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ACADEMIA ROMÂNĂ  
Institutul de Statistică  
Matematică și Matematică  
Aplicată „Gheorghe Mihoc –  
Caius Iacob”

## A 19-a CONFERINȚĂ A SOCIETĂȚII DE PROBABILITĂȚI ȘI STATISTICĂ DIN ROMÂNIA

Universitatea Tehnică de Construcții București

27 mai 2016

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# PROGRAMUL CONFERINȚEI SPSR 2016

Vineri 27 mai

Facultatea de Construcții Civile, Industriale și Agricole, UTCB  
Bd. Lacul Tei 124, sector 2, clădirea Rectorat

## Secțiuni:

1. Probabilități și Procese Stocastice
2. Statistică
3. Optimizări
4. Actuarial și Matematici Financiare

9:30 – 10:00 *Primirea participanților (sala I2)*

10:00 – 10:30 *Deschiderea Conferinței (sala I2)*

Mesajul Rectorului UTCB

Cuvântul Acad. Ioan Cuculescu

10:30 – 10:45 *Adunare generală a SPSR (sala I2)*

10:45 – 11:00 Pauză de cafea

11:00 – 12:30 Comunicări pe secțiuni (sălile I2, L1, L3)

12:30 – 14:00 Masa la Cantina-restaurant UTCB

14:30 – 15:45 Comunicări pe secțiuni (sălile I2, L1, L3)

15:45 – 16:00 Pauză de cafea

16:00 – 17:30 Comunicări pe secțiuni (sălile I2, L1, L3)

17:30 – 18:00 Închiderea conferinței (sala P1b)

## COMUNICĂRI PE SECȚIUNI

### **Secțiunea Probabilități și Procese Stocastice (Sala L3)**

**Conduce: Acad. Ioan Cuculescu**

11:00 – 11:15

Mioara Buiculescu (ISMMA)

*Conditions for the existence and uniqueness of quasi-stationary distributions*

11:15 – 11:30

Vlad Barbu, Slim Beltaief, Serguei Pergamenschikov (University of Rouen, France)

*Robust estimation for semi-Markov nonparametric regression models*

11:30 – 11:45

Udrea Păun (ISMMA)

*Potts model*

11:45 – 12:00

Liana Manu Iosifescu (Bucharest University of Economic Studies)

*On a paper by W. Doeblin and R. Fortet on dependence with complete connections*

12:00 – 12:15

Luciana Majercsik (Universitatea Tehnică de Construcții București)

*An entropic optimization approach for deriving time-frequency energy densities of Vrancea fault earthquakes*

## **Secțiunea Statistică (Sala I2)**

**Conduce: Ion Văduva**

11:00 – 11:15

Aida Toma, Amor Keziou (ASE București, ISMMA; University of Reims, Champagne Ardenne, Reims, France)

***Minimum Dual Divergence Estimators for Moment Condition Models: A Monte Carlo Simulation Study***

11:15 – 11:30

Raluca Vernic (Universitatea Ovidius Constanța)

***Conditional Tail Expectation for Sarmanov's distribution***

11:30 – 11:45

Luiza Bădin; Cinzia Daraio; Leopold Simar (ASE București și ISMMA; Universitatea Sapienza din Roma; Universitatea Catolică Louvain)

***Optimal bandwidth selection in conditional frontier models: a Monte Carlo investigation***

11:45 – 12:00

Irina Băncescu (Doctoral School of Mathematics, University of Bucharest)

***Statistical models suitable for various applications***

12:00 – 12:15

Vasile Preda, Romică Trandafir, Sorin Demetriu (Universitatea București, Universitatea Tehnică de Construcții București)

***Bi-Transmuted Exponential Distribution***

12:15 – 12:30

Elena Robe-Voinea, Raluca Vernic (Universitatea Bucuresti, Universitatea Ovidius Constanța)

***Risk analysis based on the Monte Carlo method for a ship design project***

**Secțiunea Optimizări (Sala L1)**

**Conduce: Mircea Iulian**

11:00 – 11:15

Bogdan Biolan (University of Bucharest)

***On Signal Transmission Optimizations***

11:15 – 11:30

I.M. Stancu-Minasian, A.M. Stancu (I.S.M.M.A. București)

***On multiobjective problem under higher-order convexity***

11:30 – 11:45

Răzvan-Cornel Sfetcu (Doctoral School of Mathematics, University of Bucharest)

***Convergence of Tsallis and Rényi divergences***

11:45 – 12:00

Vasile Preda, Cristian Niculescu (Universitatea București)

***Second-Order Optimality Conditions in Interval Multiobjective Optimization Problems***

12:00 – 12:15

Cornaciu Veronica (Universitatea Titu Maiorescu)

***Some optimality conditions for optimization problems based on generalized convexities and generalized algebraic operations***

12:15 – 12:30

Monica Patriche (Universitatea din București)

***Existence of the equilibrium in choice***

## **Secțiunea Probabilități și Procese Stocastice (Sala L3)**

**Conduce: Maria Tudor**

14:30 – 14:45

Tiberiu Socaciu (Universitatea Ștefan cel Mare din Suceava)

***Pricing-ul derivatelor în framework de tip Heston folosind formula lui Heston și o formulă alternativă***

14:45 – 15:00

George-Andrei Pădureanu (Universitatea din București)

***Aplicații de Statistica Proceselor pentru conceptul „Internetul Tuturor Lucrurilor”***

15:00 – 15:15

Valentin Ionescu (Academia Română)

***O generalizare a teoriei probabilităților (condiționat-)libere și o teoremă asimptotică universală multivariată***

15:15 – 15:30

Valentin Ionescu (Academia Română)

***Realizări de repartiții infinit-divizibile necomutative pe bimodule Fock***

15:30 – 15:45

Adriana Agapie (Bucharest University of Economic Studies)

***Consistency versus Compatibility in the context of Analytic Hierarchy Processes***

15:45 – 16:00

Sorina Sfetcu (University of Bucharest)

***Rényi entropy of orthogonal polynomials***

**Secțiunea Statistică (sala I2)**

**Conduce: Vlad Barbu**

14:30 – 14:45

Cristian Preda (Universitatea Lille / ISMMA Gh. Mihoc - C. Iacob)

***Regression with categorical functional data***

14:45 – 15:00

Alexandru Amarioarei (Institutul Național de Cercetare Dezvoltare pentru Științe Biologice)

***Approximations for the distribution of the discrete scan statistics when the scanning window has arbitrary shape***

15:00 – 15:15

Bogdan Gheorghe Munteanu, Alexei Leahu (Academia Forțelor Aeriene Henri Coandă, Brașov)

***Statistical simulation for the Min Poisson-Lomax distribution***

15:15 – 15:30

Iuliana Iatan (Universitatea Tehnică de Construcții București)

***Modern Neural Methods for Function Approximation***

15:30 – 15:45

Andrei Anghel, Maria Tudor, Cristiana Tudor (Bucharest University of Economic Studies)

***A bootstrap approach to identifying the relative importance of errors in estimates used in portfolio optimization***

15:45 – 16:00

Paul Pascu, Eugenia Iancu (Universitatea Ștefan cel Mare Suceava)

***Improving the process of making predictions using intelligent software***

**Secțiunea Optimizări (Sala L1)**  
**Conduce: I. M. Stancu-Minasian**

14:30 – 14:45

Cristian Bușu, Mihail Bușu (ASE București)

*A quantitative analysis of the telecommunication sector Romania vs. European Union*

14:45 – 15:00

Mihaela Păun (Institutul Național de Cercetare Dezvoltare pentru Științe Biologice)

*Towards a new HPC failure metric based on inequality indices*

15:00 – 15:15

Florentin Șerban (Bucharest University of Economic Studies; Doctoral School of Mathematics, University of Bucharest)

*Portfolio optimization models using entropy measures*

15:15 – 15:30

Balcau Costel (Universitatea din Pitești)

*Graph entropy optimization*

15:30 – 15:45

Silvia Dedu, Muhammad Sheraz (Bucharest University of Economic Studies; Institute of Business Administration, Karachi, Pakistan)

*Information measure approach for risk models optimization*

15:45 – 16:00

Anca-Teodora Șerban-Opreșcu (Bucharest University of Economic Studies)

*Academic Communication in Higher Education. Key Factor for Scientific Value*



**Secțiunea Statistică (sala I2)**

**Conduce: Cornelia Enăchescu**

16:00 – 16:15

Eugenia Iancu (Universitatea Ștefan cel Mare Suceava)

***Exploring and Extracting Knowledge from Databases for Statistical Analysis***

16:15 – 16:30

Ghica Manuela (Universitatea Spiru Haret)

***Estimation of reliability in multicomponent stress-strength model using exponentiated power quasi Lindley strength and Weibull stress distributions***

16:30 – 16:45

Silvia Dedu (Bucharest University of Economic Studies)

***Statistical models for assessing the quality of scientific research***

16:45 – 17:00

Anamaria Aldea; Mădălina Stoica (Bucharest University of Economic Studies)

***Overview of Romanian universities using non-parametric hyperbolic efficiency estimators***

17:00 – 17:15

Pompilia Strambu (Universitatea Spiru Haret)

***On the object-oriented approach to statistical programming***

17:15 – 17:30

Aurelia Cășaru (Doctoral School of Mathematics, University of Bucharest)

***A new class of Weibull models with bathtub hazard rate function***

17:30 – 17:45

Cojocea Manuela-Simona (Universitatea din București)

***Despre robustețe și t-Regresie***

17:45 – 18:00

Elena Baibarac, Florin Enache (Politehnica University of Bucharest, Doctoral School of Electronics, Telecommunications and Information Technology)

***Encryption algorithms used in Virtual Private Network***

## **Secțiunea Actuarial și Matematici Financiare (sala L1)**

**Conduce: Raluca Vernic**

16:00 – 16:15

Iulian Mircea, Mihaela Covrig (ASE București)

*Assessment of The Project Cash Flow by Using Fuzzy Numbers*

16:15 – 16:30

Vasile Stănciulescu (Financial Supervision Authority)

*Epsilon, p-strategy for reinsurance with reinstatements*

16:30 – 16:45

Daniel Ciuiu (UTCB; Institutul de Prognoză Economică)

*Decomposition of the Time Series and of Shocks Using the Simple Fractions Decomposition and Applications*

16:45 – 17:00

Cristinca Fulga (Bucharest University of Economic Studies and Institute of Mathematical Statistics and Applied Mathematics of Romanian Academy)

*Portfolio selection with loss aversion and prior stock ranking based on AHP*

17:00 – 17:15

Mihaela Covrig, Iulian Mircea, Dumitru Badea (Academia de Studii Economice din București)

*Estimating claims mean frequency and severity using generalized linear models*

17:15 – 17:30

Carmen Adriana Gheorghe (National Institute of Economic Research, Romanian Academy)

*Income inequality dynamics analysis for Romania in the last three decades*

17:30 – 17:45

Ioana Ileana (Doctoral School of Mathematics, University of Bucharest)

*Optimization Problems Based on New Algebraic Operations*

## REZUMATE

- Adriana Agapie (Bucharest University of Economic Studies)

### **Consistency versus Compatibility in the context of Analytic Hierarchy Processes**

Acknowledgements: This work was supported by a grant of Romanian National Authority for Scientific Research, CNCS-UEFISCDI, project number PN-II-ID-PCE-2011-3-0893.

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- Anamaria Aldea, Mădălina Stoica (Bucharest University of Economic Studies)

### **Overview of Romanian universities using non-parametric hyperbolic efficiency estimators**

Higher education efficiency began to have a serious impact on the allocation of funds and many institutions have developed a separate department specialized to increase efficiency. In this context, we employ advanced hyperbolic efficiency estimators to evaluate and rank the Romanian universities according to their research and teaching status. We use different models to study efficiency sensitivity to variable changes and we also explore scale efficiency and trade-offs in the educational system using two groups of universities according to their size. Results show medium efficiency level for the Romanian educational system and potential improvements in resource allocation. Further analysis is needed to account for teaching quality and students' experience.

Acknowledgements: This work was supported by a grant of Romanian National Authority for Scientific Research, CNCS-UEFISCDI, project number PN-II-ID-PCE-2011-3-0893.

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- Alexandru Amarioarei (Institutul Național de Cercetare Dezvoltare pentru Științe Biologice)

**Approximations for the distribution of the discrete scan statistics when the scanning window has arbitrary shape**

The object of this talk is to extend, in a natural way, the notion of discrete scan statistics by taking, instead of a moving sum, a moving score function that is applied on blocks of random variables and to present an approximation for its distribution. As an application, we investigate the problem of the two dimensional discrete scan statistics with arbitrary windows shape. To illustrate the accuracy of our results, a numerical study will be conducted where different shapes (quadrilaterals, triangles, circles and ellipses) and models for the random field (Bernoulli, Poisson) will be considered.

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- Andrei Anghel, Maria Tudor, Cristiana Tudor (Bucharest University of Economic Studies)

**A bootstrap approach to identifying the relative importance of errors in estimates used in portfolio optimization**

Previous research shows that the importance of accurately estimating average returns is about an order in magnitude greater than the importance of estimating covariance matrices. However parametric simulations that prove the above point are only suitable for unrealistically precise

estimates. We employ a non-parametric method for generating estimates and we quantify the minimum threshold in precision for which mean-variance optimization produces reasonable portfolios. We also show that some of the best known models that describe asset prices will generate estimates whose precision is most likely less than the minimum threshold computed here.

Acknowledgements: This work was supported by a grant of Romanian National Authority for Scientific Research, CNCS-UEFISCDI, project number PN-II-ID-PCE-2011-3-0593.

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- Elena Baibarac, Florin Enache (Politehnica University of Bucharest, Doctoral School of Electronics, Telecommunications and Information Technology)

### **Encryption algorithms used in Virtual Private Network**

Virtual Private Network (VPN) is used for sending and receiving data across any shared or public network, but also ensuring the users that they benefit from the security and privacy of a private network. This privacy is provided by the strength of the encryption algorithm used during the packet transmission. For a secure communication, a VPN needs more than just one pair of keys for ensuring encryption. That is why confidentiality and data integrity are added, so that no third-party can modify the data along the communication. In this paper, we present different types of encryption algorithms for VPNs, advantages and disadvantages of using them, also considering how they can affect the performance of the VPN's connection.

Keywords: Encryption, Security, Virtual Private Network, Information Theory,

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- Luiza Bădin; Cinzia Daraio; Leopold Simar (ASE București și ISMMA; Universitatea Sapienza din Roma; Universitatea Catolică Louvain)

### **Optimal bandwidth selection in conditional frontier models: a Monte Carlo investigation**

Conditional efficiency measures represent a flexible tool to evaluate the impact of external-environmental variables in a completely nonparametric production frontier framework, without having to impose strict hypotheses on the data generating process. The bandwidths for the conditioning variables play a crucial role in the process of estimating these measures since they “tune” the localization for computing the conditional efficiencies (FDH and/or DEA). In this paper we present and compare through a Monte-Carlo simulation study the performances of several different approaches, all asymptotically equivalent, to calculate the bandwidths necessary to estimate the conditional efficiency measures. The main objective of our analysis is to advice on the best performing approach in terms of the resulting estimates of conditional efficiency and to provide practical suggestions for a simple implementation.

Acknowledgment: This work was supported by a grant of the Romanian National Authority for Scientific Research and Innovation, CNCS - UEFISCDI, Project number PN-II-RU-TE-2014-4-2905.

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- Vlad Barbu, Slim Beltaief, Serguei Pergamenshchikov (University of Rouen, France)

### **Robust estimation for semi-Markov nonparametric regression models**

We consider the nonparametric robust estimation problem for regression models in the continuous time with the semi-Markov noises. An adaptive model selection procedure is proposed. Under general moment conditions on the noise distribution a sharp non-asymptotic oracle inequality for the robust risks is obtained.

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- Irina Băncescu (Doctoral School of Mathematics, University of Bucharest)

### **Statistical models suitable for various applications**

In this paper we present new statistical models with interesting properties concerning systems. We establish the mathematical properties of a new class of distributions based on the exponentiated generalized method and on the transmutation map. We obtain closed formulae for moments, generating function, Lorenz curve and not only. We give new theorems concerning the limiting distributions of the order statistics. We discuss stochastic ordering. We also perform data analysis for a new statistical model.

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- Aurelia Căşaru (Doctoral School of Mathematics, University of Bucharest)

### **A new class of Weibull models with bathtub hazard rate function**

Different Weibull statistical models have been used for reliability data being an interesting alternative to the exponential distribution. În this paper, we present a new

Weibull model that has increasing, decreasing, bathtub or even upside-down bathtub shapes of the hazard rate function.

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- Balcau Costel (Universitatea din Pitești)

### **Graph entropy optimization**

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- Bogdan Biolan (University of Bucharest)

### **On Signal Transmission Optimization**

Considering some optimization models for signal transmission we show how multiple transmission on the bandwidth can be improved using Walsh-Orthogonal sequences and Zadoff-Chu sequences.

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- Mioara Buiculescu (ISMMA)

### **Conditions for the existence and uniqueness of quasi-stationary distributions**

We discuss the conditions set out in the recent papers [1] and [2] for the existence and uniqueness of quasi-stationary distributions compared with the ones formerly imposed in [3].

#### References

- [1] N. Champagnat and D. Villemonais - Exponential convergence to quasistationary distribution and Q-process. *Probability Theory and Related Fields*, 64 (2015) , no. 1.
- [2] R. Knobloch and L. Partzch - Uniform conditional ergodicity and intrinsic ultracontractivity. *Potential Analysis*, 33 (2010) , 107-136.
- [3] P. Tuominen and R.J. Tweedie - Exponential decay of general Markov processes and their discrete skeletons. *Adv.*



- Cristian Bușu, Mihail Bușu (ASE București)

**A quantitative analysis of the telecommunication sector Romania vs. European Union**

Over the past decade, the mobile telecommunication sector has changed radically. In most EU countries, the public telecom operator has been fully or partially privatized while national telecom regulators have been empowered to monitor and control ex-ante the functioning of the market. The impact on mobile market efficiency is due to both micro and macroeconomic indicators. This paper is focused on the regression analysis to test the differences between Romania and other countries from European Union regarding the telecom sector, based on macroeconomic indicators across EU countries. Panel data was used over the period of time from 2005 to 2014. The main conclusion of the analysis points out that Romania is one of the leaders in the hierarchy of countries according to the number of subscription rates per 100 inhabitants, with a significant potential growth.

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- Daniel Ciuiu (UTCB; Institutul de Prognoză Economică)

**Decomposition of the Time Series and of Shocks Using the Simple Fractions Decomposition and Applications**

In this paper we will use the decomposition of rational functions in simple fractions. The rational functions are build using the delay polynomials  $\varphi(B)$  and  $\theta(B)$  of an ARIMA time series.

For decomposition of the time series  $X_t$  we use the rational fraction  $\frac{\theta(B)}{\varphi(B)}$ , and for the decomposition of the white noise  $a_t$  we use the rational fraction  $\frac{\varphi(B)}{\theta(B)}$ .

Finally, because for the decomposition of  $X_t$  we do not take into account that the roots of  $\varphi(B)$  are greater than one in absolute value, we eventually multiply in the first above case  $\varphi(B)$  by  $(1-B)^d$  for taking into account the possible trend and by  $(1-B^s)^{d_s}$  for taking into account the possible seasonal components.

AMS Subject Classification: 62M10, 37M10, 91B84

Keywords: ARMA and ARIMA time series, delay operator, delay polynomials.

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- Cojocea Manuela-Simona (Universitatea din București)

### **Despre robustețe și t-Regresie**

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- Cornaciu Veronica (Universitatea Titu Maiorescu)

### **Some optimality conditions for optimization problems based on generalized convexities and generalized algebraic operations**

In this paper, we introduce a new generalized pseudo-operations with one parameter. Using algebraic operation introduced by Ben Tal and the new generalized pseudo-operation with one parameter, some classes of generalization of convexity are given in the case of fractional semi-infinite programming problem. We introduce convex functions, uniform pseudoconvex

functions, uniform quasiconvex functions . The nonsmooth multi-objective fractional semi-infinite programming involving these generalized convex functions is researched, and some sufficient optimality conditions are obtained. The results obtained in this paper generalize and extend previous results obtained in this field.

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- Mihaela Covrig, Iulian Mircea, Dumitru Badea (Academia de Studii Economice din București)

**Estimating claims mean frequency and severity using generalized linear models**

The paper points out the use of generalized linear models in estimating claims mean frequency and severity. The numerical illustration is done on a specific dataset.

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- Silvia Dedu, Muhammad Sheraz (Bucharest University of Economic Studies; Institute of Business Administration, Karachi, Pakistan)

**Information measure approach for risk models optimization**

Risk assessment and risk optimization represent important topics in various research fields. The optimal strategy of an insurance company corresponds to the minimal uncertainty with reference to its claims. We consider some information measures based risk assessment models for actuarial and survival models involving truncated and censored loss random variables. Representation formulas for the second order entropy corresponding to the left truncated or censored from below and right truncated or censored from above random variables are derived. Also, some optimization models with applications to Stop-Loss

reinsurance under various uncertainty measures are proposed. Their properties are studied and interpretations of the results are provided.

Acknowledgments. This work was supported by a grant of the Romanian National Authority for Scientific Research, CNCS - UEFISCDI, project number PN-II-RU-TE-2012-3-0007.

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- Silvia Dedu (Bucharest University of Economic Studies)

**Information measure approach for risk models optimization**

Performance evaluation of scientific research represents an important topic in the recent literature. The study of informetric distributions is one of the most relevant issues in the current informetric research. In this paper we propose some probabilistic models for assessing the quality of scientific research. The most relevant descriptive measures are obtained, including moments, quantiles and estimation methods. Computational results are provided.

Acknowledgements: This work was supported by a grant of the Romanian National Authority for Scientific Research and Innovation, CNCS - UEFISCDI, project number PN-II-RU-TE-2014-4-2905.

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- Carmen Adriana Gheorghe (National Institute of Economic Research, Romanian Academy)

**Income inequality dynamics analysis for Romania in the last three decades**

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- Ghica Manuela (Universitatea Spiru Haret)

**Estimation of reliability in multicomponent stress-strength model using exponentiated power quasi Lindley strength and Weibull stress distributions**

The present study deals with multicomponent system of  $n$  independent components which follow exponentiated power quasi Lindley strength and Weibull stress distributions. The marginal and system reliability functions are given. Numerical and graphical study supports the idea that the stress-strength model can be used to different medical fields, as stress fracture from orthopedic surgery.

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- Cristina Fulga (Bucharest University of Economic Studies and Institute of Mathematical Statistics and Applied Mathematics of Romanian Academy)

**Portfolio selection with loss aversion and prior stock ranking based on AHP**

In this paper we present an integrated methodological approach for selecting portfolios. The proposed methodology is focused on incorporation of investor's preferences in the Mean-Risk framework. We propose a risk measure calculated only with the downside part of the portfolio return distribution which, we argue, capture better the practical behavior of the loss-averse investor. We establish the properties of the proposed risk measure, study the link with stochastic dominance criteria, point out the relations with Conditional Value at Risk and Lower Partial Moment of first order, and give the explicit formula for the case of scenario-based portfolio optimization. The proposed methodology involves two stages: firstly, the investment opportunity set is determined (in our case, the Mean-Risk

efficient frontier), and secondly, one single preferred efficient portfolio is selected, namely the one having the highest Expected Utility value on the efficient frontier. Three classes of utility functions with loss aversion corresponding to three types of investors are considered. The empirical study is targeted on assessing the differences between the efficient frontier of the proposed model and the classical Mean-Variance, Mean-CVaR and Mean-LPM1 frontiers. We firstly analyze the loss of welfare incurred by using another model instead of the proposed one and measure the corresponding gain/loss of utility - we use a proximity index of the welfare gain/loss in the Expected Utility framework. Secondly, we assess how much the portfolios really differ in terms of their compositions - we use a dissimilarity index based on the 1-norm. We describe and interpret the optimal solutions obtained with the proposed model and emphasize the role and influence of loss aversion parameters values and of constraints. Three types of constraints are studied: no short selling allowed, a certain degree of diversification imposed, and short selling allowed.

Acknowledgments. This work was supported by a grant of the Romanian National Authority for Scientific Research, CNCS - UEFISCDI, project number PN-II-RU-TE-2012-3-0007.

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- Eugenia Iancu (Universitatea Ștefan cel Mare Suceava)

### **Exploring and Extracting Knowledge from Databases for Statistical Analysis**

The classification of a data set based on specialized software enables building a model using some drive data, its testing based on test data and then use it to make predictions. Model building can be done using specialized

algorithms, then it can be used to predict the value of a type attribute class. The algorithms are quite complicated to be hand tools, so using specialized software packages make data analysis and predictive models of specific softwares intelligent. However, bear in mind that these classification algorithms will always cause a certain group with certain characteristics. The resulting groups may or may not be useful for the classification of data. If groups make a difference between group variables and those differences are useful, then analyzing these classifications proves to be useful.

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- Iuliana Iatan (Universitatea Tehnică de Construcții București)

### **Modern Neural Methods for Function Approximation**

There exist various methods that have been established as function approximation tools and an ANN (Artificial Neural Networks) is one of them. First we develop a study on the structure corresponding to the Fourier Series Neural Networks (FSNNs) and then and then we design a new model of neural network for function approximation. We compare the experimental results obtained by them with some numerical methods like Taylor series to the approximation of several kinds of conventional function curves, such as sine function, exponential function, polynomial function. We conclude with advantages of using neural network to implement function approximation. For each function, the approximation achieved using our neural method is finer than that obtained using the FSNN.

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- Ioana Ileana (Doctoral School of Mathematics, University of Bucharest)

### **Optimization Problems Based on New Algebraic Operations**

We establish some optimality conditions for a nonlinear optimization problem under new algebraic operations.

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- Valentin Ionescu (Academia Română)

### **Realizări de repartiții infinit-divizibile necomutative pe bimodule Fock**

Aceasta comunicare este dedicata domnilor academicieni Marius Iosifescu si Ioan Cuculescu, cu ocazia rotundeii aniversari din acest an: LA MULTI ANI ! Se arata ca semigrupul slab-continuu corespunzator oricarei repartitii infinit-divizibile in raport cu convolutia conditionat-libera aditiva, in cazul multivariat, este realizat printr-un proces stocastic cuantic construit din operatori fundamentali pe un bimodul Fock conditionat-liber, ale carui cresteri sunt conditionat-liber independente. Acest fapt extinde o teorema a lui R. Speicher din cadrul teoriei probabilitatilor libere cu valori operatori a lui D. Voiculescu. Un rezultat analog este derivat in cazul convolutiei booleene aditive cu valori operatori, cu intermediul bimodulului Fock boolean.

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- Valentin Ionescu (Academia Romana)

### **O generalizare a teoriei probabilităților (condiționat-) libere și o teoremă asimptotică universală multivariată**

Aceasta comunicare este dedicata domnilor academicieni Marius Iosifescu si Ioan Cuculescu, cu ocazia rotundeii aniversari din acest an: LA MULTI ANI ! Independenta



libera cu amalgamare in raport cu un numar arbitrar de medii conditionate se poate realiza prin aplicatii de bimodule definite pe algebre involutive. In cazul variabilelor aleatoare necomutative cu valori scalari adecvate acestei notiuni, rezultatul surprinzator a fost o teorema limita centrala "universala". Dupa reamintirea altor rezultate obtinute de noi, comunicarea se concentreaza pe o versiune generala a teoremei limita centrala "universala", in cazul multivariat, pentru variabile aleatoare cuantice cu valori operatori, corespunzand notiunii de independenta mentionate anterior. Din doua metode de demonstratie, o expunem pe aceea mai simpla. La originea acestor investigatii este o problema formulata de P. Biane, in contextul dezvoltarii teoriei probabilitatilor libere de catre D. Voiculescu si al fundamentarii teoriei probabilitatilor conditionat-libere de catre M. Bozejko si R. Speicher.

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- Luciana Majercsik (Universitatea Tehnică de Construcții București)

**An entropic optimization approach for deriving time-frequency energy densities of Vrancea fault earthquakes**

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- Liana Manu Iosifescu (Bucharest University of Economic Studies)

**On a paper by W. Doeblin and R. Fortet on dependence with complete connections**

We comment on and place in a contemporary context the paper by W. Doeblin and R. Fortet "Sur le chaines a liaisons completes".

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- Iulian Mircea, Mihaela Covrig (ASE București)

### **Assessment of The Project Cash Flow by Using Fuzzy Numbers**

The approach described in this paper represents a development of quantitative modelling of net present value in the investment projects and life policies. For the calculation of the main recognized indicators of the investment project we using fuzzy numbers. We propose effective evaluation of the project as a fuzzy composite option. Also, one extended use of fuzzy set theory in insurance financial pricing consists in modelling some uncertain parameters. This approach maintains stochastic and fuzzy sources of uncertainty throughout the valuation process of these projects.

Acknowledgements: This work was supported by a grant of Romanian National Authority for Scientific Research, CNCS-UEFISCDI, project number PN-II-ID-PCE-2011-3-0593.

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- Bogdan Gheorghe Munteanu, Alexei Leahu (Academia Forțelor Aeriene Henri Coandă, Brașov)

### **Statistical simulation for the Min Poisson-Lomax distribution**

In this work it is proposed and tested the simulation's algorithm for the Min Poisson-Lomax (MinPoiL) distribution. This distribution has been introduced in paper (2016, [1]) and treated in a uniform manner using power series distributions class (PSD). This study is intended as a completion of the research by Al-Zahrani and Sagor (2014, [2]), targeting the distribution of the random variable min

$\{Y_1, Y_2, \dots, Y_Z\}$ , where  $Z \approx \text{Poisson}(\lambda)$ ,  $\lambda > 0$  and  $Y_1, Y_2, \dots, Y_Z$  are independent random variables, Lomax distributed. The above mentioned algorithm it was implemented by means of Eclipse SDK programming environment.

Keywords: power series distribution, Lomax distribution, Poisson distribution, distribution of the minimum.

2000 AMS subject classifications: 60K10, 62N05.

References

[1] B. Gh. Munteanu, Max and Min Poisson-Lomax power series distributions, ICAMNM, april 14-16, 2016, Craiova, Romania.

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- Paul Pascu, Eugenia Iancu (Universitatea Ștefan cel Mare Suceava)

### **Improving the process of making predictions using intelligent software**

Today's society is rapidly changing due to permanent innovation in all fields of knowledge. Intelligent systems enable the exploitation of knowledge by combining database technology with knowledge base and expert systems technology. These intelligent systems can help improve the prediction process based on economic models. This paper describes how to improve the workings of an intelligent diagnostic and predictive system regarding the economic activity by analyzing the evolution of economic indicators for a given time.

- Monica Patriche (Universitatea din București)

**Existence of the equilibrium in choice**

In this paper, we prove the existence of the equilibrium in choice for games in choice form. These games have recently been introduced by A. Stefanescu, M. Ferrara and M. V. Stefanescu. Our results link the recent research to the older approaches, regarding games in normal form or qualitative games.

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- George-Andrei Pădureanu (Universitatea din București)

**Aplicatii de Statistica Proceselor pentru conceptul „Internetul Tuturor Lucrurilor”**

Monitorizarea Proceselor Industriale este din totdeauna o preocupare in lumea industrială, mai ales in contextul interconectării dispozitivelor de masura și a comunicării masina la masina (M2M). Se prezinta cateva Aplicatii de Statistica Proceselor pentru conceptul "Internetul Tuturor Lucrurilor" (Internet of Things).

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- Mihaela Păun (Institutul Național de Cercetare Dezvoltare pentru Științe Biologice)

**Towards a new HPC failure metric based on inequality indices**

We introduce a new set of statistics, specifically the derivation of a new failure index that can be used in the evaluation of the reliability of High Performance Computing systems. We use the FI to study real data (log files) related to failures from Los Alamos Laboratory and show that insight into the overall system reliability can be achieved based on the logs of the previous failures. The index relates to the Gini and Atkinson indices from Econometrics, but these ideas can be applied to any multi-

tenant distributed computing environment including HPC and Big Data analytic platforms. In HPC, job schedulers such as SLURM, PBS, or LSF can leverage the FI to provide application- and user-level perspective on resource utilization and operational risk. Users and applications exhibiting higher FI values relative to others concurrently using the shared hardware resource can be provisioned with additional fault tolerance capabilities such as more frequent checkpointing.

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- Udea Păun (Academia Română)

### **Potts model**

We present a few remarks on the Potts model.

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- Cristian Preda (Universitatea Lille / ISMMA Gh. Mihoc - C. Iacob)

### **Regression with categorical functional data**

In this presentation we develop regression linear models for scalar response and categorical functional data predictor. We approximate linear models through functional multivariate correspondance analysis and non-linear models through RKHS methods. A simulation study is presented.

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- Vasile Preda, Cristian Niculescu (Universitatea București)

### **Second-Order Optimality Conditions in Interval Multiobjective Optimization Problems**

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- Vasile Preda, Romică Trandafir, Sorin Demetriu (Universitatea București, Universitatea Tehnică de Construcții București)

### **Bi-Transmuted Exponential Distribution**

A functional composition of the cumulative distribution function of one probability distribution with the inverse cumulative distribution function of another is called the transmutation map. In this paper, we will use the quadratic rank transmutation map (QRTM) in order to generate a flexible family of probability distributions taking firstly exponential distribution as the base value distribution by introducing a new parameter that would offer more distributional flexibility obtained transmuted exponential distribution and, then we use this distribution as base to obtain bi-transmuted exponential distribution. Some properties of the new distribution are presented: the sampling generating by inverse method, the calculation of moments, the distribution parameter estimation, the statistical order.

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- Elena Robe-Voinea, Raluca Vernic (Școala Doctorală de Matematică, Universitatea București; Universitatea Ovidius Constanța)

### **Risk analysis based on the Monte Carlo method for a ship design project**

An important issue during the development of a ship basic/detailed design is to pay attention to the aspect called risk analysis. Taking into consideration that building a ship implies a lot of risks, an important duty is to prevent them by maximizing the probability and consequences of positive events and, in the same time, by minimizing the probability

and consequences of adverse events related to the project's objectives. A well-known method such as Monte Carlo simulation is quite often used to analyze the risks in a project development. This paper aims to present the method for an ongoing ship design project using Primavera Risk Analysis program software.

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- Răzvan-Cornel Sfetcu (Doctoral School of Mathematics, University of Bucharest)

### **Convergence of Tsallis and Rényi divergences**

Given some discrete probability distribution  $\psi_n(x) = (\psi_{n,1}(x), \psi_{n,2}(x), \dots, \psi_{n,n}(x))$ , we show that the sequence of Tsallis divergence  $(D^T(\psi_{n,n}(x)))_n$  and the sequence of Rényi divergence  $(D^R(\psi_{n,n}(x)))_n$  are convergent for any  $x \in (-1, 1)$ .

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- Sorina Sfetcu (University of Bucharest)

### **Rényi entropy of orthogonal polynomials**

Let  $\psi_j = (\psi_{n,1}, \psi_{n,2}, \dots, \psi_{n,j})$  be a discrete probability distribution given by

$$\psi_j = p_{i-1}^2 \left( \lambda_j^{(n)} \right) \left( \sum_{k=0}^{n-1} p_k^2 \lambda_j^{(n)} \right)^{-1}, \quad i \in \{1, 2, \dots, n\},$$

where  $(p_n)_n$  is a

sequence of orthonormal polynomials on  $\mathbf{R}$  and  $\lambda_j^{(n)}, j \in \{1, 2, \dots, n\}$  are the zeroes of  $p_n$ . We consider Rényi

entropy  $S_{n,j}^R = \frac{1}{1-\alpha} \log \left( \sum_{i=1}^n \psi_{i,j}^\alpha \right)$  for any  $\alpha \in (0, \infty)$ . In

case of Chebyshev polynomials of the first and second kinds we give an explicit formula for  $S_{n,j}^R$ .

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- Tiberiu Socaciu (Universitatea Ștefan cel Mare din Suceava)

**Pricing-ul derivatelor în framework de tip Heston folosind formula lui Heston și o formulă alternativă**

Voi prezenta in paralel solutiile closed-form pentru ecuatia Heston si ecuatia Heston-S (ca alternativa la rezolvarea problemei pricing-ului in cazul optiunilor europene si a optiunilor digitale) impreuna cu cateva comentarii.

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- I.M. Stancu-Minasian, A.M. Stancu (I.S.M.M.A București)  
**On multiobjective problem under higher-order convexity**

In this paper, we consider a multiobjective problem for which we establish sufficient optimality conditions. Also, we consider a dual problem and prove duality theorems.

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- Vasile Stănciulescu (Financial Supervision Authority)  
**Epsilon, p-strategy for reinsurance with reinstatements**  
The present paper is concerned with epsilon, p-strategy for a reinsurance contract with reinstatements. Firstly we define this type of strategy and then we show its existence and present some of its properties. The present paper is concerned with  $\varepsilon$ , p-strategy for a reinsurance contract with reinstatements. It is to be noted that in the reinsurance contract approached in this paper constant reinstatement premiums are due when the reinsurer's loss exceeds certain bounds. For this reinsurance contract we examine the existence of an  $\varepsilon$ , p-strategy and its properties. Also due to the use of constant reinstatement premiums, the reinsurance contract approached here is simpler than the contracts in which the reinstatement premiums are computed pro rata



capita or pro rata temporis. In both cases the reinstatement premiums are random because of the randomness of the size and occurrence time of claim. Therefore they are unknown at the beginning of the contract. The paper is organized as follows: In Section 2 we define the reinsurance contract and its  $\varepsilon$ , p-strategy. In Section 3 we present some auxiliary knowledge which is needed to obtain our results. In Section 4 we present the main result of an existence of an  $\varepsilon$ , p-strategy for a reinsurance contract with reinstatements and some of its properties.

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- Pompiliea Strambu (Universitatea Spiru Haret)

### **On the object-oriented approach to statistical programming**

We consider some comments on the content of the statistical model for object-oriented programming. Some statistical categories are analyzed where computations are made transparent.

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- Florentin Şerban (Bucharest University of Economic Studies; Doctoral School of Mathematics, University of Bucharest)

### **Portfolio optimization models using entropy measures**

The classical portfolio optimization models take into account two important factors: risk and return. In this paper we consider an additional factor: liquidity, which may influence the performance of the portfolio and based on maximum entropy theory, we present new models, developing portfolio optimization models which integrate entropy theory into the Markowitz portfolio model in order to improve the return - risk relationship. We derive analytical formulas to solve portfolio optimization problems. Computational results are presented.

Acknowledgment: This work was supported by a grant of the Romanian National Authority for Scientific Research and Innovation, CNCS - UEFISCDI, project number PN-II-RU-TE-2014-4-2905.

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- Anca-Teodora Șerban-Oprescu (Bucharest University of Economic Studies)

**Academic Communication in Higher Education. Key Factor for Scientific Value**

Presently, national and international requirements for new and customized indicators on academic performance have become common place. Educational strategies in higher education place strong emphasis on evaluating scientific performance from various perspectives. Opting to focus the present endeavor on the generous term of ‘academic communication’, the paper takes a close look at the factors, circumstances and constraints that regulate this concept in the case of academic conference participation as indicator of scientific value. The article starts with a systematic qualitative research meant to offer a general view of current issues encountered in conference participation in the Economics domain, followed by a quantitative study, meant to further validate the findings in the qualitative overview. The key finding of the study shows that conference participation and fostered scholar communication in this setting constitute strong incentives for proper academic exchange, while contributing to increased overall scientific performance.

Acknowledgement: This work was supported by a grant of the Romanian National Authority for Scientific Research and Innovation, CNCS – UEFISCDI, Project number PN-II-RU-TE-2014-4-2905.

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- Aida Toma, Amor Keziou (ASE București, ISMMA; University of Reims, Champagne Ardenne, Reims, France)

### **Minimum Dual Divergence Estimators for Moment Condition Models: A Monte Carlo Simulation Study**

The minimum dual divergence estimators and tests for moment condition models have been proposed recently in literature. The main advantage, of using a divergence based approach and duality, lays in the fact that it leads to asymptotic properties of the estimators and test statistics under the model, as well as under alternative including misspecification, which cannot be achieved through the classical empirical likelihood context. On the other hand, the estimators have bounded influence functions if and only if the function inducing the orthogonality conditions of the model is bounded. Since in many applications this function is not bounded, it is useful to have procedures that modify the orthogonality conditions in order to obtain robust versions of the estimators. In this paper we present robust versions of the minimum dual divergence estimators using truncated orthogonality functions and duality techniques. We present asymptotic properties of the new estimation method, underlying some advantages of using it with respect to other known methods. The accuracy of this method is illustrated through Monte Carlo simulations for an over-identifying chi-square moment condition model. **Keywords:** Moment condition models, robust estimation. **Acknowledgements:** This work was supported by a grant of the Romanian National Authority for Scientific Research, CNCS – UEFISCDI, project number PN-II-RU-TE-2012-3-0007.

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- Raluca Vernic (Universitatea Ovidius Constanta)

### **Conditional Tail Expectation for Sarmanov's distribution**

An insurance company must be able to evaluate the total appropriate amount of capital needed to cover its aggregate loss, and to fairly allocate this capital among its different lines of business (this is known as the capital allocation problem). One of the main tools used to this purpose is the risk measure, from which we recall the popular Conditional Tail Expectation (CTE). CTE describes the expected amount of risk that can be experienced given that the risk exceeds a threshold value, providing an important measure of the right-tail risk. In this talk, we present CTE formulas for Sarmanov's class of distributions. This class of multivariate distributions is characterized by a flexible structure that can model a large range of dependencies starting from given marginals. An application to a bivariate real data set is also discussed.

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