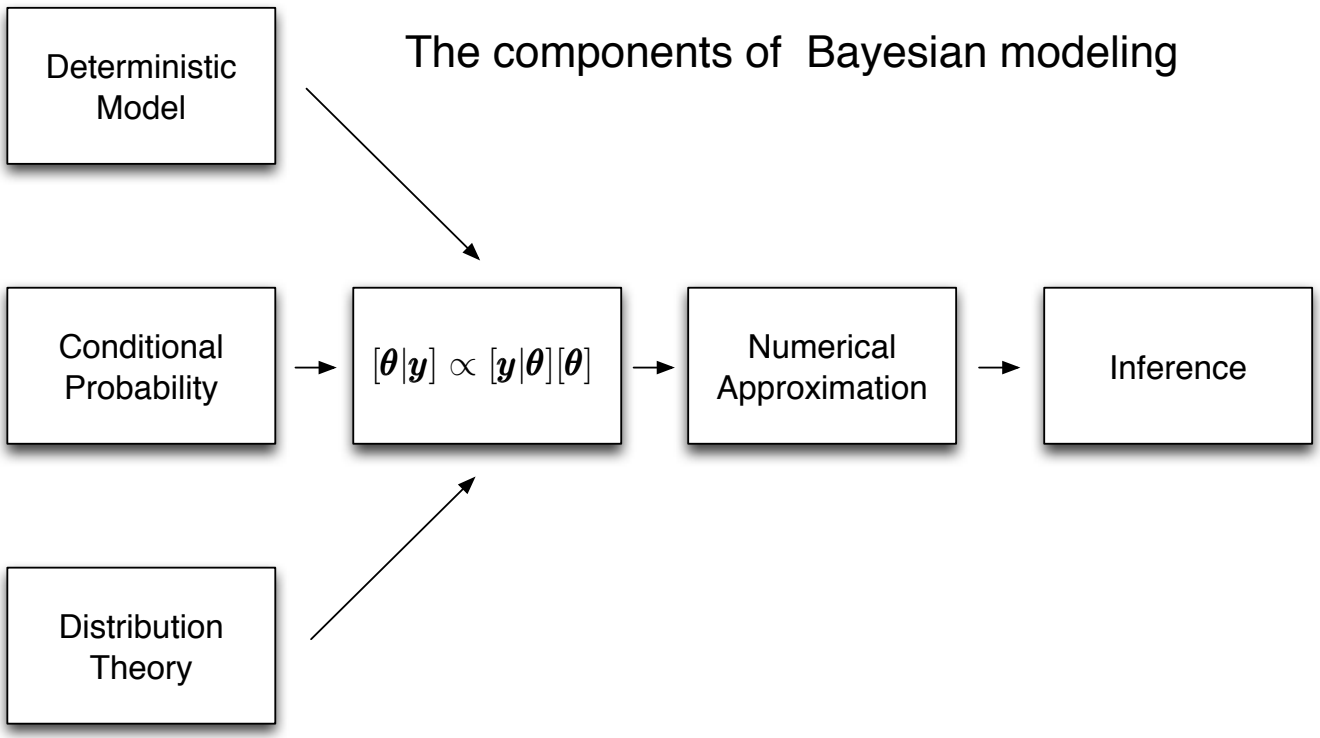
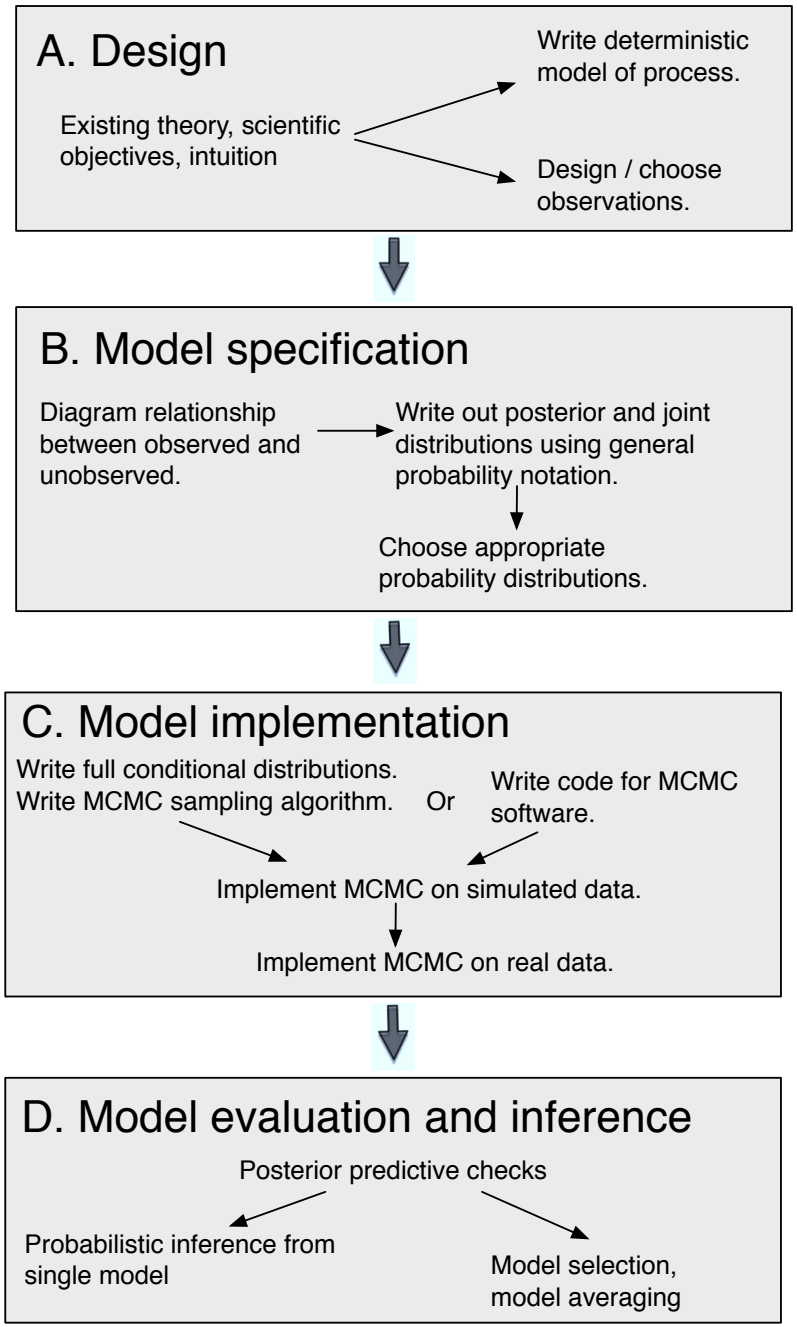
Learning outcomes

1. Explain basic principles of Bayesian inference.
2. Diagram and write out the posterior and joint distributions for Bayesian models.
3. Explain basics of Markov chain Monte Carlo (MCMC).
4. Use software for implementing MCMC methods .
5. Develop and implement hierarchical models.
6. Evaluate model fit.
7. Appreciate possibilities for model selection.
8. Understand papers and proposals using Bayesian methods.

Learning outcomes



Learning outcomes



Applications of Bayesian hierarchical models

- Multi-level models (aka, group level effects. random effects)
- Errors in observations of predictor variable
- Errors in observations of responses
- Mixture models (zero-inflation)
- State-space models
- Ecological forecasting
- Meta-analysis
- Missing data

Board work on light limitation of trees

Things to watch for:

- Modeling parameters
- Sampling error in x's
- Calibration error in y's
- Derived quantities
- Treatment effects
- Differences between species

These will appear in exercise.