ECE/CS 541
Computer System Analysis:
Probability Review II

Mohammad A. Noureddine
Coordinated Science Laboratory
University of Illinois at Urbana-Champaign

Fall 2018

ECE/CS 541: Computer System Analysis. Fall 2018. Based on slides provided by Prof. William H. Sanders and Prof. David Nicol.

Slide 1

Learning Objectives

- Or what is this course about?

- At the start of the semester, you should have
  - Basic programming skills (C++, Python, etc.)
  - Basic understanding of probability theory (ECE313 or equivalent)

- At the end of the semester, you should be able to
  - Understand different system modeling approaches
    - Combinatorial methods, state-space methods, etc.
  - Understand different model analysis methods
    - Analytic/numeric methods, simulation
  - Understand the basics of discrete event simulation
  - Design simulation experiments and analyze their results
  - Gain hands-on experience with different modeling and analysis tools

ECE/CS 541: Computer System Analysis. Fall 2018.

Slide 2

Announcements and Reminders

- HW0 is due tonight @ 11:59 pm
- We will post HW1 tonight
  - Covers the probability review
  - Prepare you for the probability quiz
  - Due on **September 18, 2018 at the start of class**

- Probability quiz on **September 20, 2018**
  - First 30 minutes of class

- Project Proposals due near the first week of October
  - Start forming groups and thinking about your projects
  - Come to office hours for discussions

ECE/CS 541: Computer System Analysis. Fall 2018.

Slide 3

Announcements

distinguished lecture in Computer Science

Google Maps: A Planet-Scale Playground for Computer Scientists

A Distinguished Lecture Sponsored by the Department of Computer Science
Guest Speaker: Luiz Barroso, Google Fellow & Vice President of Engineering, Google
Date/Time: Monday, September 10 at 10 a.m.
Location: 2405 Siebel Center

Abstract: Are there good soba noodle places nearby? How do I get to JFK by train? When does this park close? Show me Stonehenge! Helping people explore and get things done in the real world is the task our team has taken on, and it is a rather challenging one. In this talk I will describe the technical complexity of creating models that reflect the real world for products such as Google Maps, Search and Google Earth.

Bio: Luiz André Barroso, VP of Engineering and a Google Fellow. His team is responsible for collecting and curating maps, local knowledge and imagery data that powers many Google products. He was previously the technical lead for Google's computing infrastructure and has also worked on a number of software infrastructure projects.

Luiz has published several technical papers and has co-authored "The Datacenter as a Computer", the first textbook to describe the architecture of warehouse-scale computing systems, now in its 3rd edition. Before Google, he was a member of the research staff at Digital Equipment Corporation, where his group did some of the pioneering research on modern multi-core processor architectures. Luiz is a Fellow of the ACM and the AAAS, and holds B.S. and M.S. degrees in Electrical Engineering from the Pontifícia Universidade Católica of Rio de Janeiro, and a Ph.D. in Computer Engineering from the University of Southern California.

CS Distinguished Lecture Recordings:
https://mediaspace.illinois.edu/channel/Computer%2BScience%2BLecture%2BSeries/83215181

I ILLINOIS

Today's Lecture

- Review of the basic concepts of probability theory
  1. Independence
  2. Conditional probability & Bayes' rule
  3. Example
  4. Random Variables
  5. Distribution Functions
  6. Common random variables

ECE/CS 541: Computer System Analysis. Fall 2018.

Slide 5

Mandatory xkcd


```
int getRandomNumber()
{
    return 4;   // chosen by fair dice roll.
                // guaranteed to be random.
}
```

- Title text: "RFC 1149.5 specifies 4 as the standard IEEE-vetted number."

ECE/CS 541: Computer System Analysis. Fall 2018.

Slide 6