Model selection and multimodel inference lab key

Landscape Genetics DGS 2018

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**Conceptual exercise**

1. Considering the guidelines above and the principle of parsimony, what model is the ‘best’ of this set? How do you know?

Model 3 (the human footprint model) because it has the lowest AIC and BIC and/or because it has the highest evidence weight, and also because it is more parsimonious (has fewer variables) than the model competing with it (Model 2).

1. How strong is the evidence for the best model, and how does it differ between AICc and BIC?

There is substantial evidence that this model is closer to truth than Models 1, 4, and 5. This difference is more pronounced with BIC.

1. Why are evidence weights from BIC less equivocal between models than AICc evidence weights?

Because Model 2 is penalized more for additional variables using BIC than AIC.

1. What variables would contribute to a multimodel prediction that would be excluded if only the best model was used?

Shrub, forest, solar insolation, soils, and slope

1. Before starting this analysis, the researcher found that slope was collinear with land cover types therefore did not include them in the same models. What does this mean for inference from the best model?

The mechanism for the influence of agriculture and development may be about flatter areas rather than about land cover.

**Worked example**

1. Why would adding in the last land cover cause a high amount of collinearity? Consider how these data were calculated.

Each land cover variable is the proportion of the line intersecting that land cover, so if you put all of them in, they become perfectly collinear (like using all alleles in other analyses).

1. What did using AICc (rather than AIC) do to inference from these results?

Increased the penalty for each parameter, which changed the best model from model 2 to model 3.

1. How does k relate to the number of parameters in each model?

It adds 3 to the number of variables listed.

1. Find the best model and type its name into R to look at the beta values for the fixed effects. What does this tell you about the influence of land covers on gene flow of Columbia spotted frogs?

Agriculture increases gene flow (decreases genetic distance) and development reduces gene flow (increases genetic distance).