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Eco 602 – Week 8 Reading Questions

10/19/2021

OLS and Likelihood

*I worked independently on these reading questions

Q1. Refer back to sections 7.1 and 8.2 for McGarigal's descriptions of the form of the linear statistical model for the non parametric OLS and parametric likelihood-based inference techniques. Recall that he used the same data to illustrate both paradigms: Brown creeper abundance (response) and proportion of late successional forest (predictor).

Describe the key difference between the non-parametric model (Ch. 7.1) and the parametric model (Ch. 8.1):

The key difference is that the non-parametric model required no particular known probability distribution to be specified beforehand for the stochastic part of the model. Since this non-parametric model doesn't assume any particular underlying distribution, all of the focus is on the sample itself, as it is unable to make an explicit link to the underlying population from which the sample was drawn. The non-parametric model for brown creeper abundance in terms of late successional forest is a linear model, where the ordinary least squares method is used to maximize the best parameters to fit this model. We do not assume that the errors associate with this non-parametric model will follow any particular distribution. The parametric model, on the other hand, does make an assumption that the population parameter errors can be adequately modeled by the normal distribution. Here the deterministic part of the parametric model is still linear, but the stochastic part (aka the errors) assumes the shape of the normal distribution. That is the key difference between these models.

Q2. Interpolation and extrapolation may both be used to make predictions. What is the difference between interpolation and extrapolation?

Interpolation is prediction within a measured range of data, whereas extrapolation is a prediction made beyond the measured range of data.

Q3. Explain why extrapolation has more pitfalls than interpolation.

The problem with extrapolation is that you have nothing to check how accurate your model is outside the range of your data. Interpolation is within your data range so you have a bit more certainty with a model you can fit to the existing data points. You have to be extra cautious when extrapolating values, as it can result in odd and/or incorrect conclusions, especially if you choose an incorrect model.