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Analysis of Environmental Data

Week 12 Reading

1. If you have a data regarding the growth of a fish species in various ponds across Massachusetts in relation to a handful of water quality variables (temperature, conductivity, DO, pH etc.), you will have to choose which predictor variables best explain the variation in growth across the sites. Say you find that temperature explains a large percentage of the variation in the data, and dissolved oxygen explains a smaller, but still substantial percent of the variation, and the other water chemistry variables explain even smaller amounts of variation.

   The tradeoffs inherent in this situation are that the more parameters you include, the better you are able to describe the total variation in fish growth among the sites, however if you were to include all of the parameters in the model you aren't able to accurately interpret which variables are the most influential in predicting fish growth. Thus you have to choose a subset of variables that explain the most variation without undermining the inferences that can be derived from the model. For example, if you choose temperature and dissolved oxygen and omit the rest of the variables, you will still be able to explain a large amount of the variability while maintaining a simple and easily interpretable model with clear mechanistic implications related to the environmental conditions experienced by the fish species of interest.

2. A and B

3. Biomass= -1.7 +(0*.043)+(0*.192)+(0*-.027)= -1.7 grams

4. Biomass= -1.7+(10*.043)+(30*.192)+(20*-.027)

   = -1.7 + 0.43 + 5.76 + (-.54)= 3.95 grams

5. Linear regression is used to predict a continuous response variable based on one or more continuous predictor variables. ANOVA is used to predict a continuous response variable based on one or more categorical predictor variables or grouping factors.

6. $y = \alpha + \beta x$ This is the deterministic part of the equation

7. $+ \epsilon$ This is the stochastic part of the equation (i.e. the residuals)