Final Project - Stat 575

June 20, 2019

Important Dates

- Tuesday, July 2: Email me an annotated R (or R Markdown) output on which your report will be based along with a few paragraphs describing your results. If you have any issues about what you should do in your simulation, write them down for me and I will discuss them with you.
- Wednesday, July 3: Project Presentation, Hard copy due in class

Project Description

The final report for the project should be at least 4 pages that describes the questions of interest, how you used the simulation tehcnique with details on the steps you used in your analysis, your findings about your question of interest and the limitations of your study. Specifically, your report should contain the following:

1. Abstract: A one paragraph summary of what you set out to learn, and what you ended up finding. It should summarize the entire report.
2. Introduction: A discussion of what objectives, background, and theory.
3. Analysis: Describe the necessary steps taken to implement the simulation procedure.
4. Results: Provide inferences about the questions of interest and discussion.
5. Limitations of study and conclusion: Describe any limitations of your study and how they might be overcome and provide brief conclusions about the results of your study.

Project Presentation

Prepare a 10-15 minutes worth of presentation slides which contains significant portions of your project.

Projects Exercises

1. Project 7.A (or 6.A in 1st ed) textbook project
2. Project 7.B (or 6.B in 1st ed) textbook project
3. Project 7.C (or 6.C in 1st ed) textbook project
4. Project 7.D (or 6.D in 1st ed) textbook project
5. Project 8.A (or 7.A in 1st ed) textbook project
6. Project 8.B (or 7.B in 1st ed) textbook project
7. Simulate a Markov chain with the Metropolis algorithm with the Cauchy distribution C(0,1) as a target distribution. Select the following as proposal distributions:

   a. normal pdf with mean 0 and variance 2 as proposal distirbution,

   b. t pdf with degree of freedom 20 as proposal distribution,

   Use histograms, qq-plots and autocorrelation plots to describe your result. How does the simulated Markov chain depend on the variance of the proposal distribution?
8. Present Subsection 10.3.1 (Nearest Neighbor Tests, Section 8.3 in 1st edition) - be sure that you cover the introduction in Section 10.3

9. Present Subsection 10.3.2 (Energy Test for Equal Distributions, Section 8.3 in 1st edition) - be sure that you cover the introduction in Section 10.3
10. Present Section 10.4 (Distance Correlation, Section 8.4 in 1st edition)

Project Assignment

Each student is assigned only one problem. The R result below assigns the problem for each student - represented by his/her initials.

```
set.seed(123)
student <-  c("DE", "KKG", "BG", "KCJ", "SK", "SM", "PAQ", "BR", "CT", "IT")
pres.order <- sample(student, size=10, replace=FALSE)
data.frame(project.exercise = 1:10, initials = pres.order)
```

```
##    project.exercise initials
## 1                 1       BG
## 2                 2       IT
## 3                 3      KKG
## 4                 4       BR
## 5                 5       SM
## 6                 6       CT
## 7                 7       DE
## 8                 8      PAQ
## 9                 9       SK
## 10               10      KCJ
```