My Mathematics 504 Simulation Modeling and Analysis, CSU Fullerton

Nasser M. Abbasi

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Contents

1 Introduction

This course part of my Masters degree in Applied Mathematics at California State University, Fullerton
Course description (from CSUF catalogue)
MATH 504A Simulation Modeling and: Prerequisites: Math 501A,B; 502A,B; 503A,B. Corequisite: Math 504B. Advanced techniques of simulation modeling, including the design of Monte Carlo, discrete event, and continuous simulations. Topics may include output data analysis, comparing alternative system configurations, variance-reduction techniques, and experimental design and optimization.Units: (3)
MATH 504B Applications of Simulation Modeling Techniques
Description: Prerequisites: Math 501A,B; 502A,B; 503A,B. Corequisite: Math 504A. Introduction to a modern simulation language, and its application to simulation modeling. Topics will include development of computer models to demonstrate the techniques of simulation modeling, model verification, model validation, and methods of error analysis.Units: (3)

1.1 Instructor

Professor Gearhart, W. B. CSUF Math department.

1.2 Class description handout/flyer

PDF

2 Handouts given during the course

We followed mostly the instructor class notes pdf
These are additional handouts given

#	date	description	link
1	Monday 1/22/200	Course description	pdf
2	Monday 1/22/08	A problem in conditional probability (the first simulation HW, confidence interval, histogram)	pdf
3	Monday 1/28/08	Computing project guideline	image
4	Monday 1/28/08	Continuous approximation to random walks	pdf
5	Monday 2/25/08	Problems to practice solving first order pde using the characteristics method	pdf
6	Monday	Craps game and inventory problem. Markov chain computing assignment	image
7	Monday 3/10/2008	Handout on convergent finite markov chains	pdf
8	Monday 3/17/2008	Key solution to problem 5.7 (HW 8)	pdf
9	Monday 3/19/08	Key solution to problem 6.3,6.5 (HW 9)	pdf
10	Wed 4/23/20088	Key solution to problem 10.4 to practice on	pdf
11	Monday 4/28/2008	Chapter 10 supplement. Kolmogorov equations with worked examples showing how to make the Q matrix	pdf
12	Wed 5/7/08	Key solutions to Poisson chapter from lecture notes, chapter 9	pdf
13	Wed 5/7/088	Key solutions to continuous time Markov chains, chapter from lecture notes, chapter 10	pdf
14		Hastings metropolis algorithm lecture 11	pdf

3 study notes,lecture notes

Some notes I did during the course HTML

4 HWs

#	date	description	solution	code	score
1	Wed 2/7/08	Computing Assignment #1 A problem in conditional probability (the first simulation HW, confidence interval, histogram) see first hand out PDF for more details	PDF HTML	Matlab source code file.m	5/5
2	Mon 2/5/08	Derive PDF of Y from an experiment where we switch boxes, uses probability decision tree	PDF HTML		2/2

3	Wed 2/20/2008	The long analytical problem. Problem #4 from handout #3 above. Solving Einstein-Weiner pde using fourier transform	PDF HTML		2/2
4	Wed 2/27/2008	Computing Assignment #2 The limiting process simulation. Show that random walk final position is normally distributed in the limit under the Einstein-Weiner process (see problem 2 in this handout PDF	HTML		2/2
5	Wed 2/27/2008	Problem 3.9 from handouts (probability distribution related to record time distribution)	PDF HTML		2/2
6	Monday 3/3/2008	Computing Assignment #3 Craps game and inventory problem. Markov chain Problem description is here	report PDF HTML	Mathematica notebooks inventory.nb code listing HTML	
7		Practice problems These are 5 problems to practice using method of characteristics to solve first order liner pde. The problems are listed in the handout above. PDF	PDF HTML		2/2
8	Monday 3/10/2008	Problem 5.7 from lecture notes (Irreducible matrix, analytical problem) Problem description here Key solution is PDF	PDF HTML		2/2
9	Monday 3/17/08	Problems 6.3 and 6.5 from the handout Description here Solution key PDF	PDF HTML		2/2

10	Wed 4/16/2008	These problem related to Hastings-Meropolis algorithm. And Proofing a Markov chain is irreducible, regular and time inverse. Implemented the simulation using Mathematica	PDF HTML Graded solution. (Entered some data wrong for the numerical problem. corrected) PDF Key solution PDF	1. 8.5 part (a) code Hastings simulation. notebook PDF 2. 8.5 part(b): direct construction of p matrix from q and π. notebook PDF	4/4
11	Wed 5/7/2008	Problems 10.5 and 10.6 These deal with continues time markov chains. To determine rate of arrival and departure for birth/death process	PDF HTML		
12	Wed 5/7/2008	Computer problem, problem 12.3 in lecture notes. Simulation of problem 10.5 in above HW. Repair shop problem	PDF key Matlab code given file.m	Matlab function file.m	4/4

13	Wed 5/7/2008	Problems 9.3 and 9.5 (On Poisson process)	PDF HTML	Small Mathematica function for problem 9.5 to plot $P(X = n)$ notebook	

5 Challenge Problems

These are extra problems relating to first midterm the instructor gave the class to try to work out. Here are the questions image image
This is my solution so far HTML

6 Links

1. Mathworks SimEvents `http://www.mathworks.com/products/simevents/description2.html`
2. Free demo of extend `http://www.extendsim.com/prods_demo.html`
3. Started to make comparison between some simulation packages. Here is a link. This is not complete HTML