Stat 432 Homework 1

Assigned: Jan 24, 2019; Due: 11:59pm Feb 1, 2019

Question 1 (basic R)

Perform the following tasks on the `iris` dataset:

a. Change the class labels of the `Species` variable from `setosa`, `versicolor` and `virginica` to `small`, `median` and `large`, respectively.

b. Change the variable name from `Species` to `Size`. Note that for both questions a) and b), you need to change the original variable, not creating a new variable and replacing the old one.

c. Create a boxplot for the variable `Petal.Length` that shows different boxes for different levels of `Size`.

d. Use a linear model to estimate `Petal.Length` using all other four covariates. Report the coefficients and the most significant variable.

Question 2 (a simple optimization)

Consider a minimization problem with two arguments (the Rosenbrock function):

$$f(x_1, x_2) = (1 - x_1)^2 + 100 \times (x_2 - x_1^2)^2$$

a. Write an R function that takes a vector (of two elements) as the input and output the Rosenbrock function value.

b. Finally, use the `optim()` function to find and report the minimizer.

c. (bonus) Write your own R code of coordinate descent algorithm to obtain the minimal solution. You can choose either Gauss-Seidel or Jacobi implementation.