In the Name of God

The 15th Workshop in Applied Stochastic Processes

ABSTRACTS

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Golestan University

Gorgan, Iran

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Neda Esmaeili
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Dr. Omid Naghshineh Arjmand
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Dr. Mahmoud Taheri
Hadi jamshidi
Dr. Navideh Modarresi
Parisa Ahmadi
Ali khezeli
Dr. Mehrnaz Mohammadpour

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ORAL PRESENTATION

A New Markov Switching Model With Logistic Weights

N. Alemohammad[1], S. Rezakhah[2] and S. Hosseinalizadeh[3]

[1] *Department of Mathematics and Computer Science, Shahed University, Tehran, Iran.*

[2] *Faculty of Mathematics and Computer Science, Amirkabir University of Technology, Tehran, Iran.*

[3] *Department of Computer Engineering and Information Technology, Qazvin Branch, Islamic Azad University, Qazvin, Iran.*

Abstract: This paper is devoted to study a Markov switching model where in states we have the smooth transition ARCH models with different volatilities. The asymptotic behavior of the second moment is investigated and an upper bound for it is calculated. A Bayesian strategy is used to estimate the parameters. A dynamic programming algorithm for the forecasting is proposed. Finally we illustrate the efficiency of the model by simulation and forecasting the volatility. We show that this model provides a much better forecast in comparison to the smooth transition ARCH model.

Bayesian Reconstruction in Lévy Distribution

Isaac Almasi and Adel Mohammadpour

Department of Statistics, Faculty of Mathematics & Computer Science, Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran.

Abstract: Let $Y_1, \cdots, Y_n$ be order statistics from a Lévy distribution with parameter θ. Assume that some of middle order statistics are lost, that is we only observed the data set $Y = \{Y_1, \cdots, Y_r, Y_s, \cdots, Y_n\}$. We are going to reconstruct the $l(r < l < s)$th order statistic based on the data set Y. It should be noted that variance of order statistics of Lévy distribution do not exist. Therefore, we limit ourselves to use the order statistics for which the moments exist. In this work, we propose two methods: Maximum Likelihood Reconstruction(MLR) and Bayesian Reconstruction(BR). To compute MLR, if θ be known, we obtain closed form for reconstruction Y_l. However, if θ is unknown, in this case, first we obtain MLE's θ by EM algorithm, then reconstructed Y_l by maximum likelihood approach. The next method for reconstruction Y_l is the Bayesian approach. In this approach, we assume that the unknown parameter θ is viewed as the realization of a random variable which has a prior distribution. A numerical method has to be applied to compute the BR. Also, numerical example and Monte Carlo simulation study of the Lévy distribution are given to illustrate all the reconstruction methods discussed in this work. To evaluate the estimators, we compute Mean Square Reconstruction Errors for the MLR and BR reconstructions. Finally, we conclude BR is better than MLR.

Dynkin Games and Asymmetric Information

Neda Esmaeeli

Department of Statistic, Sharif University of Technology, Tehran, Iran.

Abstract: The talk will contain two parts: In the first part we will introduce the concept of game contingent claims (GCC in brief) with a short review of American contingent claims in a general framework. From a financial point of view, a game contingent claim could be seen as a generalization of the notion of American contingent claims, where not only has the buyer (or holder) the right to exercise at any time before the maturity, but also the seller (or issuer) has the right to cancel the contract at any time before the maturity time. This is a typical optimal stopping game which is known as a zero-sum Dynkin game which was introduced by Dynkin as an extension of the optimal stopping problems. In the second part, we will place ourselves in the framework of asymmetric information. It is a situation in which one party in a transaction has more or superior information compared to another. This extra information could be for example, a noisy signal of a functional of the final value of the assets. Since a filtration usually encodes a flow of information, it is natural to model extra information by an enlargement of a filtration. We will present an introduction to the enlargement of filtrations. Finally we will mention some results about a Dynkin game with asymmetric information in a special case.

Structure of continuous time ARMA processes driven by semi-Levy measure

N. Modarresi[1] and S. Rezakhah[2]

[1] *Faculty of Mathematics and Computer Science, Allameh Tabataba'i University, Tehran, Iran.*

[2] *Faculty of Mathematics and Computer Science, Amirkabir University of Technology, Tehran, Iran.*

Abstract: Continuous-time autoregressive moving average (CARMA) processes of order(p; q) with a nonnegative kernel and driven by a nondecreasing semi-Levy process constitute a useful and general class of non-stationary process with periodically stationary increments. Motivated by this we introduce periodically divisible distribution and it's relation to semi-Levy random measure. For representation of the subordinator we use semi-Levy Poisson process with a special intensity parameter. The moments and asymptotic behavior of the introduced model with some specified properties are presented. We show that this process is well defined without having to assume further conditions on the driving process.

A Hyperexponential Approximation to Finite- and Infinite-time Ruin Probabilities of Compound Poisson Processes

Amir T. Payandeh Najafabadi

Department of Statistic, Shahid Beheshti Univeraity, Tehran, Iran.

Abstract: Consider the problem of evaluating infinite-time (or finite-time) ruin probability under a given compound Poisson surplus process. Such problem leads to a integro-differential equation which cannot be solve analytically. This article approximates claim size distribution by a finite mixture exponential, say Hyperexponential, distribution. Then, it restates the corresponding integro-differential equation as a solvable ordinary differential equation (or a partial differential equation for finite-time ruin probability). Application of our findings has been given though a simulation study. Improvement of our findings compare to the Crammer-Lundberg upper bound has been given.

Harmonizable Processes: Spectral Characterization and Estimation

A. R. Soltani

Department of Statistics and Operations Research, Faculty of Science, Kuwait University Kuwait.

Abstract: Harmonizable processes form a wide class of stochastic processes including stationary processes, periodically correlated processes and simple processes. In this research we provide a spectral characterization for harmonizable processes. Then provide certain examples. We also introduce corresponding periodogram for the spectral estimation and give certain guideline for the estimation procedure.

Application of a Functional Equation to Characterization of the Generalized Pareto Distribution

Mahdi Tavangar

Department of Statistic, Isfahan University of Technology, Tehran, Iran.

Abstract: The problem of characterizing a probability distribution on the basis of some properties of a random sample is extensively studied in the literature. This subject of characterization is mainly useful in the area of goodness of fit tests. It is well-known, in the literature, that most of the characterization results on exponential distribution are based on the solution of Cauchy functional equation and integrated Cauchy functional equation. In this talk, we give some new characterization results on the generalized Pareto distribution (which includes the exponential, Pareto and power distributions) based on the concepts of conditional random variables and progressively Type-II right censored order statistics. We prove the main results without restricting to distributions that are absolutely continuous with respect to Lebesgue measure.