Introduction

Lab 1

Elad Zippory

Quant III

September, 14, 2015

Agenda

1. Administration
2. Exponential Family
3. Efficiency in R
4. Simulating Bayes' Theorem in R

Administrative Matters

- Office Hours: Monday, 13:00-15:00.

Administrative Matters

- Office Hours: Monday, 13:00-15:00.

Administrative Matters

- Office Hours: Monday, 13:00-15:00.
- HW submitted in a printed form.

Administrative Matters

- Office Hours: Monday, 13:00-15:00.
- HW submitted in a printed form.
- Provide code snippets WITHIN the body of the answer.

Administrative Matters

- Office Hours: Monday, 13:00-15:00.
- HW submitted in a printed form.
- Provide code snippets WITHIN the body of the answer.
- Provide code files. Should be ready to run AS IS.

Administrative Matters

- Office Hours: Monday, 13:00-15:00.
- HW submitted in a printed form.
- Provide code snippets WITHIN the body of the answer.
- Provide code files. Should be ready to run AS IS.
- You must show ALL of your derivations.

Administrative Matters

- Office Hours: Monday, 13:00-15:00.
- HW submitted in a printed form.
- Provide code snippets WITHIN the body of the answer.
- Provide code files. Should be ready to run AS IS.
- You must show ALL of your derivations.
- If you are using a known result, elaborate why it helps you. Imagine I do not know why you are doing what you are doing.

Administrative Matters

- Office Hours: Monday, 13:00-15:00.
- HW submitted in a printed form.
- Provide code snippets WITHIN the body of the answer.
- Provide code files. Should be ready to run AS IS.
- You must show ALL of your derivations.
- If you are using a known result, elaborate why it helps you. Imagine I do not know why you are doing what you are doing.
- You may discuss a problem with any student in this class, and work together on solving it. This can involve brainstorming and verbally discussing the problem, going together through possible solutions, but should not involve one student telling another a complete solution.

Administrative Matters

- Office Hours: Monday, 13:00-15:00.
- HW submitted in a printed form.
- Provide code snippets WITHIN the body of the answer.
- Provide code files. Should be ready to run AS IS.
- You must show ALL of your derivations.
- If you are using a known result, elaborate why it helps you. Imagine I do not know why you are doing what you are doing.
- You may discuss a problem with any student in this class, and work together on solving it. This can involve brainstorming and verbally discussing the problem, going together through possible solutions, but should not involve one student telling another a complete solution.
- Once you solve the homework, you must write up your solutions on your own, without looking at other people's write-ups or giving your write-up to others.

WTS: binomial $\in$ Exponential Family

- $f(y) = a(\theta)b(y)e^{\eta(\theta)T(y)}$
- $Pr(X = x) = \frac{n!}{k!(n-k)!}p^x(1-p)^{n-x}$
- 1. Show that the binomial is a member of the exponential family
- 2. Find the sufficient statistic and show it is sufficient.
- Whiteboard notes will be available on website.

Why vectorizing is important

- R is created by C and S.

Why vectorizing is important

- R is created by C and S.
- When used properly, R can be fast. Use three principles Vectorize your code, use Base functions and use dedicated libraries written in C.

Why vectorizing is important

- R is created by C and S.
- When used properly, R can be fast. Use three principles Vectorize your code, use Base functions and use dedicated libraries written in C.
- "R Inferno"

Why vectorizing is important

- R is created by C and S.
- When used properly, R can be fast. Use three principles Vectorize your code, use Base functions and use dedicated libraries written in C.
- "R Inferno"
- Your new best friends are at StackOverFlow

Why vectorizing is important

- R is created by C and S.
- When used properly, R can be fast. Use three principles Vectorize your code, use Base functions and use dedicated libraries written in C.
- "R Inferno"
- Your new best friends are at StackOverFlow
- Let's go to R for how to write concise and fast code.

Getting the analytical solution via simulations

- $P(A|B) = \frac{P(B|A)P(A)}{P(B)}$
- Assume we do not know Bayes' Rule. How can we use R to get $P(A|B)$?