یازدهمین کارگاه فرآیندهای تصادفی و کاربردهای آن

۵ و ۶ تیر ماه ۱۳۹۲

دانشگاه صنعتی اصفهان - دانشکده علوم ریاضی

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The 11th International Iranian Workshop on Stochastic Processes and Their Application

Isfahan University of Technology, 26 -27 June. 2013

دفترچه راهنمای
یازدهمین کارگاه فرایندهای
تصادفی و کاربردهای آن

دانشکده علوم ریاضی – دانشگاه صنعتی اصفهان

چهار شنبه ۹۲/۰۴/۵ و پنج شنبه ۹۲/۰۴/۶

محل برگزاری کارگاه : تالار خوارزمی، دانشکده علوم ریاضی

دبیر علمی و اجرایی کارگاه: دکتر صفیه محمودی، عضو هیئت علمی دانشگاه صنعتی اصفهان

اعضای کمیته اجرایی:

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زهرا مؤمنین، دانشجوی کارشناسی ارشد آمار، دانشگاه صنعتی اصفهان

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پشتیبان : دانشگاه صنعتی اصفهان

جدول زمان‌بندی برنامه‌های یازدهمین کارگاه آموزشی فرایندهای تصادفی و کاربردهای آن:

چهارشنبه ۱۳۹۲/۰٤/٥ (صبح)

۸:۳۰-۸:۰۰ پذیرش

۹:۰۰ — ۸:۳۰ افتتاحیه

۱۰:۳۰ — ۹:۰۰ دکتر احمد رضا سلطانی (دانشگاه کویت و دنشگاه شیراز)

۱۱:۰۰- ۱۰:۳۰ پذیرایی

۱۲:۳۰-۱۱:۰۰ دکتر کسری علیشاهی (دانشگاه صنعتی شریف)

چهارشنبه ۱۳۹۲/۰٤/٥ (عصر)

۲:۳۰ — ۲:۰۰ بهنام امیری (دانشگاه شیراز)

۳:۰۰ — ۲:۳۰ محمد صابر (دانشگاه شیراز)

۴:۰۰ — ۳:۰۰ دکتر غلامرضا امیدی (دانشگاه صنعتی اصفهان)

۴:۳۰ — ۴:۰۰ پذیرایی

۵:۰۰ — ۴:۳۰ دکتر عاطفه زمانی (دانشگاه شیراز)

۵:۳۰ - ۵:۰۰ محمدرضا محمودی (دانشگاه شیراز)

۶:۰۰ - ۵:۳۰ حسین حق بین (دانشگاه شیراز)

۱۰:۳۰-۶:۳۰ **گشت و گذار در اصفهان (میدان امام)**

پنجشنبه ۱۳۹۲/۰٤/٦ (صبح)

۱۰:۰۰ — ۸:۳۰ دکتر کسری علیشاهی (دانشگاه صنعتی شریف)

۱۰:۳۰-۱۰:۰۰ دکتر حسن داداشی (دانشگاه زنجان)

۱۱:۰۰ — ۱۰:۳۰ پذیرایی

۱۲:۳۰ - ۱۱:۰۰ دکتر علی دولتی (دانشگاه یزد)

پنجشنبه ۱۳۹۲/۰٤/٦ (عصر)

۳:۰۰- ۲:۳۰ ام البنین بزرگ (دانشگاه یزد)

۳:۳۰- ۳:۰۰ آمنه میرنیام (دانشگاه شیراز)

۴:۰۰-۳:۳۰ بهزاد کفاش (دانشگاه یزد)

۴:۳۰-۴:۰۰ پذیرایی

۵:۰۰ — ۴:۳۰ ندا اسماعیلی (دانشگاه صنعتی شریف)

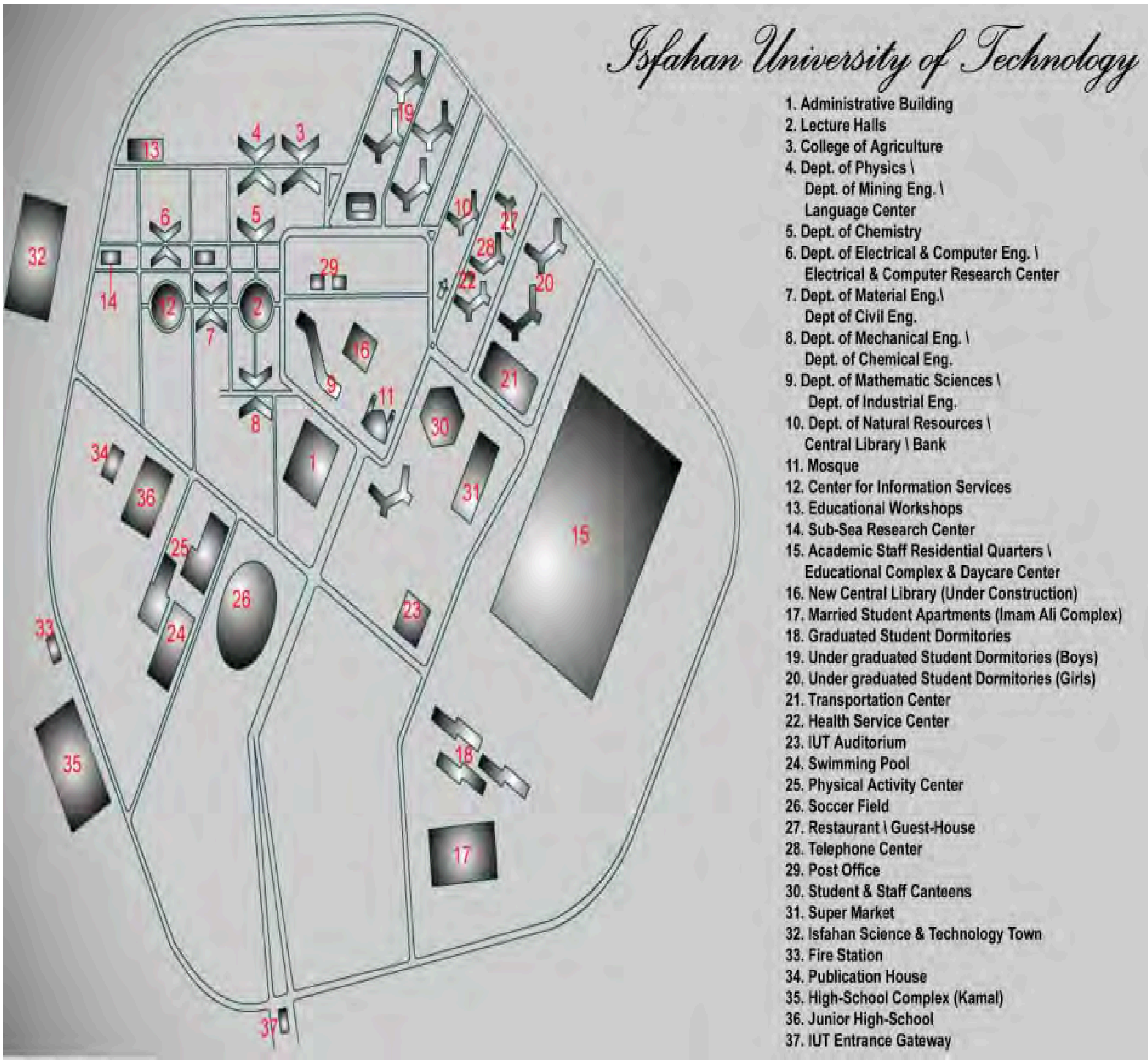
۵:۳۰-۵:۰۰ دکتر رسول روزگار (دانشگاه یزد)

۶:۰۰ - ۵:۳۰ بهزاد کفاش (دانشگاه یزد)

۶:۳۰ - ۶:۰۰ نجمه احمدی (دانشگاه شیراز)

۷:۰۰- ۶:۳۰ اختتامیه

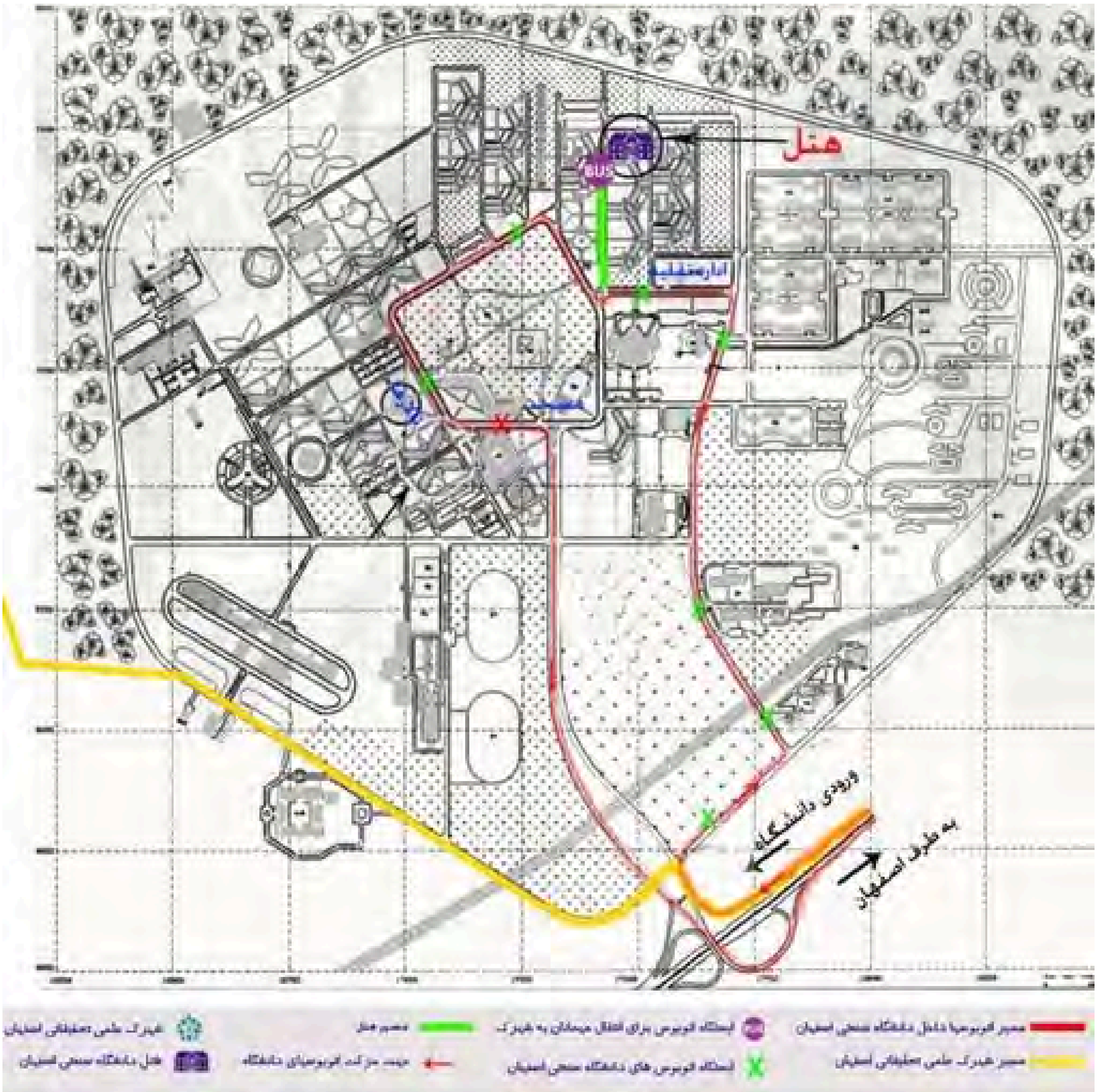
نقشه دانشگاه صنعتی اصفهان



شماره تلفن‌های مورد نیاز:

18 (0311-3912210)	**مرکز تلفن دانشگاه**
2575 (0311-3912575)	**مهمانسرای دانشگاه**
3800 (0311-3913800), 5050 (0311-3915050)	**تاکسی تلفنی دانشگاه**
0311-3912601	**دانشکده علوم ریاضی**

نقشه دانشگاه صنعتی اصفهان:



Aims of the workshops and the research teams

Aims and Scopes. To have 2 workshops per year, dedicated to specific research subjects of current interest. A Research Team (RT) will be formed for each subject. A participant is expected to be a member of an RT and be actively engaged with the research proposals set by the RT. Faculty members, doctoral students, and outstanding master students in all areas related to the probability and stochastic processes are encouraged to apply for the membership in one or more appropriate research teams.

Research Subjects and Headers.

1. Infinite Dimensional Processes, Gaussian, Stable, PC and Simple.
Head Research: Dr. Safiah Mahmoodi.
Email: mahmoodi@cc.iut.ac.ir

2. Simple processes, Car processes.
Head Research: Prof. A.R. Soltani.
Email: soltani@kuc01.kuniv.edu.kw

3. Inference on Stochastic Models.
Head Research: Dr. Mohammadpour
Email: m.mohammadpour@umz.ac.ir

4. Structural Representation for Stable Processes.
Head Research: Dr. A. Parvardeh
Email: afshin382@yahoo.com

5. Polynomials with Random Coefficients.
Head Research: Dr. S. Rezakhah
Email: Research Team Members: Prof. A.R. Soltani, Dr. S. Mahmoodi

6. Probability Theory for Random Mixtures.
Head Research: Prof. A. R. Soltani

7. Stable Distributions and Related Distributions.
Head Research: Prof. A. R. Soltani Contact Address; As above

8. Stochastic Analysis and Related Topics.
Head Research: Prof. B. Zangeneh
Email: zangeneh@sina.sharif.edu

9. Spectral Density Estimation and Time Series Modelling
Head Research: A. Nematollahi
Email: nematollahi@susc.ac.ir

10. Inference for Stable Distributions
Head Research: Dr. A. R. Nematollahi Contact Address; As above

11. Self Similar Processes, Modelling and Inference
Head Research: Dr. S. Rezakhah Contact Address; As above

12. Point Processes
Head Research: Dr Varcehei Contact Address;
Email: varsei@quilan.ac.ir

13. Mathematical Finance
Head Research: Dr Zamani Contact Address; As above

14. Functional Stochastic Analysis
Head Research: Dr Jahanipour
Email: jahanipu@Kashanu.ac.ir

15. Semi-Markov and Reward Processes
Head Research: Dr K. Khorshidian
Email: khorshidian@sucs.ac.ir

16. General Autoregressive Conditional Heteroscedasticity
Head Research: Dr Hamidreza Amindavar
Email: hamidami@aut.ac.ir

17. Stochastic Optimizations
Head Research: Dr A. Ahmadi Javid
Email: Ahmadi_javid@aut.ac.ir

18. Dependence Structure and Copula Theory
Head Research: Dr A. Ahmadi Javid
Email: Ahmadi_javid@aut.ac.ir

19. Stochastic Networks and Optimization
Head Research: Dr. S. Mehdi Hashemi
Email: hashemi@aut.ac.ir

Abstracts

Spatial Scan Statistics

Ahmad Reza Soltani (سخنران مدعو)

Zeta Function and Random Prime Numbers

Kasra Alishahi (سخنران مدعو)

The 11th International Iranian Workshop on Stochastic Processes and Their Application

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Application of Copulas in Stochastic Process

Ali Dolati (سخنران مدعو)

Department of Statistics, College of Mathematics, Yazd University

Abstract: Copulas are multivariate distributions with univariate uniform (0,1) marginals. In this talk we review the relationship between copulas and stochastic processes. It will discuss that many properties of stochastic processes and known theorems in stochastic process can be given alternative and in most cases simpler proofs via copulas.
The topics will covered in this talk is as follows:
(1) Copulas and their basic properties
(2) Relations between copulas and basic concepts in stochastic processes that could be characterized by copulas
(3) Some open questions in this field.

The chromatic number of random graphs

G. R. Omidi (سخنران مدعو)

Department of Mathematical Sciences, Isfahan University of Technology, Isfahan

School of Mathematics, Institute for Research in Fundamental Sciences (IPM)

Abstract: One of the most interesting parameters of a graph G is it's chromatic number ($\chi(G)$), namely the minimum number of colors required to color its vertices so that no pair of adjacent vertices has the same color.

The classical model of random graphs, in which each possible edge on vertices is chosen independently with probability p , is denoted by ($G(n,p)$). This model, introduced by Erdos and Renyi in 1960, has been studied intensively in the past four decades.

The chromatic number of random graphs is a topic that has attracted considerable interest since the breakthrough achieved by Shamir and Spencer, which marked one of the first applications of martingales in combinatorics. The asymptotic behavior of (($\chi\big(G(n,p)\big)$) has been studied intensively during the last 20 years of the 20th century and finally has been completely solved by Bollobas for the case of dense graphs and by Luczak for all remaining values of probability. The key ingredient of both proofs was the use of martingales. Recently, the study of chromatic number of random graphs has been developed significantly. In this lecture, I will present a survey on this problem.

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An Efficient Algorithm for Solving the Stochastic Optimal Control Problem: Some Experiences from Merton's Problem

[1,2]Behzad Kafash, [2]Ali Foroush Bastani and [1]Ali Delavarkhalafi

[1]Faculty of Mathematics, Yazd University, Yazd,

[2]Department of Mathematics, Institute for Advanced Studies in Basic Sciences, Zanjan

Abstract: Dynamic optimization problems with uncertainties are usually modelled as continuous time and space stochastic optimal control problems. *Bellman's dynamic programming* approach via the Hamilton-Jacobi-Bellman (HJB) equation and *Pontryagin's maximum principle* method represent the most well-known methods for solving optimal control problems. The HJB equation is a nonlinear first order hyperbolic partial differential equation which is used for constructing a nonlinear optimal feedback control law. This equation has no analytical solution in general and finding a numerical solution is at least the most logical way to treat it. The study of numerical methods has provided an attractive field for researchers of mathematical sciences which has resulted in the appearance of different numerical methods and efficient algorithms to solve the optimal control problems.

In this work, we attempt to solve the stochastic optimal control problems by using the Markov chain approximation method. This technique introduced by Kushner in his pioneering work [Kushner, H.J. and Dupois, P.G., *Numerical Methods for Stochastic Control Problems in Continuous Time*, 2nd Edition, Springer-Verlag, (2001)], is a numerical procedure based on Markov chain approximation techniques. We also introduce a computational algorithm based on policy space iteration and finally we show the performance of this algorithm on a test case with a famous explicit solution, namely the Merton's optimum consumption/portfolio problem.

Key words: Stochastic optimal control problems, Dynamic programming principle, Markov chain approximation method, Merton's consumption/portfolio problem.

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A new estimator for ordinary kriging

[1]Mohammad M Saber, [1]Behnam Amiri A, [1]Mehrdad Taghipour,[1] Zohreh Shishebor

[1]Department of statistics, Shiraz University

Abstract: Spatial data sets are analyzed in many scientific disciplines. Kriging, i.e. minimum mean squared error linear prediction, is probably the most widely used method of spatial prediction. Although it is an unbiased estimator that has minimum mean squared error, it necessarily does not have minimum MSE in the class of all linear estimators without unbiasedness condition. In this work, a biased estimator will be introduced that has less mean squared error than previous estimator.

Key words:

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Key words: Stochastic optimal control problems, Dynamic programming principle, Markov chain approximation method, Merton's consumption/portfolio problem.

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Stochastic Optimal Control Problems: Theory, Financial Application and Simulation

[1,2]*Behzad Kafash*

[1]Imam Javad University College, Yazd, Iran.

[2] Faculty of Mathematics, Yazd University

Abstract: Control theory is a branch of optimization theory. It deals with finding a control law for a given system such that a cost is minimized or a payoff maximized. Stochastic optimal control is a subfield of control theory. Many problems in modern financial economics involve the solution of continuous time, continuous state stochastic optimal control problems. In a stochastic optimal control problem we seek to minimize the expected cost functional

$$J(s,y;u)=\mathbb{E}_{sy}\int_s^T L(t,x(t),u(t))dt+\psi\big(x(T)\big).$$

subject to stochastic differential equation

$$dx(t)=f\big(t,x(t),u(t)\big)dt+b\big(t,x(t),u(t)\big)dW(t)$$

with initial condition

$$x(s)=y.$$

where y is a given vector in $\mathbb{R}^n$. And $x(t)\in X\subseteq\mathbb{R}^n$ is the state process, $u(t)\in U\subseteq\mathbb{R}^m$ is the control process, $W(t)$ is a Wiener process, $f\big(t,x(t),u(t)\big)$ is a drift, and $b\big(t,x(t),u(t)\big)$ is diffusion. An effective tool in analyzing stochastic control problems is dynamic programming, which leads to a PDE called the Hamilton-Jacobi-Bellman equation. So, our problem reduces to solving this PDE. In fact, some technical rigor required is provided by the Verification Theorem. Also, the field of stochastic control has developed greatly since the 1970s, particularly in its applications to finance. Robert Merton [Merton. R., Continuous Time Finance, Blackwell (1990)] used stochastic control to study optimal portfolios of safe and risky assets. In this work, solution of stochastic optimal control problems via Hamilton-Jacobi-Bellman equation is presented and some examples are investigated.

Key words: Stochastic optimal control problems, Dynamic programming principle, Hamilton-Jacobi-Bellman (HJB) equation

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Likelihood-based inference in autoregressive models with scaled t-distributed innovations by means of EM-based algorithms

[1]*H. Haghbin and A. R. Nematollahi*

Department of Statistics, Shiraz University

Abstract: This paper proposes the ECME algorithm to find the maximum likelihood estimates of model parameters in general AR models with independent scaled t-distributed innovations whenever degree of freedom is unknown. The ECME, sharing advantages with both EM and Newton-Raphson algorithms, is an extension of ECM, which itself is an extension of the EM algorithm. The ECM and ECME algorithms which are analytically quite easier than the non-iterative methods are then compared. A simulation study also provided to show the performances of ECME with respect to the ECM. We conclude that the ECM method would take the less iteration, however, the ECM method takes more computational time than the ECME update.

Key words:

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On the asymptotic distribution for the periodogram of simple Processes

[1,2]A. R. Soltani, [1]A.R. Nematollahi, [1]M. R. Mahmoudi

[1,]Department of statistics, Shiraz University, Shiraz, Iran

[,2]Department of Statistics and Operation Researches, Kuwait University

Abstract: A simple random measure is a finite sum of random measures with disjoint supports. A type of simple random measure which is induced by a multivariate random measure $(\Phi_1, \ldots, \Phi_m)$ and measurable mappings $T_1, \ldots, T_m$ is considered. According to this, Soltani and Parvardeh (2006) introduced a class of processes, called simple, including stationary processes and discrete time periodically correlated processes. A new approach for obtaining the asymptotic distribution for the periodograms of time series data sampled from a discrete time periodically correlated second order process is established by Soltani and Azimmohseni (2007). In this work, the periodogram for the simple processes is introduced and following Soltani and Azimmohseni (2007), the time dependent spectra of the simple processes together with an auxiliary operator which is defined here is employed to establish the asymptotic properties of the periodogram for these processes

Key words:

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A note on statistical inference for the parameters of the vector AR models with multivariate t-distributed innovations

A.R. Nematollahi and A.S. Mirniam

Department of statistics, Shiraz University, Shiraz, Iran

Abstract: This lecture proposes the EM algorithm and its extensions (ECM and ECME), to find maximum likelihood estimators of unknown parameters when the vector AR(1) model with multivariate t-distributed innovations is considered. Also the foresaid algorithms; EM, ECM and ECME, are studied and compared to find the best one in the sense of the rate of convergence.

Key words:

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New formulas for one and two dimensional divided differences with multiple nodes

Rasool Roozegar

Department of Statistics, Yazd University

Abstract: The notion of one dimensional divided difference was introduced by T. Popoviciu in 1934. Many properties of these differences were obtained by D. V. Ionescu. The well-known formula for divided differences with multiple nodes has played an important role in applied mathematics, particularly in numerical analysis and polynomial interpolation. The aim of this paper is to present new formulas for one and two dimensional divided differences in the case of multiple knots. These formulas have simpler form than the known formulas given in the literature.

2010 Mathematics Subject Classification. Primary 41A63; Secondary 41A05, 65D05.

Key words: Divided difference, multiple nodes, one and two dimensional.

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Tests for Detecting Hidden Periodicities in Functional Time Series

A. Zamani and Z. Shishebor

Department of Statistics, Faculty of Science, Shiraz University

Abstract: In time series analysis, it is of interest to know whether there is a periodic component in the data or not. For this purpose, different testing procedures are applied in real data case. The aim of this paper is to extent the concept of hypothesis testing for detecting hidden frequencies, such as Fisher's test, to the case of functional data analysis.

Key words: Functional Time Series, F-test, Hidden Frequencies, Periodograms.

On Convolution of Dependent Random Variables

N. Ahmadi and A. Dolati

Department of statistics, Shiraz University

Department of Statistics, Yazd University.

Abstract: Many problems in mathematical probability theory involve the computation of the distribution function for the sum of random variables. It is well known that the distribution of sums of variables is the convolution of marginal distributions in the case of independence, no general characterization has been given to the general case of sums of dependent variables. In this talk we review recent results on the concept of convolution to dependent variables, using the theory of copulas.

Key words:

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Large Deviation Principle for mild solutions of Stochastic Evolution Equations with Multiplicative Levy Noise

H. Dadashi

Department of Mathematics, IASBS, Zanjan

Abstract: We demonstrate the large deviation principle in the small noise limit for the mild solution of stochastic evolution equations with monotone nonlinearity and multiplicative Levy noise. This is achieved using a variational representation of exponential integrals w.r.t. Levy noise. An Ito-type inequality is one of the main tools in the proofs. Our framework covers a wide range of parabolic, hyperbolic and delay differential equations. We give some examples to illustrate the applications of the results.

Key words:

Finite Element Methods for Parabolic Stochastic PDE's

N. Esmaeili

Department of Mathematical Sciences, Sharif University of Technology

Abstract: Stochastic partial differential equations, or SPDEs, have been widely used to model many applications in engineering and mathematical sciences. Thus, a number of numerical methods have been developed to solve stochastic partial differential equations. The present article focuses on the finite element method for stochastic parabolic partial differential equations driven by space-time white noise in one dimensional case. The discretization with respect to space is done by piecewise-linear tent-finite elements and in time one-step theta schemes are applied.

Key words:

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ترکیب توزیع حدی و مدل مارکف پنهان جهت مدامندی(مدلسازی) بادهای حدی (منطقه مورد مطالعه: غرب میانه ایران)

حسن شرقی قلعه جوق، بهنام امیری آقبلاغ، اکبر آبروش، زهرا مفاخری

چکیده: در این مقاله مدل زنجیر مارکف پنهان HMM برای تشریح سری زمانی بادهای حدی مورد استفاده قرار گرفته است. در این مدل چندین توزیع مقدار غایی برای تشریح نوسانات سرعت بادهای حدی بکار گرفته می شود. و چرخش بین مدل های مختلفبا استفاده از یک مدل مارکف پنهان، که نشانگر چرخش بین وضعیت های مختلف می باشد، کنترل و مدلبندی می شود.ما این مدل را(EVHMM (Extreme Value Hidden Markov Model می نامیم. این مدل برای داده های شبیه سازی شده دقت برازش مدل را به خوبی نشان می دهد در ادامه مدل را برای داده های حدی باد در مناطق غربی ایران بزارش داده و با مدل " توزیع حدی عام" که برای مدلبندی داده های حدی به کار می رود مقایسه می کنیم

داده‌های مورد نیاز از شبکۀ ایستگاههای همدیدی سازمان هواشناسی (حداقل با ٤٠ سال آمار پیوسته از بدو تاسیس تا سال ٢٠٠٦) از ٥ ایستگاه مستقر در غرب میانه ایران استخراج شد. بررسی‌ها نشان داد توزیع EVHMM برای مقادیر حدی، دارای برازش بیشتری با داده‌های سریع‌ترین بادهای رخ دادۀ ماهانه دارند و با استفاده از ان بهتر می توان به مدل بندی و تحلیل شدت وزش باد پرداخت.

ما مدل EVHMMرا برای بادهای حدی ایران اجرا نموده و با استفاده از براورد پارامترها با الگوریتم EM، نتایج حاصله را مورد تجزیه و تحلیل قرار می دهیم نتایج حاصله نشان می دهد مدل تطبیق داده شده قابل تفسیر بوده و یک تشریح خوب برای داده ها همانند توزیع حاشیه ای، بدست می آورد. در ادامه با استفاده از الگوریتم Viterbi یک معیار مناسبی برای تشخیص ساختار دوم یا همان ماه ها و سال های بادخیز و آرام را مشخص نموده و می توان این چرخه نوسانی بین سال های باد خیز و آرام را مورد تحلیل و برسی قرار داد.

واژگان کلیدی:

List of participants:

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