SDS 439 - Homework 06

Due April 14, 1:00 pm

Batteries

We have a dataset measuring the lifetimes of three different battery types at three different temperatures. At each type x temperature combination, there are four independent observations.

1. Load the data and make an informative plot, showing information about the type, temperature, and lifetimes. Hint: to load the data, use the `read.table` function, as this particular dataset is tab-separated instead of commma-separated.
2. Fit the two-factor additive model, treating lifetime as the response, and type and temperature as the two factors, and print the table.
3. Give a brief description of why each parameter estimate "makes sense".
4. Fit the two-factor interaction model and print the summary table
5. The largest interaction term is between type 3 and temperature 70. Give an interpretation for this term and explain why it makes sense that this is the largest interaction.
6. Now fit a factor numeric interaction model, where type is the factor, and temperature is a numeric covariate, and print the model summary
7. What are the slopes for the three types, and which type has the worst performance with respect to increasing temperature?
8. The factor-factor interaction model is different from the factor-numeric interaction model. Explain how they are different and which of the two models is more flexible.
9. Fit a model that has type as factor, and temperature as numeric, but include linear and quadratic effects of temperature, and the linear and quadratic terms both interact with type. Print the model summary.
10. Which of the previous models is this model equivalant to? If you've implemented it correctly, it should be equivalent to one of the other models you've fit.