CSC2206 - System Modeling and Analysis

Peter Marbach

www.cs.toronto.edu/~marbach/csc2206_F20.html

System Modeling and Analysis

- Motivation
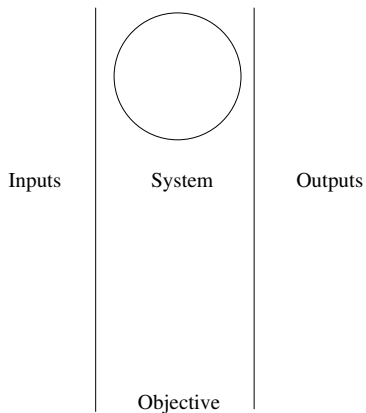- Overview
- Course Organization

Motivation

Goal

- Make you stronger researchers by providing tools to model systems with uncertainty.
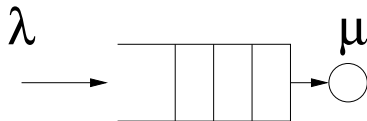
Application Areas

- Machine Learning
- Social Networks
- Online Markets
- Financial Mathematics
- Systems
    - Database Systems
    - Computer Systems
    - Computer Networks

Inputs   System   Outputs

Objective

- Heuristics
- Simulations
- Mathematical Modeling and Analysis

Questions

- Performance of a Given System?
- Performance Change as Systems Changes
- Choose between different Designs
- Optimal Design

Approach

- Mathematical Representation/Model

- Analysis

Why Difficult?

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Goal

- Know Probabilistic Models
- Know when and how to apply them
- Become Stronger Researchers

Outline

- Review Probability Theory
- Poisson Processes
- Renewal Processes
- Markov Chains
- Markov Processes
- Markov Reward Processes
- Dynamic Programming

$->$ **Quality not Quantity**
$->$ **Fundamentals not Applications**
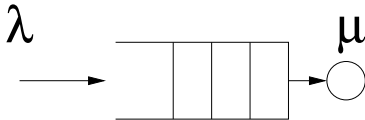
- Lectures
  - Concepts
- Assignments
  - Study and Practice

How to be Successful

- Be Motivated
- Study in Groups
- Keep up with Reading/Material
- Spend Time on Assignments

Course Material

- Text Book:
    - "Discrete Stochastic Processes," R. Gallager.
    - "STOCHASTIC PROCESSES: THEORY FOR APPLICATIONS," R. Gallager
- Reference:
    - "Stochastic Processes," S. Ross
- Lecture Slides

Grading

- 5 Assignments: 15%
- Midterm: 30%
- Final: 55%

Each student has to submit (in Latex and pdf-file) the solutions for one of the assignments.

Email by Friday

- Name and Student ID

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- Schedule
- Assignments
- Lecture Slides
- Reading Assignments