

11th INTERNATIONAL
CONFERENCE ON
OPERATIONS RESEARCH

La Habana, March 11th-14th, 2012

Organized by:

Universidad de La Habana.

SAMM, Université Paris I, Panthéon-Sorbonne.

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FOREWORDS

It is our pleasure to welcome you to the 11th International Conference on Operations Research.

This is La Habana's Eleventh Edition of the International Conference on Operations Research. It is the result of the joint work of different groups of the organizing universities and supporting institutions.

The contributors are coming from countries of Europe, North and South America, Asia, Africa.

***** It is a established tradition to have a set of first rated researchers as Plenary Speakers. In this occasion the saga goes on with the prestigious names Hans Jakob Lüthi, Christianne Tammer, Helmut Gfrerer, Alexander Karmann and Bernard Cornet. Closed anniversaries motivate reflections and projections.

Presently with the active leadership of Prof. Dr. Marie Cottrell, Chair of the Programm Committee, the Conference is as healthy as ever and we can be optimistic about its future. This is supported by the number and the level of the contributions, as well as by the rate of participation of newcomers.

We again welcome the participants and, although some problems may appear, we hope that you have a pleasant time in Habana during the days ahead.

Prof. Dr. Sira Allende and Prof. Dr. Marie Cotrell
Chairs of the Program Committee

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INVITED LECTURERS

PLENARY LECTURERS

Bernard Cornet (Paris-Kansas).

Helmut Gfrerer (Linz).

Alexander Karman (Dresden).

Hans Jakob Lüthi (Zürich).

Christianne Tammer (Halle).

MAIN LECTURERS

Inicial Apellido(PAis)

PLENARY LECTURES

PRICING SECURITIES VIA NON-ADDITIVE RISK-NEUTRAL PROBABILITIES

B. Cornet^{*,**}

^{*}Université Paris 1. Panthéon-Sorbonne, France.

^{**}University of Kansas, USA.

The risk-neutral capacity associated with a financial economy with a bid/ask spread is defined as a generalization of the Arrow-Debreu price valuation to the case of incomplete securities with frictions. We intend to study and characterize the financial models for which securities can be priced via this risk-neutral capacity. The set of risk-neutral probabilities is characterized as disjoint, the sur-replication cost function can be shown to be sub-modular or equivalently can be expressed as the Choquet integral of future payoffs with respect to the risk-neutral capacity. The set of risk-neutral probabilities is characterized as the core of the risk-neutral capacity in the cases of bets on events in the presence of a frictionless bond. Moreover when the event securities are additionally assumed to be disjoint, the sur-replication cost function can be shown to be sub-modular or equivalently can be expressed as the Choquet integral of integral of future payoffs with respect to the risk-neutral capacity.

ON REGULAR AND LIMITING CODERIVATIVES OF THE NORMAL CONE MAPPING TO INEQUALITY SYSTEMS

H. Gfrerer^{*} and J. Outrata^{**}

^{*}Johannes Kepler University Linz, Austria.

^{**}Czech Academy of Sciences, Czech Republic.

In this talk we consider generalized equations of the form $(GE) \quad 0 \in f(x, y) + \hat{N}_\Gamma(y)$ where $f : \mathbb{R}^n \times \mathbb{R}^m$ is continuously differentiable, the set $\Gamma := \{y \in \mathbb{R}^m \mid q_i(y) \leq 0, i = 1, \dots, l\}$ is given by a system of C^2 inequalities and $\hat{N}_\Gamma(y)$ denotes the regular normal cone to γ at y . In modern variational analysis, generalized derivatives are the essential ingredients for deriving stability results for solutions maps of generalized equations as well as stating optimality conditions for mathematical programs. For the special case of the generalized equation (GE), these generalized derivatives are well known in case that LICQ is fulfilled for the inequalities describing Γ . We give in this talk workable formulas for the graphical derivative and the regular respectively limiting coderivative, when LICQ does not hold at the reference point. We use neighborhood based first order constraint qualifications, which, however, can be characterized by point based second order conditions.

WHAT DETERMINES THE INTEREST MARGIN? AN ANALYSIS OF THE GERMAN BANKING SYSTEM

A. Buehn*, A. Karmann**, and M. Pedrotti***

*Utrecht University, The Netherlands.

**Technische Universität Dresden, Germany.

***Universität Potsdam, Germany.

This paper analyzes the determinants of the interest margin of German banks over the period 1995-2007, explicitly addressing differences among different bank groups. We use three empirical models to focus on the following aspects: the time evolution of the interest margin, the average differences across groups, and the presence of autoregressive effects. For each model our results show that the interest margin can be mainly explained by market power and inefficiency, the influence of which is particularly high for cooperative banks. The Winner's Curse phenomenon and the cross-subsidization strategy negatively influence the margin of private banks.

A UNIFIED APPROACH FOR DIFFERENT CONCEPTS OF ROBUSTNESS AND STOCHASTIC PROGRAMMING VIA NONLINEAR SCALARIZING FUNCTIONALS

Klamroth*, C. and E. Köbis** and A. Schöbel*** and Chr. Tammer**

*University of Wuppertal, Germany.

**Martin-Luther-Universitt Halle-Wittenberg, Germany.

***Georg-August-Universitt Gttingen, Germany.

We show that many different concepts of robustness and of stochastic programming can be described as special cases of a general nonlinear scalarization method by choosing the involved parameters and sets appropriately. This leads to a unifying concept which can be used to handle robust and stochastic optimization problems. Furthermore, we introduce multiple objective (deterministic) counterparts for uncertain optimization problems and discuss their relations to well-known scalar robust optimization problems by using the nonlinear scalarization concept.

SWISS DRG: A FINANCIAL RISK PERSPECTIVE

H.J. Lüthi, and C. Mandl

ETH Zurich, Switzerland.

Due to the rising costs in health systems, politicians have designed different intervention strategies to curb the cost: Centralizing facilities, assigning specialized treatments to different providers, and complementing this interventions by financial incentives. A sophisticated accounting system was installed for fixed reimbursement of a "treatment per case" based on a standard average costing (Swiss DRG). Similar "case-based" systems for stationary health services have been installed in different countries (Germany, Australia, US). DRG requires that at the end of hospitalization the individual treatment of each patient has to be unbundled into standard cases resulting in a fixed, diagnosis dependent payment. Indeed, the matching of the doctor's diagnosis with the case is done automatically by a management accounting system based on key-words. In this paper we will focus on the financial consequences for both the providers of health care and the insurers. Obviously, there is a swap of risk: Uncertain costs for the provider are compensated by fixed costs for the insurer. What is the fair price of this swap? We do not intend to calculate the risk-premium based on actuarial mathematics. Rather, we just ask how to adjust the premium of the provider or the insurer such that the risk of a financial loss is bounded.

This approach is similar to the Value-at-Risk concept in financial industries. By focusing on the risk-transfer relation we are able to understand the basic strategies of risk mitigation for both agents.

As it turns out, if both parties, health providers and insurer, could agree on a fair premium defined on a Value-at-Risk concept, it appears that the premium to the end consumer will be larger compared with the "old" system where the insurer covers full cost to the provider. Finally we look at the portfolio effect of the system based on a coherent risk-measure: As it turns out the effects are substantial and the sensitivity of the providers' net income with regard to small changes of the (fixed) compensation is huge while it remains small for the insurer. In particular, we argue that general providers offering basic services are likely to make substantial losses whereas specialized health clinics might profit from the streamlining of its processes.

GENERAL TIME-TABLE

Legend

Abbrev.	Activities	Abbrev.	Activities
ART	Algorithms and related topics	EM	Economical Models
MC	Multicriteria decision making	O	Optimization
OR	Operations Research	ORE	Operations Research Education
P	Poster	PDE	Partial differential equation
PS	Probability and statistic	SM	Stochastic Models

Tuesday 11th

08:30-09:30: Registration, Facultad de Matemática y Computación, Universidad de La Habana.

09:30-10:30: Opening Session, Aula Magna, Universidad de La Habana.

10:30-13:00: Registration, Facultad de Matemática y Computación, Universidad de La Habana.

14:30-15:30: Plenary Lecture. Hotel Habana Riviera.

15:30-17:30: IP1. Hotel Habana Riviera.

17:30-18:15: Tour: "Hotel Habana Riviera and its History"

19:30-23:00: Welcome party, Salón Internacional, Hotel Habana Riviera.

Wednesday 12th

Hotel Habana Riviera

9:00-10:00: Plenary Lecture, Salón Gelabert.

10:00-10:30: Coffee Break.

10:30-12:30 Parallel Sessions

Room 1	Room 2	Room 3	Room 4
PS1	A1	CV1	O1

12:30-14:30: Lunch Break

14:30-16:10: Parallel Sessions

Room 1	Room 2	Room 3	Room 4
PS2	DM1	IP2	L1

16:10-16:30: Coffee Break.

16:30-18:30 Parallel Sessions

Room 1	Room 2	Room 3	Room 4
PS3	Presentation of Books	CV2	PDE1

Thursday 13th
Hotel Habana Riviera

9:00-10:00: Plenary Lecture, Salón Gelabert.
 10:00-10:30: Coffee Break,
 10:30-12:30 Parallel Sessions

Room 1	Room 2	Room 3
PS4	A2	ME1

12:30-14:00: Lunch Break
 14:30-15:30: Plenary Lecture, Salón Gelabert.
 15:30-16:10 Parallel Sessions

Room 1	Room 2	Room 3l
PS5	O2	ME2

16:10-16:30: Coffee Break.
 16:30-18:30 Parallel Sessions

Room 1	Room 2	Room 3
PS6	O3	ME3

Friday 14th
Hotel Habana Riviera

9:00-10:00: Plenary Lecture, Salón Gelabert.
 10:00-10:30: Coffee Break.
 10:30-13:30 Parallel Sessions.

Room 1	Room 2l
PS7	ME4 Women in Science

11:30-13:00: Round Table Women in Mathematics and Informatics. 14:00-...: Closing Address.

SESSIONS

Plenary Lecture:

14:30-15:30: Luthi , H. J.: Swiss DRG: A financial risk perspective.

Introducer: M. Cotrell.

Image processing 1(IP1). Room 1.

Chair: M. Baguer.

Time	Speaker	Title
15:30-15:50	Guerrero, F.	A method for red blood cell cluster separation in digital images of sickle cell disease.
15:50-16:10	Carrera, D.	Texture classification using regular vines.
16:30-16:50	Delgado, W.	Aplicación de métodos a posteriori para la corrección de sombras en imágenes de la membrana corioalantoica de embriones de pollo.
16:50-17:10	Cruz, E.	Deblurring: A GPU approach.
17:10-17:30	Phoulady, M.A.	Review of the effects of two-dimensional, computational filters on the processing of pseudo-spectral of immersed boundary of incompressible Navier-Stokes equations.
17:30-17:50	Phoulady, M.A.	Investigation of the one-dimensional numerical filters effects on the Fourier pseudo-spectral embedded boundary solution of the incompressible Navier-Stokes equations.

Wednesday, 12th
Morning

Plenary Lecture:

9:00-10:00: Tammer, C. A unified approach for different concepts of robustness and stochastic programming via nonlinear scalarizing functionals. Introducer: G. Bouza.

Probabilities and Statistics 1(PS1). Room 1.

Chair: J.N. Bacro.

10:30-11:10	.	
11:10-11:30	Masiello, E.	Ruin probability and climate change.
11:30-11:50	Ribereau, P.	Skew generalized extreme value distribution.
11:50-12:10	Toulemonde, G	Dependence structures for spatial extremes.
12:10-12:30	El Mahrsi, M. K.	Clustering moving object trajectories in road network environments.
12:30-12:50	Villa-Vialaneix, N.	Density-based inverse calibration with functional predictors.

Algorithms 1 (A1). Room 2.

Chair: S. Allende.

10:30-10:50	Marins, F. A.	Metaheuristics for sequencing multiple mixed-models assembly lines in a lean manufacturing environment.
10:50-11:10	Tapasco, O. A.	Simulated model for measuring performance telemarketers on a call center.
11:10-11:30	Hernández, C. T.	Evaluating reverse logistics alternatives by using analytic network process with BOCR.
11:30-11:50	Crawford, B.	Bees can solve the set covering problem?
11:50-12:10	Guénoche, A.	Multi clustering gives robustness to vertex classes in graphs.

Computer Vision 1(CV1). Room 3.

Chair: A. León

Time	Speaker	Title
10:30-10:50	Mesejo, D.	An experimental comparison of depth map denoising algorithm.
10:50-11:10	Paredes, C.	Detection of flat surfaces in three-dimensional point clouds captured by the Microsoft Kinect device.
11:10-11:30	Darias, D.	Stereoscopic vision system based on PlayStation Eye cameras.
11:30-11:50	Mesejo, J.A.	Proposal of the use of RGB-D cameras for therapeutics applications.
11:50-12:10	Franiatte, S.	Automated paintball turret target tracking algorithm.
12:10-12:30	Yero, G.	A study on diffusion in articulated human motion tracking by particle filtering.

Optimization 1(O1). Room 4.

Chair: C. Tammer.

Time	Speaker	Title
10:30-11:10	Pietrus, A.	Euler's method revisited for linear control systems Main Lecture.
11:10-11:30	Jean-Alexis, C.	A nonsmooth approach to solve generalized equations.
11:30-11:50	Ilhuicatzi, M.R.	Linear-quadratic optimal control problem with a random horizon.
11:50-11:10	Andouze-Bernard, S.	An optimal control approach for E-rumor.
12:10-12:30	Bouza, G.	Subgradients-like algorithms for solving variable inequalities.

Wednesday, 12th Afternoon

Probability and Statistics 2(PS2). Room 1.

Chair: C. Hardouin.

Time	Speaker	Title
14:30-15:10	Haughton, D.	Global analytics: four illustrative stories and a virtual academic community (VALSAC) Main Lecture
15:10-15:30	Gaubert, P.	Toward a multi-agent model of labour markets' dynamics.
15:30-15:50	Randon-Furling, J.	Schelling-type urban segregation models with switching and preferential dynamics.
15:50-16:10	Haughton, J.	Setting the post-2015 development agenda: is multidimensional poverty measurable?

Probability and Statistics 2(PS3): Room 1.

Chair: D. Haughton

Time	Speaker	Title
16:30-16:50	Hardouin, C.	Exact marginal distributions and normalizing constant for Gibbs processes.
16:50-17:10	Dematteo, A.	On tail index estimation based on multivariate data.
17:10-17:30	Lassoued, D.	On exponential dichotomy of non-autonomous periodic systems.
17:30-17:50	Boushaba, M.	Joint reliability importance in a k -out-of- N : F system for Markov-dependent components.
17:50-18:10	Boelaert, J.	Is one demand function enough?. An inquiry on preference stability using discrete mixtures of neural networks.

Decision Making 1 (DM1). Room 2.

Chair: S. Allende.

Time	Speaker	Title
14:30-14:50	Fernández, E.	Comparison of several outranking-based multicriteria sorting methods.
14:50-15:10	Scott, D. J	Glarma models and the Glarma R package.
15:10-15:30	Cerny, M.	Solving inverse interval linear programming using a parametric programming approach.

Image processing (IP2). Room 3.

Chair:

Time	Speaker	Title
14:30-14:50	Baguer. M.L.	Graph based segmentation.
14:50-15:10	Chinea, L.	An algorithm to detect and segment touching or overlapping objects.
15:10-15:30	Alvarez, Y.T	An eyelid segmentation method based on a multi-objective evolutionary approach.
15:30-15:50	Garcés, Y.	New similarity index for the mean shift iterative algorithm.
15:50-16:10	Castañeda, I.	Image segmentation using wavelets based on texture classification.

Computer Vision (CV2). Room 3.

Chair:

Time	Speaker	Title
16:30-16:50	Escobedo, M.	Estudio de las orientaciones de los vasos sanguíneos a partir del análisis del espectro de Fourier en imágenes de la membrana corioalantoica de embriones de pollo.
16:50-17:10	Ahmad, T.	Comparative analysis of human activity recognition using various techniques.
17:10-17:30	Govender, N.	Probabilistic models for D actives shape recognition using Fourier descriptors and mutual information.

Logistics 1(L1). Room 4.

Chair: A. Ruiz

Time	Speaker	Title
14:30-15:10	Daduna, J.R.	Container shuttle systems for linking seaport container terminals and dedicated satellite terminals.
15:10-15:30	Juárez, L. H.	Estimating of transit demand in transport systems.
15:30-15:50	Guedes, P.	Solving large instances of multi-depot vehicle scheduling problem with time-space network and column generation.
15:50-16:10	Da Silva MA.	Cross-layer optimization applied to obtain time metric specified to wireless mesh networks.

Partial differential equations 1 (PDE1). Room 4.

Chair: M. Rodríguez.

Time	Speaker	Title
16:30-16:50	Zine Aissaoui, M.	Stationary solution of the equation of coagulation of droplets with a vertical wind.
16:50-17:10	H. Fujita	Equations for stationary motion of the air in one dimension and computation for the formation of clouds by a wind.
17:10-17:30	Rodríguez, M.	Turing-Hopf patterns in higher dimensions.
17:30-17:50	Mora, C.	Stable numerical methods for two classes of stochastic differential equations with multiplicative noise

Thursday, 13th Morning

Plenary Lecture:

9:00-10:00: Gfrerer, H.: On regular and limiting coderatives of the normal cone mapping to inequality system

Probabilities and Statistics 4(PS4). Room 1.

Chair: V. Sistachs.

Time	Speaker	Title
10:30-11:10	Menéndez, E. P.	Nonparametric regression: an alternative to the scatter diagram.
11:10-11:30	Monterrey, P. A.	Probability distribution of p -value in tests for the mean of one normal population.
11:30-11:50	Monterrey, P. A.	Effect of physical activity on energy and nutrient intake in young university students: a Bayesian analysis.
11:50-12:10	Bouza, C.	Some results on sampling populations with a graph structure.
12:10-12:30	López, L.	Prognostic factors for cervical cancer patients in Tabasco, México.
12:30-12:50	Gaviño, G.	Competitive comprehensive model, enterprise- higher education institutions: study applied to region IV on the state of Mexico.

Algorithms 2(A2). Room 2.

Chair: S. Behar.

Time	Speaker	Title
10:30-10:50	Fosado, O.	HYDRA: plataforma informática para el análisis in silico de modelos metabólicos a escala genómica.
10:50-11:10	Reyes, R.	Development and analysis of probabilistic algorithms for genome-scale metabolic reconstruction.
11:10-11:30	Freyre, P.	Generación aleatoria de permutaciones del grupo simétrico o del alternado.
11:30-11:50	Morales, W.	Constraint based curve manipulation with cubic A -splines.

Mathematical Economics (ME1). Room 3.

Chair: B. Cornet

Time	Speaker	Title
10:30-10:50	Mazalov, V.	A game theoretic model for tournament organization
10:50-11:10	Gardes, F.	Riemannian consumers
11:10-11:30	Reichl, P.	Stability issues for the fixed-point problem of QOE-based charging in the internet.
11:30-11:50	Gardes, F.	Full price elasticities and the value of time: A Tribute to the Beckerian model of the allocation of time.
11:50-12:10	Lahiri, S.	Existence of competitive equilibrium in piecewise linear and concave exchange economies and the non-symmetric Nash bargaining solution.

Thursday 13th afternoon

Probability and Statistics 5(PS5). Room 1.

Chair: J.F. García.

Time	Speaker	Title
15:30-15:50	Pérez, V. E.	Métodos de agregación para calcular índices compuestos. Obtención de un ranking de sostenibilidad turística.
15:50-16:10	Guerra, C. W.	Aplicación del CATPCA para el estudio de la sostenibilidad de la empresapecuaria Valle del Perú.

Probability and Statistics 6 (PS6). Room 1.

Chair: C. Bouza

Time	Speaker	Title
16:30-16:50	Sautto, J. M.	Indicadores de gestión, responsabilidad y desempeño en la administración pública del estado de Guerrero, México.
16:50-17:10	Álvarez, J.	Modelo de optimización para estimar la tasa de interés justa para un financiamiento automotriz.

Optimización 2 (O2). Room 2

Chair: G. Bouza.

Time	Speaker	Title
15:30-15:50	Bello, Y.	A direct splitting method for non-smooth variational inequalities.
15:50-16:10	Díaz, R.	A relaxed-projection splitting algorithm for variational inequalities in Hilbert spaces.

Optimización 3 (O3). Room 2

Chair: G. Bouza.

Time	Speaker	Title
16:30-16:50	Bustamante, J.	Approximating functions by positive linear operators.
16:50-17:10	Quesada, J.M.	A discrete operator for approximation of continuous periodic functions.
17:10-17:30	Gómez, J.A.	A globally convergent algorithm for a PDE-constrained optimization problem.

Mathematical Economics 2(ME2).. Room 3.

Chair: B.A. Wickstroem

Time	Speaker	Title
15:30-15:50	Cipra, T.	Optimal pension consumption strategies
15:50-16:10	Labidi, M.	A shift scheduling model for a bank IT staff

Mathematical Economics 3(ME3). Room 3.

Chair: B.A. Wickstroem

16:30-16:50	Prause, G.	On the evaluation of voting power in companies.
16:50-17:10	Ahlheim, M.	Considering household size in contingent valuation studies
17:10-17:30	Klingelhöfer, H. E.	Financial valuation of investments into new market segments and decisions on segment development .

Friday, 14th Morning

Plenary Lecture:

9:00-10:00: Cornet, B.: Pricing securitized via non-additive risk-neutral probabilities

Mathematical Economics 4 (ME4). Room 2.

Chair:

10:30-10:50	Caamal, I.	Análisis de la función de exportación de limón persa a Estados Unidos de América
10:50-11:10	Armenta, A.B.	Análisis multisectorial de la economía del estado de Tabasco

Probabilities and Statistics 7 (PS7). Room 1.

Chair:

10:30-10:50	Ramírez, M. A.	Análisis multisectorial de la economía del estado de Tabasco.
	García, J.F.	Un estudio cuantitativo de la migración en la frontera sur de México-Guatemala
10:50-11:10	García, J. F.	Complejidad y multidimensionalidad de la pobreza. El caso de México.

Poster session

Speaker	Title
Carrera, D	Estimation of Distribution Algorithms Based on Regular Vines
Hernández, D.	K-convex test functions for vector optimization with variable order
Díaz, L.	Enfoque del modelo de regresión logística bayesiano usando el Markov chain Monte Carlo
García, K.	Classification of sleep stages based in statistical pattern recognition
Jiménez , Y. R.	Modelo de pronóstico del costo de la reincorporación estudiantil en la carrera de Agronomía de la Universidad Agraria de La Habana
Raíces, I.	Modelación bayesiana para la estimación del riesgo relativo de morir por cáncer de las vías respiratorias en Cuba en el año 2011.
Sistachs, V	Árboles de decisión borrosos, una implementación de ANFIS y SDT.
Suárez, S.	Marco de trabajo para inventarios geoespaciales.
Viada, C.	Revisión sistemática de los métodos de imputación de datos faltantes y su efectos en las estimaciones.

APPROXIMATING FUNCTIONS BY POSITIVE LINEAR OPERATORS

J. A. Adell Pascual*, J. Bustamante González**, and J. M. Quesada Teruel***

*Universidad de Zaragoza, Spain.

**Benemérita Universidad Autónoma de Puebla, Mexico.

***Universidad de Jaén, Spain.

This talk is concerned with estimates of the rate of convergence in approximating a function f by a sequence of positive linear operators L_n acting on f . Two main cases are addressed: In the first one, f or its derivative f' are supposed to be of bounded variation, and the rates of convergence are given in terms of the corresponding local variation on appropriate intervals. In the second, f is a general continuous function, and the rates of convergence are expressed in terms of the second order Ditzian-Totik modulus of smoothness of f . In both cases, the given estimates are near optimal, even optimal for some particular subsets of functions. The important special case of the Bernstein polynomials is discussed in more detail. We use a probabilistic approach which allows us to represent the sequence of positive linear operators L_n as mathematical expectations of suitable stochastic processes.

CONSIDERING HOUSEHOLD SIZE IN CONTINGENT VALUATION STUDIES

M. Ahlheim* and F. Schneider**

*University of Hohenheim, Germany.

**University of Linz, Austria.

In many empirical Contingent Valuation studies one finds that household size, i. e. the number of household members, is negatively correlated with stated household willingness to pay for the realization of environmental projects. This observation is rather puzzling because in larger households more people can benefit from an environmental improvement than in small households. Therefore, the overall benefit should be greater for larger households. A plausible explanation could be that household budgets are tighter for large families than for smaller families with the same overall family income. The fact that larger families can afford only smaller willingness to pay statements in Contingent Valuation surveys than smaller families with the same income and the same preferences might have consequences for the allocation of public funds whenever the realization of an environmental project is made dependent on the outcome of a Contingent Valuation study. In this paper we show how the use of household equivalence scales for the assessment of environmental projects with the Contingent Valuation Method can serve to reduce the discrimination of members of large families.

COMPARATIVE ANALYSIS OF HUMAN ACTIVITY RECOGNITION USING VARIOUS TECHNIQUES

T. Ahmad

Government College University, Pakistan.

Many efforts have been applied on human activity recognition such as face recognition and motion analysis [1]. The major problems in recognition are: 1. Scale. 2. Shift. 3. Projection. Human Activities are identified by the pose of the body such as standing, sitting etc. and some of the activities are like the emotions, facial expressions etc. Generally, human activity recognition is achieved by two groups of instruments so far; one on the basis of wearable sensors and the other one on the basis of environment sensing instruments. For Wearable sensors we use accelerometers, gyroscopes, and microphones etc. and for environment sensing instruments we use video recorders, shock sensors etc. Since the installation of the environment sensing instruments is intrusive and quite expensive so Wearable sensors are preferred. The Human Activity is recognized by combining information of human pose, human location and elapsed time. The main objective of this research is to recognize various

activities of the human body by the help of the various techniques like Machine Learning, Sensor Technology etc. It will be helpful in commercial use like the restaurants and food places full of the automated robots and many more. It is also helpful in Medical field like fully automated nurse robots available for the patient care etc. it is also helpful in security purposes and many more.

STATIONARY SOLUTION OF THE EQUATION OF COAGULATION OF DROPLETS WITH A VERTICAL WIND

M.Z. Aissaoui*, M. Meriem*, and H. Fujita Yashima*,**

*Université 8 mai 1945, Algeria.

**Università di Torino, Italy.

We consider the equation which describes the processes of coagulation and transport of water droplets as well as growth of droplets by condensation in the atmosphere in the presence of a vertical ascending wind. This study is motivated by the interest of phenomena of intensive condensation of water vapor and consequent intensive precipitation caused by an ascending wind. In this study, we consider the density of liquid water $\sigma(m; z)$ (with respect to the volume of air) contained in droplets of mass m at the vertical position $z \in [0; 1]$, supposing that the velocity $u(m; z)$ with which the droplets of mass m are transported by the wind and the gravitation force, the rate $h_{gl}(m; z)$ with which they grow by condensation and the rate $\beta(m; m_0)$ with which they form their union (coagulation) are given ; the velocity $u(m; z)$ is positive for some $(m; z)$ and negative for some $(m; z)$. The transport in physical space $[0; 1]$ and the growth by condensation can be considered as a transport in the space $\mathbb{R}^+ \times [0; 1]$ with a given velocity $U(m; z) = (h_{gl}(m; z); u(m; z))$, while the process of coagulation is described by an integral operator (of Smoluchowski type). The main result of our investigation is the existence of a stationary solution of the equation in consideration under some suitable hypotheses. In the proof, the technics of characteristics are employed to obtain a solution, Schauder's fixed point theorem is used, but the estimates in the neighborhood of $\{(m; z) | u(m; z) = 0\}$ need considerable elaborations.

A TOOL TO SIMULATE AN INTERSECTION CONTROLLED BY TRAFFIC LIGHTS TIMING VARIABLES

S. Allende*, G. Bouza*, O. Fonseca*, C. Lema**, L. P. Pedreira**, and G. Pujol**

*Universidad de la Habana, Cuba.

Universidad de la Coruña, Spain.

Due to the complexity of many phenomena, simulation is one of the most useful tools which can be used to study the behavior of the processes. In the present investigation, we consider an intersection of n streets, regulated by traffic lights. We assume that the arrivals and departures of the vehicles follow a Poisson distribution which can vary within the studied interval. We implement a friendly simulator in .Net framework using C#, for describing the level of congestion at the intersection during the specified period of time. Based on a discrete event simulation, we generate the lengths of the queues and, with these data; the user can identify the problematic phases and change the parameters in order to determine the best option.

AN EYELID SEGMENTATION METHOD BASED ON A MULTI-OBJECTIVE EVOLUTIONARY APPROACH

Y. Alvarez-Betancourt* and M. Garcia-Silvente**

*University of Cienfuegos, Cuba.

**University of Granada, Spain.

Iris recognition has been classified as one of the most robust and reliable methods for identifying a specific human individual. Currently, research is on the way to meeting the challenges of non-ideal iris recognition. Hence, what is required is an accurate detection of several image quality factors. Eyelid occlusion is a quality factor that may significantly affect accuracy. In this paper, we present a multi-objective evolutionary approach to obtain the combination of contour pieces which best models the eyelid contours. The proposed method is composed of three main steps: recovering information of contours, obtaining approximated solutions, and selecting the best solution. Thus, NSGA-II was used to deploy a multi-objective evolutionary framework with 4 objectives. The experiments were developed on a subset of CASIA-IrisV4- Interval image database, using the methodology of Udupa to assess the quality of image segmentation. Thereby, it is proven that the proposed method is reliable and has a strong match with true segmentation which is based on a consensus criterion of experts.

AN OPTIMAL CONTROL APPROACH FOR E-RUMOR

S. Andouze-Bernard*, G. Bouza**, and A. Piétrus*

*Université des Antilles et de la Guyane, France.

**Universidad de la Habana, Cuba.

Social networks have a significant role in spreading rumors. Such phenomena of e-rumor are big challenges for communities, organizations and states, since the spread of rumors can rapidly jeopardize their public opinion and their economic and financial markets. In these last decades, many mathematical theories have been developed on this topic. In this work, an optimal control approach is applied on an existing dynamical models in order to minimize rumor spreading in simple cases and suggest intervention strategies.

ANÁLISIS MULTISECTORIAL DE LA ECONOMÍA DEL ESTADO DE TABASCO.

A.B. Armenta Ramírez and M. Á. Ramírez Martínez

Universidad Juárez Autónoma de Tabasco. Mexico.

Se realiza el análisis regional de la economía tabasqueña mediante el análisis de insumo producto. El objetivo es analizar la economía del estado de Tabasco a través de un Modelo de Equilibrio General Aplicado de una economía Regional con año base 2003 (MEGAR-TAB 2003). En Tabasco, una economía regional, se han presentado situaciones que han sido resultados de políticas económicas federales y locales, que en los últimos 30 años la han llevado a los niveles de pobreza y marginación que hoy se vive, a pesar de contar grandes recursos naturales y cuyo resultado es relevante analizar. Su economía está anclada sobre un recurso natural de importancia nacional que es el petróleo, que entendemos como un recurso puntual dado la estrecha geografía en que puede ser extraído, donde los costos de producción son relativamente bajos. Dada su concentración y generación de grandes excedentes, se asocia con cierta inequidad en términos de poder y se caracteriza por relaciones verticales entre accionistas, gerentes, trabajadores, y en el caso de México con el gobierno. Dado que las rentas del recurso pueden ser apropiadas fácilmente por una élite (Torvik, 2001), la industria ha generado rentas improductivas como la industria de la indemnización, asignación de contratos directos, y del lado público, altas participaciones federales sin una clara transparencia en la rendición de cuentas de los gastos ejercidos, generadas por las relaciones verticales de agente-principal e incrementando el riesgo moral entre todos los agentes (Sobarzo, 2008; Sobarzo, 2003; Gamboa y Messmacher, 2003). Esto genera una clara distinción entre la extracción del petróleo que ha generado grandes ingresos pero al mismo tiempo situaciones de poco desarrollo de la industria manufactura y una economía, en general, orientada a los servicios.

GLOBAL ANALYTICS FOUR ILLUSTRATIVE STORIES AND A VIRTUAL ACADEMIC COMMUNITY
(VALSAC)

S. Arumugam*, J. Boland**, D. Haughton***, P. Nguyen**** I. Hudson****, M. Skaletsky*****,

B. Vasanthi*, and Ch. Zhang*****

*Kalasalingam University, India.

**University of South Australia, Australia.

***Bentley University, USA. Université Paris I (SAMM) and Université Toulouse I (GREMAQ), France.

****University of Newcastle, Australia.

*****T&C Consulting, Hanoi, Vietnam.

*****Bentley University, USA.

This paper outlines four stories in order to give a sense of what global analytics (AKA data analysis, data science, data mining, applied to international data) entails, and then motivates the VALSAC (Virtual Academic Living Standards Analytics Community) initiative. The first story takes us to Tamil Nadu (India) and discusses a Social Network Analysis (SNA) of a community of weavers in the village of Sankarapandiapuram. The second story takes us to Viet Nam. We demonstrate how Kohonen maps - otherwise known as self-organizing maps - can be used to address the issue of comparing the living standards of Vietnamese provinces. In the past single indicators such as the GDP per capita or the poverty rate have been used to rank provinces. However it is recognized that the living standard of a province is a multi-dimensional concept, and the problem arises of how to rank provinces on the basis of several indicators. Attempts to use composite indicators such as the Human Development Index (HDI) carry some limitations. The Kohonen map methodology makes it possible to map Vietnamese provinces on a two-dimensional grid, on the basis of a number of living standards indicators, and to give an interpretation of the dimensions on the grid. Our results shed some light onto some intriguing past rankings based on single or composite indicators, and at the same time demonstrate the usefulness of the Kohonen map methodology in the social sciences. The third story also takes place in Viet Nam. We discuss a methodology (multilevel models) to obtain small area estimates in the context of the Vietnam Living Standards Surveys. The problem is that household surveys provide excellent and typically unbiased data on household living standards but tend to be expensive to administer and thus have small sample sizes, making estimation at such disaggregated levels as communes so inaccurate as to be impractical. Our models for estimating more accurately the commune-level mean (logarithm of) household expenditure per capita rely on independent variables available both in the 1999 Census and in the VHLSS of 2002. As a useful by-product, we also obtain a Location Impact Factor (LIF) for each commune, a measure of the impact on living standards of commune location when characteristics such as the education and employment structure, etc. of the commune population are controlled for. The fourth story is set in Russia. It leverages the multilevel models methodology to generate the first comprehensive investigation of the digital divide in Russia, on the basis of recent household survey data. Inspired by these four stories, the paper then motivates and describes the VALSAC (Virtual Academic Living Standards Analytics Community) initiative.

DEPENDENCE STRUCTURES FOR SPATIAL EXTREMES

J.N. Bacro*, C. Gaetan**, and G. Toulemonde*

*Université Montpellier 2, France. **DAIS, Università Ca' Foscari, Italy.

Extreme events are rare by nature but they may induce strong damages on human lives and material assets. That is why the last few decades have witnessed a tremendous interest in Extreme Value Theory. The univariate case is now well-known. The multivariate one is obviously more complex and offers various options to capture the main characteristics of the underlying dependence structure [1,2]. Usually the dependence structure is

specified in terms of multivariate max stable distributions. These distributions assume a constant extremal dependence structure even when very extremal events are investigated and this entails that only two cases can be effectively dealt : dependence and exact independence for extreme values. The case of asymptotic independence is not included whereas this situation may occur in practice : for instance, Gaussian vectors are asymptotically independent [3]. In a spatial context, max stable processes arise as an infinite dimensional generalization of multivariate max-stable distributions and these processes are widely used. Nevertheless the same problem occurs : these processes are unable to take into account asymptotic independence. A class of asymptotic independent models has been recently proposed by [4]. In this talk, we propose a new spatial process for extremes allowing to model asymptotic dependence, asymptotic independence and, eventually, independence depending on the distance between two observation sites. Inference for this model will be illustrated by means of a real example.

SUBGRADIENTS-LIKE ALGORITHMS FOR VARIABLE INEQUALITIES

J.Y. Bello Cruz*, G. Bouza-Allende*, and L. R. Lucambio Pérez*

*Universidade Federal de Goiás, Brazil.

**Universidad de La Habana, Cuba.

Consider the variable inequality problem, that is to find a solution of the inclusion given by the sum of a function and a point-to-cone application. This problem can be seen as a generalization of the classical system inequality problem taking a variable order structure. Exploiting this special structure, we propose variants of the subgradient algorithm for solving a system of variable inequalities. Their convergence is analyzed under convex-like conditions.

A RELAXED-PROJECTION SPLITTING ALGORITHM FOR VARIATIONAL INEQUALITIES IN HILBERT SPACES

J. Y. Bello Cruz* and R. Díaz Millán**

*Federal University of Goias, Brazil.

**Federal Institute of Education, Science and Technology, Brazil.

We introduce a relaxed-projection splitting algorithm for solving variational inequalities in Hilbert spaces for the sum of nonsmooth maximal monotone operators, where the feasible set is defined by a nonlinear and nonsmooth continuous convex function inequality. In our scheme, the orthogonal projections onto the feasible set are replaced by projections onto separating hyperplanes. Furthermore, each iteration of the proposed method consists of simple subgradient-like steps, which do not demand the solution of any nontrivial subproblem, using only the individual operators exploring the structure of the problem. Assuming monotonicity of the individual operators and the existence of solutions, we prove that the sequence generated converges weakly to a solution.

IS ONE DEMAND FUNCTION ENOUGH?. AN INQUIRY ON PREFERENCE STABILITY USING DISCRETE MIXTURES OF NEURAL NETWORKS

J. Boelaert

SAMM Université Paris I. Panthéon-Sorbonne, France.

Preference stability is a standard assumption of modern economics, stating that consumer preferences do not vary over time or space, which means that a single demand function can explain all consumption behavior. We

test this hypothesis using discrete mixtures of feedforward neural network on Canadian household consumption microdata, and find that at least two distinct functions are present in the data, thus rejecting the preference stability hypothesis. The question of the power of this test is raised, and addressed using simulated data.

JOINT RELIABILITY IMPORTANCE IN A K-OUT-OF-N:F SYSTEM FOR MARKOV-DEPENDENT COMPONENTS

M. Boushaba* and M. Reghioua**

*University of Constantine, Algeria.

**Ecole Normale Supérieure de Constantine, Algeria.

Joint Reliability Importance (JRI) is investigated to provide information on the type and the degree of interactions between components by identifying its sign and its value. In this paper, we study JRI in a k -out-of- $n : F$ system for Markov dependent components. We obtain a closed-form formula for the JRI of two components and more than two components using the probability generating function. Our numerical examples show the results keywords: Joint reliability importance; k -out-of- $n : F$ system; Markov dependent components; probability generating function.

SOME RESULTS ON SAMPLING POPULATIONS WITH A GRAPH STRUCTURE

Carlos N. Bouza

Universidad de La Habana, Cuba.

Selecting a sample in a social network is particularly important. This problem is of increasing importance nowadays, due to the proliferation of internet networks. We consider a large population where the units are interconnected in some way. In this paper sampling designs that use the graph structure of the population are presented. The determination of a central tendency graph is derived using a maximum likelihood principle. The results of simulation experiments are discussed.

K-CONVEX TEST FUNCTIONS FOR VECTOR OPTIMIZATION WITH VARIABLE ORDER

G. Bouza-Allende and D. Hernández-Escobar

Universidad de La Habana, Cuba.

Vector Optimization with Variable Order is a rising area of applied math. Recent papers have extended classical methods to deal with this variable order structure. Therefore, test functions are needed to check the effectiveness of new algorithms. Classical convergence hypotheses are the convexity of the function with respect to the order and the continuity of the point-to-set application which defines the order. In this work, we propose a class of functions and the corresponding order such that these good properties are fulfilled.

A DISCRETE OPERATOR FOR APPROXIMATION OF CONTINUOUS PERIODIC FUNCTIONS

J. Bustamante-González* and J. M. Quesada Teruel**

*Benemérita Universidad Autónoma de Puebla, México.

**Universidad de Jaén, Spain.

The approximation of a continuous π -periodic function is realized by means of discrete two-terms linear combinations of Jackson kernels. The rate of Convergence is given.

ANÁLISIS DE LA FUNCIÓN DE EXPORTACIÓN DE LIMÓN PERSA A ESTADOS UNIDOS DE AMÉRICA

I. V. Caamal Cauich, G. Pat Fernández, and F. Deviana Aguilar
Universidad Autónoma Chapingo, México.

México es el principal productor y exportador de limón persa en el mundo. Los principales estados productores de México son Veracruz, Tabasco y Oaxaca. En la presente investigación se estudia la función de exportación del limón persa de México a Estados Unidos de América, para el periodo de 2003-2013. El modelo considera que las exportaciones están en función del precio unitario de exportación (PUEX), el ingreso de los Estados Unidos (GDP) y la demanda de importaciones de limón persa de los Estados Unidos (DIM). Los resultados muestran que los coeficientes de regresión estimados fueron del signo esperado de acuerdo con la teoría económica y son estadísticamente significativos. Así mismo, las elasticidades obtenidas para cada una de las variables son positivas y menores que uno. Los resultados muestran inelasticidad y relación positiva entre las variables explicativas y las exportaciones, significa que un incremento porcentual en estas variables genera un cambio positivo y de menor proporción en las exportaciones de limón persa de México a Estados Unidos. Las variables PUEX, GDP y DIM, tienen un impacto positivo en las exportaciones de limón persa a Estados Unidos de América.

ESTIMATION OF DISTRIBUTION ALGORITHMS BASED ON REGULAR VINES

D. Carrera, Y. Gonzalez-Fernandez, J. Azor, M. Soto, and A. Ochoa
Institute of Cybernetics, Mathematics and Physics, Cuba.

In this work we use regular vines (R-vines) to model the search distributions of an Estimation of Distribution Algorithm (RVEDA). An R-vine is a probabilistic graphical model that specifies the dependence structure of a multivariate distribution by a product of conditional and unconditional bivariate copulas. Copulas separate the effects of dependence and marginal distributions in a joint distribution. As far as bivariate copulas can belong to different families, R-vines cover a wide range of linear and nonlinear dependences. This explains the flexibility of these models to codify the correlations among variables of the objective function. In RVEDA the marginal densities are modeled by normal or nonparametric normal kernel distributions, while R-vines fit bivariate copulas chosen from a set of different families. We test the performance of the algorithm on several benchmark functions that exhibit different source of complexity. The experimental results show that an RVEDA with mixed copula types performs better than an RVEDA with only normal bivariate copulas. The experiments also show that both the dependence structure and the marginal distributions play an important role in the performance of the algorithm.

TEXTURE CLASSIFICATION USING REGULAR VINES

D. Carrera, O. Pereira, Y. González-Fernández, M. Soto, and A. Ochoa
Institute of Cybernetics, Mathematics and Physics (ICIMAF), Cuba.

This work deals with texture classification using a Bayesian framework based on regular vines (R-vines). R-vines are graphical models that represent the dependence structure of multivariate distributions as a product of conditional and unconditional bivariate copulas. Under the proposed approach, texture is modeled by the parameters of beta distributions fitted to the bands of a wavelet decomposition of the image. This approach is able to deal with both large dimensions and a mixture of linear and nonlinear correlations among the problem features as far as the bivariate copulas can come from different families. Segmentation experiments carried out on artificial textures support this statement. The R-vine classifier outperforms a multivariate Gaussian

and a product copula classifier, which assume features are linearly correlated or non-correlated whatsoever, respectively.

A GLOBALLY CONVERGENT ALGORITHM FOR A PDE-CONSTRAINED OPTIMIZATION PROBLEM

M. Carrillo*, J. A. Gómez*, and A. Fraguera**

*Universidad de La Frontera, Chile.

**Universidad Autónoma de Puebla, Mexico.

We study the convergence properties of an algorithm for the inverse problem of electrical impedance tomography, which can be reduced to a PDE constrained optimization problem. The direct problem consists of the potential equation $div(\varepsilon \nabla u) = 0$ in a circle, with Neumann condition, describing the behavior of the electrostatic potential in a medium with conductivity given by the function $\varepsilon(x, y)$. We suppose that at each time a current ψ_i is applied to the boundary of the circle (Neumanns data) and it is possible to measure the corresponding potential ϕ_i (Dirichlet data). The inverse problem is to find $\varepsilon(x, y)$ given a finite number of Cauchy pairs measurements (ϕ_i, ψ_i) , $i = 1, \dots, N$. The problem was formulated as a least square problem, and the developed algorithm solves the continuous problem using descent iterations in its corresponding finite element approximations. Wolfe's conditions are used to ensure the global convergence of the optimization algorithm for the continuous problem. Although exact data are assumed, measurement errors in data and regularization methods shall be considered in a future work.

IMAGE SEGMENTATION USING WAVELETS BASED ON TEXTURE CLASSIFICATION

I. Castañeda Suárez* and Á. León Mecías**

*ISPJAE, Cuba.

**Universidad de La Habana, Cuba.

The importance of image segmentation is well known. There are many existing segmentations schemes based on wavelets analysis. A method that automatically selects the optimal features for each pixel using discrete wavelet transform is proposed, the Haar transform plays a leading role to a significantly lower computational complexity than most existing schemes, a robust segmentation algorithm is guaranteed by translation and invariant rotation texture classification which results in better estimation and more detailed texture characterization at region boundaries and giving a consistently high performance for rotated features. The main idea is to classify the image's pixels accordingly using wavelets analysis, never mind if the pixel belongs to a smooth or textured region of the image. The image is decomposed into four sub-bands (LL, LH, HL, and HH) several times, taking three levels as the starting point. The *HH* channel of the first level is not used as it tends to contain the majority of noise in the image and thus degrade the classification performance. The energy of each channel is calculated finding the mean of its wavelet coefficients. Rotation invariant is achieved by combining pairs of diagonally opposite wavelet channels to form single features. It means that *LH* and *HL* in each level are grouped together. The energy values are classified in two classes for each sub=band and considered the texture information used together with spatial (x,y), color (gray-level or L*U*V values) to constitute the feature vector. The image is filtered using mean shift algorithm in the feature space which provides better discrimination between regions where colors are similar but texture is different. The output image is finally segmented using k-means clustering algorithm.

SOLVING INVERSE INTERVAL LINEAR PROGRAMMING USING A PARAMETRIC PROGRAMMING APPROACH

M. Cerny
University of Economics, Czech Republic.

An interval linear program is a linear programming problem (in the form $\max\{c^T x : Ax \leq b\}$, say), where the coefficients A, b, c are known intervals. By inverse interval linear programming problem we mean the following task: given interval matrices/vectors $[\underline{A}, \overline{A}]$, $[\underline{b}, \overline{b}]$ and $[\underline{c}, \overline{c}]$ and a prescribed value $\gamma_0 \in \mathbb{R}$, find $A_0 \in [\underline{A}, \overline{A}]$, $b_0 \in [\underline{b}, \overline{b}]$ and $c_0 \in [\underline{c}, \overline{c}]$ (where A_0, b_0, c_0 are real-valued matrices/vectors) such that $\max\{c_0^T x : A_0 x \leq b_0\} = \gamma_0$ or state that no exists. Said otherwise, the inverse problem deals with designing linear programs in the way that data of the linear program can be selected from given intervals and the optimal value of the linear program must attain the prescribed value γ_0 . We present a generalization of a parametric approach, called *rank-one decomposition method*. We also compare this method with the straightforward Binary Search technique. We also discuss limits of the techniques since both of them rely on the assumption of continuity of the optimal value function $f(A, b, c) = \max\{c^T x : Ax \leq b\}$. We also discuss some necessary conditions for its continuity and their possible extensions.

AN ALGORITHM TO DETECT AND SEGMENT TOUCHING OR OVERLAPPING OBJECTS

L. Chinea-Valdés*, L. Guerrero-Úbeda**, and J. V. Lorenzo-Ginori*

*Universidad Central Martha Abreu de las Villas, Cuba.

**Centro Oftalmológico del Hospital Ernesto Guevara de la Serna, Cuba,

In several problems related to image segmentation tasks, the need of separating objects that are touching or overlapping occurs frequently. Examples of this can be found when working with images of cellular microscopy or with geological specimens, among others. This paper presents a method for the detection and separation of aggregates, oriented to applications in images of cellular microscopy, based in the use of grayscale morphological image processing techniques. The procedure starts applying a correction of the possible non-uniform illumination and then a coarse segmentation method, which is not capable of resolving the aggregates into their constituent objects. Solving this last problem is the main objective of this paper. Here together with the segmentation of the images, it is important to consider the computational cost, which can be high when large numbers of images are to be processed. Taking into account the above mentioned factors, in this work the aggregates were detected through the application of the conventional distance and H-maxima transforms. A stopping criterion was used, in accordance with the numbers of extended maxima that appear in successive iterations when applying the H-max transform. Whenever the aggregates in cell images are detected, they shall be separated into their constituent objects using the watershed transform with markers. In this case, the inner markers were the centroids of extended minima/maxima obtained from the application of the H-min (or H-max) transform. Finally, an evaluation using indexes of effectiveness was performed to evaluate the results in terms of the adequate detection of aggregates.

OPTIMAL PENSION CONSUMPTION STRATEGIES

T. Cipra

Charles University in Prague, Czech Republic.

The paper shows by means of the concept of utility that the annuitization through life annuities or pensions can be an effective instrument how to ensure economically seniors. Various quantitative arguments are presented supporting this statement (e.g. the annuity equivalent wealth AEW is calculated using Czech data). The methods of mathematical optimization are used for this purpose. The corresponding optimization problems are solved separately for PB (perfect bond) markets, PA (perfect annuity) markets and CA (classical annuity)

markets, and for the utility function CRRA (constant relative risk aversion) which is frequent in the practice. In conclusion, some numerical results are presented.

A DESIRABILITY-BASED MULTI-CRITERIA DECISION MAKING STRATEGY FOR DRUG DISCOVERY

M. Cruz-Montegudo^{*,**,***}, J.L. Velázquez-Libera^{***}, H. P. The^{**}, M. N. D. S. Cordeiro^{*}, and F. Borges^{*}

^{*}University of Porto, Portugal.

^{*}Central University of Las Villas, Cuba.

^{***}University of Las Tunas, Cuba.

A multi-objective optimization (MOOP) method based on Derringer's desirability function and ranking methods were employed as a rational strategy of multi-objective virtual screening to identify new hits. Was conducted a simultaneous study of the inhibitory efficacy over the *HIV*-1 RT and the toxic effects over *MT4* blood cells of a diverse set of *HIV*-1 NNRTIs, based on a diverse dataset collected from prior literature reports. The molecular descriptors implemented on DRAGON software were used to encode numerically the molecular structure of the compounds. Were found the theoretical levels of the predictive variables required to reach a desirable ($D_{IC_{50}-CC_{50}} = 1.000$) RT inhibitor candidate with the best possible compromise between RT inhibitory efficacy ($IC_{50} = 0.001\mu M$) and toxicity over *MT4* blood cells ($CC_{50} = 563.638\mu M$). This information is used as a pattern to rank the library of compounds according to a similarity-based structural criterion. The corrected ranking quality index ($\Psi^* = 0.357$) calculated, represents a percentage of ranking quality (R%) of 64.34%. The results obtained in this work allow highlighting the benefits of exploiting a combined strategy of desirability-based multiobjective optimization and ranking as valuable tools in drug discovery and development process.

DEBLURRING: A GPU APPROACH

E. Cruz and M. Salas

Complejo de Investigaciones Tecnológicas Integradas, Cuba.

When an image is captured, it always has problems affecting its quality and utility. Problems caused by environment induced degradations, or by optics and electronics of the capture devices. The image blur is one of these degradations. The image de-blurring procedures are very useful in a variety of fields, like astrophotography, medicine, neuroscience, video surveillance or forensic analysis of image and video. A lot of methods had been proposed for restoring blurred images. Usually, the algorithms that give the best results are computationally taxing. In this paper, implementations of two methods (Wien filter, Hansen-Nagy-O'Leary) are proposed. Those implementations use the power or massively parallel compute devices, amortizing the computation const. Later, the response time and restoration quality are analyzed.

BEEES CAN SOLVE THE SET COVERING PROBLEM

R. Cuesta^{*}, B. Crawford^{*,**}, R. Soto^{*,***}, and F. Paredes^{****}

^{*}Pontificia Universidad Católica de Valparaiso, Chile.[†]

^{**}Universidad Finis Terrae, Chile.

^{***}Universidad Autónoma de Chile, Chile.

^{****}Universidad Diego Portales, Chile.

The Set Covering Problem (SCP) is a classic problem in combinatorial analysis, sciences of the computation and theory of the computational complexity. It is a problem that has led to the development of fundamental

technologies for the field of the algorithms of approximation. Also it is one of the problems of the List of 21 Karp's *NP*-complete problems whose *NP*-completeness it was demonstrated in 1972. Many algorithms have been developed to solve it. Exact algorithms are mostly based on branch-and-bound and branch-and-cut. However, these algorithms are rather time consuming and can only solve instances of very limited size. For this reason, many research efforts have been focused on the development of heuristics to find good or near-optimal solutions within a reasonable period of time. As top-level general search strategies, metaheuristics were also applied to the SCP. An incomplete list of this kind of metaheuristics for the SCP includes genetic algorithms, simulated annealing, ant colony and tabu search. In this paper we present the metaheuristic Artificial Bee Colony (ABC) solving the SCP. The bees algorithm is a new population-based search algorithm, it mimics the food foraging behavior of swarms of honey bees. In its basic version, the algorithm performs a kind of neighborhood search combined with random search and can be used for optimization problems. Research on ABC for SCP has not been seen to date.

CONTAINER SHUTTLE SYSTEMS FOR LINKING SEAPORT CONTAINER TERMINALS AND DEDICATED SATELLITE TERMINALS

J. R. Daduna
Berlin, Germany.

Worldwide for many seaports considerable problems arise when it comes to expanding their facilities. The needed areas are not available due to historical urban settlement structures and the (usually more profit-oriented) forms of land use in the neighboring zones. These circumstances limit the quantitative and qualitative performance enhancement, which is fundamental for international competition in times of increasing demand. Hereof seaport container terminals (SCT) are strongly affected because process structures in container transport require sufficient space and fitting technological equipment. A repeatedly discussed solution persists in building satellite terminals (ST), which are established very near to the SCT. Nevertheless, one critical aspect of this solution is the design of a sufficient transport system between SCT and ST, which, on one hand, must be enforceable from the transport policy point of view and, on the other hand, must be able to guarantee a sufficient performance. Here (fully automated) railway and (guided) road traffic systems, heavy-lift cable car and overhead conveying systems as well as underground tunnel systems are under consideration for container transport. Existing as well as conceptualized systems are analyzed and assessed with regards to their possible usability for shuttle transports between SCT and ST. Fundamental for this are operational aspects (i.e. accessible capacity, velocity and security), the question of technical feasibility, arising investment and operational costs as well as (political) enforceability.

STEREOSCOPIC VISION SYSTEM BASED ON PLAYSTATION EYE CAMERAS

D. Darias and O. L. Vera
Universidad de La Habana, Cuba.

In this paper we experimentally tested the performance of a stereoscopic system based in PlayStation Eye cameras and computing on graphics processing units. The device and the algorithms used to obtain the depth map are described. A set of indoor and outdoor scenes were designed to measure the quality of the scene reconstruction. The device was integrated with the OpenNI platform to test the accuracy of the skeleton and hand tracking algorithms. The new device has a lower cost compared to commercial sensors with similar features, allowing developers to create new forms of human-computer interaction through real time depth maps.

CROSS-LAYER OPTIMIZATION APPLIED TO OBTAIN TIME METRIC SPECIFIED TO WIRELESS MESH NETWORKS

M. da Silva*, E. L. Frana Senne**, and N. Lankalapalli Vijaykumar*

*National Institute for Space Researches, So José dos Campos, Brazil.

**Universidade Estadual Paulista, Guaratinguetá, Brazil.

Time metrics are extremely important to evaluate performance of multimedia transmissions on wireless networks, mainly in wireless mesh networks (WMNs), whose characteristic is to provide Internet access to remote devices. An example of such a metric is WCETT (Weighted Cumulative Expected Transmission Time), in which each time of transmission per hop is a weighted average based on proactive and reactive conditions. This paper presents a combination of solutions to minimize WCETT in a given model subject to constraints in some of the network layers: Mixed Integer Linear Programming and use of a heuristic. The heuristic is based on decomposing in subproblems represented by each layer used in the model.

ON TAIL INDEX ESTIMATION BASED ON MULTIVARIATE DATA

A. Dematteo and S. Cléménçon

Telecom ParisTech, France.

This article is devoted to the study of tail index estimation based on i.i.d. multivariate observations, drawn from a standard heavy-tailed distribution, i.e. of which 1-d Pareto-like marginals share the same tail index. A multivariate Central Limit Theorem for a random vector, whose components correspond to (possibly dependent) Hill estimators of the common shape index $1/\alpha$, is established under mild conditions. Motivated by the statistical analysis of extremal spatial data in particular, we introduce the concept of (standard) heavy-tailed random field of tail index and show how this limit result can be used in order to build an estimator of fi with small asymptotic mean squared error, through a proper convex linear combination of the coordinates. Beyond asymptotic results, simulation experiments illustrating the relevance of the approach promoted are also presented.

ENFOQUE DEL MODELO DE REGRESIÓN LOGÍSTICA BAYESIANO USANDO EL MARKOV CHAIN MONTE CARLO

L. Díaz González*, D. Covarrubias Melgar*, and V. Sistachs Vega**

Universidad Autónoma de Guerrero, México.

Universidad de La Habana, Cuba.

El modelo de Regresión Logística es un modelo muy utilizado en diferentes ramas de la ciencia donde se estudian problemas en los cuales la variable respuesta es binaria. Este modelo puede ser estudiado bajo el enfoque bayesiano, sin embargo, los cálculos pueden ser complicados cuando el problema es de gran dimensión, incluso utilizando medios de cómputo, es por esto que se utilizará los métodos MCMC, que son procedimientos iterativos para obtener de forma aproximada la distribución posterior de los parámetros en el modelo. La obtención de la distribución con el método MCMC se realizará en el software R., donde se presenta la implementación del modelo de regresión logística bajo el enfoque bayesiano aplicado a un problema de salud del estado cognitivo de los adulto mayores del estado de Guerrero empleado primeramente una distribución impropia no informativa y posteriormente una normal multivariada como distribuciones a priori.

CLUSTERING MOVING OBJECT TRAJECTORIES IN ROAD NETWORK ENVIRONMENTS.

M. K. El Mahrsi

Telecom-ParisTech, France.

Most of prior work on clustering moving object trajectories assumed that the former can move freely in a Euclidean space and did not consider the presence of an underlying network (e.g. a road network) and its influence on evaluating the similarity between trajectories. In this talk, we present three approaches to address clustering trajectory data in the specific context of road network environments: the first approach discovers clusters of trajectories that traveled along the same parts of the road network; the second approach is segment-oriented and aims to group together road segments based on trajectories that they share in common; the third approach combines both aspects and simultaneously clusters trajectories and road segments. We also present a case study through which we illustrate how these approaches can be used to reveal useful knowledge about flow dynamics and characterize traffic in road networks.

ESTUDIO DE LAS ORIENTACIONES DE LOS VASOS SANGUÍNEOS A PARTIR DEL ANÁLISIS DEL ESPECTRO DE FOURIER EN IMÁGENES DE LA MEMBRANA CORIOALANTOICA DE EMBRIONES DE POLLO

M. Escobedo Nicot*, W. Delgado Font*, G Palacios Roque*, F. Palacios Fernández*, and L. Ferreira Da Silva**

*Universidad de Oriente, Cuba.

**Universidad de Sao Paulo, Brasil.

La angiogénesis es el proceso que propicia la formación de nuevos vasos sanguíneos a partir de una vasculatura ya existente y puede ocurrir durante el crecimiento normal de las células así como también en adaptaciones patológicas, tales como: el crecimiento del tumor y la metástasis. La obtención de características que permitan realizar valoraciones cuantitativas acerca de la evolución de este proceso es vital para la toma de decisiones diagnósticas o de otra índole. En los últimos años la Membrana Corioalantoica de Embriones de Pollo (CAM) se ha convertido en uno de los ensayos más populares para el estudio de la angiogénesis normal y las influenciadas por procesos patológicos. La orientación de los vasos sanguíneos en la red vascular desarrollada en la membrana, es un parámetro que brinda información acerca de la distribución normal o no de los diferentes tipos de vasos sanguíneos en esta red. Por esta razón el objetivo principal de este trabajo es realizar una valoración acerca de las orientaciones de los vasos en la red vascular a partir del análisis de espectro de Fourier. El método fue implementado y evaluado para imágenes de la CAM adquiridas por Lupa Estereoscópica.

COMPARISON OF SEVERAL OUTRANKING-BASED MULTICRITERIA SORTING METHODS

E. Fernández, J. Navarro, and J. Rodriguez

Universidad Autónoma de Sinaloa, Mexico.

In these contribution pessimistic and optimistic ELECTRE-TRI procedures, ELECTRE-TRI-C and THESEUS are compared with respect to their respective capacity for making appropriate assignments. Decision maker preferences are simulated as an intermediate compromise between ELECTRE-TRI pessimistic and optimistic behavior. Large number of instances was randomly generated, covering a wide range of categories and criteria. THESEUS performance generally improves when the cardinal of the reference set increases. In almost all instances THESEUS outperforms the other methods. Pessimistic ELECTRE-TRI outperforms the optimistic procedure and the ELECTRE-TRI-C.

HYDRA: PLATAFORMA INFORMÁTICA PARA EL ANÁLISIS IN SILICO DE MODELOS METABÓLICOS A ESCALA GENÓMICA

O. Fosado Tellez*, R.A. Jaime-Infante*, Z. Hernández Martínez*, J. Triana-Dopico*, R. Rodríguez Romeu*,
A. Montagud Aquino**, and J. F. Urchueguía-Schlzel** D. Gamermann**, P. Fernández
de-Córdoba-Castellá**

*Universidad de Pinar del Río Hermanos Saíz Montes de Oca, Cuba.

**Universidad Politécnica de Valencia, Spain.

El análisis *in silico*, como parte del desarrollo de la Biología de Sistemas, se apoya en modelos matemáticos que surgen del modelo estequiométrico de la red metabólica con el objetivo de predecir el comportamiento metabólico de un sistema. En el presente trabajo se presenta una plataforma informática (HYDRA) que integra la solución de los modelos FBA (Flux Balance Analysis), RNA (Robustness Network Analysis), FVA (Flux Variability Analysis) y MoMA (Minimization of Metabolic Adjustment) que, en unión del módulo Traductor, capaz de traducir de un formato SBML a uno OptGene y viceversa, conforman una importante herramienta para los científicos que investigan en estas temáticas. Se implementaron en el sistema algoritmos para la solución de los modelos de programación lineal (FBA, RNA y FVA) y cuadrática (MoMA) que se generan.

AUTOMATED PAINTBALL TURRET TARGET TRACKING ALGORITHM

S Franiatte and A. April

École de Technologie Supérieure, Canada.

In the field of computer vision, target tracking is a difficult problem to solve. Difficulties particularly arise, first, during sudden changes in the trajectory of a tracked object, then if changes occur in the appearance of the object or scene and also during occlusions or camera movements. The current automated paintball turret project being developed at école de Technologie Supérieure located in Montréal Canada, includes the first version of a vision software that includes a target tracking algorithm. This algorithm has been designed to resolve the problems that occur when tracking a player during a paintball battle. The solutions we applied to this particular problem segment potential targets effectively regardless of lighting conditions, decide which target to follow and, finally, anticipate its trajectory. Our objective is to develop an automated turret that would identify and shoot players automatically. Techniques that we have implemented successfully use objects/scene Gaussian mixture-based image subtraction. Image subtraction is an effective segmentation solution to the problem of light variation since the images captures correspond to a very short interval of time. Mathematical morphology is then used with two objectives: 1) to eliminate the residual noise, and 2) to assemble blobs belonging to the same object. After the segmentation step, a two-step blob analysis is performed. At first, the blobs that have an area outside preset limits are discarded. Then the blobs whose aspect (bounding box aspect ratio) not matches the shape of a standing human are also discarded. The remaining blobs are tracked frame by frame. Since, by design, the turret can only shoot at one target at a time, the blob having the maximum area is selected as a target. Its position in x and y coordinates (camera coordinates) is then provided to a Kalman filter, which anticipates the target's trajectory, allowing the needed time for the turret to adjust itself before shooting.

GENERACIÓN ALEATORIA DE PERMUTACIONES DEL GRUPO SIMÉTRICO O DEL ALTERNADO

P. Freyre and N. Díaz

Universidad de La Habana, Cuba.

In this paper three new algorithms for the random generation of permutations of degree n are shown, two of them for the symmetric group S_n and one for the alternating group A_n , in such a way, that they are mainly carried out by means of the operation of additions mod n o mod i , $i = n \dots, 2$. The advantage of the three algorithms over others existing ones consists in that, in order to apply a randomly selected permutation to an

element $x \in \{1 \dots, n\}$, it is sufficient the knowledge of the random sequence that determines the permutation.

EQUATIONS FOR STATIONARY MOTION OF THE AIR IN ONE DIMENSION AND COMPUTATION FOR THE FORMATION OF CLOUDS BY A WIND

H. Fujita Yashima^{*,**}, A. Ayachi^{*}, and M. Z. Aissaoui^{*}

^{*}Université de Guelma, Algeria.

Università di Torino, Italy.

We consider the equation system describing a one-dimensional stationary flow of a viscous heat-conductive gas, in the case in which the velocity is not near to 0. In one-dimensional flow the continuity equation reduces the density to a function of the velocity so that the system is reduced to that of two equations for two unknown functions: velocity v and temperature T . We suppose that there exists a smooth solution $(\bar{v}; \bar{T})$ of the equation system without viscosity and heat-conductivity (1st order differential equations) and look for a solution $(v; T)$ of the equation system with viscosity and heat-conductivity in the neighborhood of $(\bar{v}; \bar{T})$. In fact, the smallness of viscosity and heat-conductivity permit us to use the idea of the singular perturbation theory; thus, establishing estimates in function of coefficients of viscosity and heat-conductivity and estimating also the non-linear terms, we can obtain a stationary solution by Schauder's fixed point theorem. We show also by numerical computation that the solution $(v; T)$ is effectively near to $(\bar{v}; \bar{T})$. And finally, using an analogous numerical scheme, we show the state of a flow of air which, passing over a mountain, causes the condensation of water vapor and consequently a relative augmentation of temperature. The numerical results agree satisfactorily with theoretically predicted values as well as with those observed in the Nature.

NEW SIMILARITY INDEX FOR THE MEAN SHIFT ITERATIVE ALGORITHM

Y. Garcés, E. Torres, C. Pérez, O. Pereira, and R. Rodríguez

Institute of Cybernetics, Mathematics and Physics, Cuba.

Image segmentation is a critical step in computer vision tasks constituting an essential issue for pattern recognition and visual interpretation. Mean Shift (MSH) is a robust technique which has been applied in many computer vision tasks and as an iterative algorithm has been used in many works by using the entropy as a stopping criterion. In this paper, we propose a new stopping criterion for the mean shift iterative algorithm by using images defined in Z_n ring, with the goal of reaching a better segmentation. We carried out also a study on the weak and strong of equivalence classes between two images. An analysis on the convergence with this new stopping criterion is carried out too.

CLASSIFICATION OF SLEEP STAGES BASED IN STATISTICAL PATTERN RECOGNITION

K. García Mesa^{*}, V. Sistachs Vega^{**}, and H. Läter^{***}

^{*} Institute of Neurology and Neurosurgery, Cuba.

^{**}University of Havana, Cuba.

^{***}University of Potsdam, Germany.

We propose a mathematical model for sleep stage scoring using statistical patterns recognition. The system first divided the polysomnographic signal in 30 seconds epoch and filtered with Wavelet transformation in different frequency bands, according to the Rechtschaffen and Kale's, sleep-scoring rule. For every 30 seconds epoch taken from the electroencephalogram signal, we calculated features based on total energy and the ratio of different

energy values. Finally, we used statistical patterns recognition through discriminant functions as a modeler of the physiological act of sleeping. Results showed that the mathematical model learned with a 94reached a 90% of good classification.

COMPLEJIDAD Y MULTIDIMENSIONALIDAD DE LA POBREZA. EL CASO DE MÉXICO

J. F. García Rodríguez, O. Priego Hernández, and M. Á. Ramírez Martínez
Universidad Juárez Autónoma de Tabasco, México.

Tradicionalmente se consideran pobres aquellas personas, familias y grupos de personas cuyos recursos monetarios comparados con una línea de bienestar son tan limitados que los obligan a estar excluidos de una forma de vida mínimamente aceptable. Este enfoque reduccionista considera al ingreso monetario como la única variable determinante en la medición de la pobreza, por ello se le conoce también como pobreza absoluta. Este método de estimación representa uno de los problemas fundamentales en la lucha contra la pobreza en nuestros países, ya que al reducir ésta a la necesidad de un ingreso monetario que ubique a las familias por encima de una línea de pobreza predeterminada, deja de lado múltiples factores determinantes y condicionantes del problema, puesto que la pobreza es un problema de naturaleza multidimensional y compleja. En síntesis, la pobreza tiene múltiples dimensiones que no pueden reducirse simplemente al aspecto monetario. De esta manera, para poder llegar a una aproximación objetiva y científica del problema es necesario identificar las variables determinantes de los flujos de entrada y salida de la pobreza, así como los factores que determinan y condicionan la presencia tanto de la pobreza crónica como la transitoria. (López y Beltran, 2011). Así, la eficacia de las políticas pblicas contra la pobreza depende del conocimiento de las necesidades específicas de los pobres (aspecto microeconómico). Sin embargo, depende también del crecimiento económico y de la reducción de las desigualdades sociales, así como del incremento de los gastos sociales en educación, salud, vivienda e infraestructura básica. Ello sin dejar de reconocer que los programas de transferencias monetarias condicionadas a los pobres extremos son básicos y deben ser mantenidos y ampliados. Sin embargo, ésta política asistencialista no debe sustituir a una política de gasto social agresiva enfocada a elevar las capacidades básicas de la población. (SALAMA, 2011).

FULL PRICE ELASTICITIES AND THE VALUE OF TIME: A TRIBUTE TO THE BECKERIAN MODEL OF THE ALLOCATION OF TIME

F. Gardes
Université Paris I Panthón-Sorbonne, France.

This article adopts Beckers allocation of time framework to describe households choices concerning both its monetary and its time use expenditures in order to propose a new method to derive price elasticity at a micro level. Price and full income elasticities are estimated on a matching of a French Family Budget and a Time Use survey. The utility and home production functions are specified in order to allow the computation of the households opportunity cost for time, which is shown to be smaller in average than the households wage net of taxes. This estimate serves to value time dedicated to domestic activities which are used in the definition of full prices. The estimated price elasticities compare well with the estimates by other methods, such as Frischs model based on separability assumptions over preferences or Hicks-Lewbels method based on the aggregation of commodities. Finally, the model is applied to the computation of a welfare index and to the explanation of the classic difference between cross-section and time-series estimates of income elasticities.

RIEMANNIAN CONSUMERS

F. Gardes
Université Paris I Panthéon Sorbonne, France.

The difference observed between the social distribution of consumer expenditures and their change over time is modelled using Riemannian geometry. Social distribution is measured along the geodesics of Riemannian surfaces, while changes over time correspond to movements along the tangents of these Riemannian surfaces. The Riemannian curvature of the consumption space is shown to be non-null for the Polish consumers surveyed in a four years Polish panel. This implies that usual econometric methods based on a unique metric over the whole consumption space are inadequate to estimate geodesics on the Riemannian surface. In order to propose an alternative, we define a synthetic time axis in the space of the variables which are observed in cross-section. Considering the relative position of two individuals along this time dimension allows us to estimate equations of geodesics. Also, an instrumentation using this synthetic time axis is proved to be very efficient compared to usual instrumentation for dynamic models on panel data.

TOWARD A MULTI-AGENT MODEL OF LABOUR MARKETS' DYNAMICS

P. Gaubert* and J. Randon-Furling**
**ERUDITE, Univ. Paris-Est Creteil, France.
**SAMM, Univ. Paris Pantheon-Sorbonne, France.

With a view to designing a multi-agent model able to account for some of the facts observed on labour markets, we introduce a new representation for data collected between 1984 and 2003 in the USA within the Panel Study of Income Dynamics. We look at paths described by individual points within different parameter spaces (eg in the salary-seniority space), and seek to identify classes of trajectories. We shall then examine whether these classes and their evolutions can be determined and reproduced by a simple model with multi-agent interactions. Such models are known to shed light on the relationship between the micro- and macro-level of a complex system, as well as to provide good descriptions of phenomena such as phase transitions and tipping-point effects, which could indeed correspond to some of the changes observed on various labour markets over the last few decades.

SHELLING-TYPE URBAN SEGREGATION MODELS WITH SWITCHING AND PREFERENTIAL DYNAMICS

L. Gauvin*, A. Hazan**, and J. Randon-Furling***
*ISI Foundation, Italy.
*Universite Paris-Est Creteil, Paris France.
Université Paris-1 Panthéon-Sorbonne, France.

Providing new cross-sections of the phase diagram of a Schelling-class system with switching agents (able to change from a population-type to the other), we establish that the presence of such agents in a segregative Schelling-type dynamics results in a lower segregation coefficient. We investigate causes of this decrease: whether it corresponds to noisy clusters (largely homogeneous clusters containing isolated switching agents), fuzzy interface (homogeneous clusters with macroscopic interfaces contributing to a higher overall level of mixing) or system-wide mixing. We also find that switching agents unlock frozen dynamics.

COMPETITIVE COMPREHENSIVE MODEL, ENTERPRISE HIGHER EDUCATION INSTITUTIONS: STUDY APPLIED TO REGION IV ON THE STATE OF MEXICO.

G. Gaviño Ortíz, L. A. Mendoza González, K. González Roldán, and M. J. Hernández Sartí
Universidad Autónoma del Estado de México.

The University is currently vulnerable due to political, economic and social matters, which stops the graduate's competitiveness development. Therefore, it should develop the ability to attract and retain investments as well as talent. University's commitment is to provide the individual with education. Once we have identified problems, strengths and weaknesses we are dealing with, we are able to point out proposals, work plans and to implement necessary measures to achieve higher education institutions competitiveness. This research methodological scope had four stages: 1. Consultation and revision of information sources, 2. Data derived from questionnaires, 3. Results analysis and their charts, and 4. Research development by measuring the level of satisfaction on students of Higher Education in order to identify improvement opportunities on management through statistical tools based on the Standard ISO 9001:2008. A satisfied student brings along benefits to the University, such as prestige and sense of belonging; aspects that the University has had in all these years. In order for the students to be developed with skills, the objective is to create close ties among research and production activities, so we will achieve this goal by proposing a model that allows the competitiveness development Enterprise-High Education Institutions through a collaborative work. The University is violated by many factors-political, economic and social, which reduces the competitiveness of it. Therefore, you must develop the ability to attract and retain investment and talent. Currently carry out studies and analysis as well as working in the university curriculum map update.

PROBABILISTIC MODELS FOR D ACTIVE SHAPE RECOGNITION USING FOURIER
DESCRIPTORS AND MUTUAL INFORMATION

N. Govender*, J. Warrell*, Ph. Torr**, and F. Nicolls***

*MIAS (CSIR) South Africa.

**University of Oxford United Kingdom.

***UCT South Africa.

Shape recognition is essential for robots to perform tasks in both human and industrial environments. Many algorithms have been developed for shape recognition with varying results. However, few of the proposed methods actively look for additional information to improve the initial shape recognition results. We propose an initial system which performs shape recognition using the euclidean distances of Fourier descriptors. To improve upon these results we build multinomial and Gaussian probabilistic models using the extracted Fourier descriptors and show how actively looking for cues using mutual information can improve the overall results. These probabilistic models achieves excellent results while significantly improving on the initial system.

SOLVING LARGE INSTANCES OF MULTI-DEPOT VEHICLE SCHEDULING PROBLEM WITH
TIME-SPACE NETWORK AND COLUMN GENERATION.

P. Guedes and D. Borenstein

Universidade Federal do Rio Grande do Sul, Brazil.

The multiple-depot vehicle-scheduling problem (MDVSP) is a classic logistic and transportation problem. The MDVSP is also a subproblem for solving various related problems, such as the real time vehicle scheduling problem, disruption management; and integrated problems such as the vehicle and crew scheduling problems. Although several mathematical and solution method have been developed in the literature, large instances (involving thousands of trips and several depots) are still difficult to solve in a reasonable time. The objective of this research work is to verify the applicability of the use of the space-time network towards obtaining good

solutions for large instances in short time. Time-space network was suggested by Kliewer et al (2006), and it is positioned with respect to two-dimensional axes, one representing time and the other one space or stations. The arcs represent deadheading movements; and waiting periods in the same station. Solution methods for the MDVS combining time space with integer linear programming solvers and column generation were developed. Extensive testing was carried out using random generated instances, based on demands distribution. Large instances, involving thousands of trips (between 1,000-10,000) and dozen (4-64) depots, are solved in reasonable times.

MULTI CLUSTERING GIVES ROBUSTNESS TO VERTEX CLASSES IN GRAPHS

A. Guénoche

Institut de Mathématiques de Marseille, France.

A protein-protein interaction network is considered as a simple undirected graph, weighted or non weighted $G = (X; E; A)$. A partitioning of the vertex set, into connected, eventually overlapping, clusters having a edge density larger than the whole graph, is searched. The cellular functionality of proteins is predicted from this network decomposition. To improve the prediction quality, we need to evaluate the robustness of these clusters. We propose a new method which consists in:

- selecting a non deterministic algorithm for graph partitioning in separated clusters (optimizing a modularity criterion);
- applying this algorithm several times to generate a set of close partitions;
- calculating a consensus partition P_c from this set.

This *profile* of partitions permits to evaluate the robustness of any class of a partition, as the average percentage of partitions joining any protein pair in this class. This robustness function can be applied to compare the consensus resulting of this procedure to the initial partition P_{ini} generally the single one computed from the graph. A simulation protocol, based on random graphs having a graduate community structure, corresponding to a seed partition P_{seed} , permits to assess that the consensus partition P_{cons} is much closer to P_{seed} than P_{ini} . More the average robustness of the P_{cons} classes is much higher than the P_{ini} 's one. These results permit to quantify the efficiency of the Multi-Clustering method.

EXACT MARGINAL DISTRIBUTIONS AND NORMALIZING CONSTANT FOR GIBBS PROCESSES

C. Hardouin* and X. Guyon**

*Université Paris Ouest Nanterre La Défense, France.

**SAMM Université Paris 1, Panthen-Sorbonne, France.

Usually, the computation of the marginal distributions and the normalizing constant C of a discrete probability distribution π involves high dimensional summation, such that the direct evaluation of these sums becomes quickly infeasible in practice. For example, for an Ising model on a 10×10 grid, it involves summation over 2^{100} terms. This problem has a deep impact for many applications, as for instance maximum likelihood parameter estimation, and some significant efforts have been put to bypass the problem. For instance, in spatial statistics, we replace the likelihood by the conditional pseudo likelihood. Another way is to estimate C using efficient Monte Carlo methods. However, it is sometimes possible to compute C exactly using an efficient algorithm. We propose some procedures to compute the marginals and the normalizing constant for Gibbs processes.

SETTING THE POST-2015 DEVELOPMENT AGENDA: IS MULTIDIMENSIONAL POVERTY MEASURABLE?

J. Haughton
Suffolk University, USA.

The concrete measurement of poverty is unavoidable if one is to track progress towards poverty reduction. Some, especially in Latin America, argue that a multi-dimensional poverty index comes closer to measuring true poverty than the more-traditional monetary-based measures. In establishing the *sustainable development goals* for the post-2015 development agenda, what measure of poverty should be used? We examine the debate, using new data on urban poverty in Vietnam, and draw out some practical recommendations.

DENSITY-BASED INVERSE CALIBRATION WITH FUNCTIONAL PREDICTORS

N. Hernández*, R.J. Biscay**, N. Villa-Vialaneix***, and I. Talavera*

*CENATAV, Havana, Cuba.

**Universidad de Valparaíso, Chile.

***SAMM, Université Paris 1, Panthéon-Sorbonne, France.

A standard problem in chemometrics is calibration, which aims at predicting a scalar random variable Y from a spectrum X . However, if the main problem is to predict Y from X , the physical data generation mechanism is rather that the spectrum X (e.g., an absorbance spectrum) is explained by Y , which is often a chemical variable (e.g., concentration of a substance). Using this physical model $X = r(Y) + \varepsilon$, we propose a nonparametric approach to solve statistical calibration with functional data and to predict Y from X . This approach is based on the conditional probability density of X given Y , $f(X|Y)$: the proposed predictor takes the form a weighted average of the observed values of Y , where the weights are derived from a nonparametric estimate of $f(X|Y)$. The estimation of $f(X|Y)$ is performed with standard nonparametric estimation methods: in the present paper, the proposed estimator is explicitly given in the realistic case where the error ε is supposed to fit a Gaussian distribution: r is first estimated with a Nadaraya-Watson kernel estimate and the explicit form of the $f(X|Y)$ in the Gaussian case is used to the estimate $\hat{f}(X|Y)$. The method is computationally simple and easy to implement and does not require any specific assumptions on the conditional density of Y given X , unlike most approach in functional regression. The consistency of the approach can also be proved. Its efficiency is illustrated on simulated datasets and compared to other approaches designed to solve regression problems with functional predictors.

MODELO DE OPTIMIZACIÓN PARA ESTIMAR LA TASA DE INTERÉS JUSTA PARA UN FINANCIAMIENTO AUTOMOTRIZ

R. Hernández Martínez, J. Alvarez Botello, and R. Espíndola Heredia
Universidad Autónoma del Estado de México, Mexico.

El presente modelo actuarial de tasa de interés justa, pondera de manera equilibrada el precio del dinero tanto para un prestamista, como para el solicitante -en donde ninguna de las partes resulta más beneficiada en perjuicio de la otra. De este modo, sea cual sea la elección del enganche y plazo que el cliente decida, siempre obtendrá el precio óptimo del financiamiento solicitado. La función $Z = f(x, y)$ representa a la variable de tasa de interés justa, en donde ambas partes tendrían una relación del tipo *ganar-ganar*; es decir, que ambas partes resultan mutuamente beneficiadas de la operación crediticia y en la cual ninguna de ellas obtiene ventaja en perjuicio de su contraparte. El precio justo del crédito automotriz se encuentra sobre la superficie de una gráfica de tres dimensiones cuyos puntos óptimos convergen en el vector (x, y, z) ; que determina la tasa de

interés i , para un crédito sano. El diseño de un modelo computacional permite que el usuario interactúe con las variables de enganche y plazo, para conocer cómo influyen en el comportamiento de su crédito; tanto en el pago mensual, como en los intereses, impuestos y seguros; ofreciéndole una corrida financiera a lo largo del plazo contratado. Así, el modelo actuarial es totalmente dinámico ya que se adapta a los escenarios que se propongan. Corolario de lo anterior, resulta que cualquier punto fuera de la superficie óptima de la gráfica implicaría una ventaja/desventaja para alguna de las partes; por lo que el presente modelo permite realizar análisis de sensibilidad para tomar decisiones ANTES de celebrar la operación, considerando diferentes escenarios para las variables (x, y) ; de este modo, el modelo representa

A METHOD FOR RED BLOOD CELL CLUSTER SEPARATION IN DIGITAL IMAGES OF SICKLE CELL DISEASE

S. Herold*, F. A. Guerrero*, P. D. Marrero*, A. Jaume i Capó**, and M.l González**

*Universidad de Oriente, Cuba.

**University of the Balearic Islands, Spain.

The study of cell morphology is an important aspect in the diagnosis of some diseases, such as sickle cell disease, because of the red blood cell deformations caused by these diseases. For these studies and due to the elongated shape of the erythrocyte, ellipse adjustment and concave point detection are widely used in images of peripheral blood samples, including for the detection of cells that are partially occluded in the clusters that are generated from the sample preparation. This work proposes the study of erythrocyte shape in peripheral blood smear samples of sickle cell disease using ellipse adjustments and a new algorithm for detecting noteworthy points. Furthermore, this study applies a set of restrictions that allows elimination of the significant image preprocessing proposed in previous studies. The method was validated using both randomly generated virtual images and peripheral blood smear samples images with normal and elongated erythrocytes, and the efficiency increased by more than a 99% and 98%, respectively, for the detection of the two types of objects. These efficiencies were superior to the results attained with previously proposed methods. The method can be extended to clusters of several cells and does not require user input

LINEAR-QUADRATIC OPTIMAL CONTROL PROBLEM WITH A RANDOM HORIZON

R. Ilhuicatzí Roldán

UATx, México.

In this paper a Linear-Quadratic control model of discrete-time is considered, where the transition law is a linear equation in differences and the cost per stage has a quadratic form. Also, the expected total cost with random planning horizon of infinite support and independent of the control process is considered as the performance criterion. For the corresponding control problem is proved the existence of the optimal solution through general results concerning the Markov decision processes with a random horizon. In addition, as an alternative to the approach of the optimal solution a policy of rolling horizon and the corresponding value function are provided.

A NONSMOOTH APPROACH TO SOLVE GENERALIZED EQUATIONS

C. Jean-Alexis

Université des Antilles et de la Guyane, France.

In this paper, we consider a generalized equation of the form $0 \in f(x) + G(x)$ where $f : \mathbb{R}^n \rightarrow \mathbb{R}^n$ is a $C^{1,1}$ function such that its Fréchet derivative f' is α -semi-smooth and $G : \mathbb{R}^n \text{ to } \mathbb{R}^{2n}$ is a metrically regular set-valued

map. We propose a method using the second order generalized derivative and show its convergence to a solution to the generalized equation we consider.

MODELO DE PRONÓSTICO DEL COSTO DE LA REINCORPORACIÓN ESTUDIANTIL EN LA CARRERA DE AGRONOMÍA DE LA UNIVERSIDAD AGRARIA DE LA HABANA

Y. R. Jiménez Álvarez, L. Fernández Chuairy, and J. R. Capó Pérez.
Universidad Agraria de La Habana, Cuba.

A nivel internacional el proceso de formación de profesionales está sujeto a fenómenos como: deserción y reincorporación escolar, esta ltima dada por las repitencias y por la incorporación al sistema educacional de aquellos estudiantes que por determinada situación se les otorgó licencia de matrícula en un momento determinado y van a continuar sus estudios. El fenómeno de reincorporación tiene incidencia en la elevación de los costos del proceso de formación, es por ello que para poder llevar a cabo una adecuada planificación del financiamiento del proceso docente se construye un modelo matemático que permite pronosticar el comportamiento de dichos costos para un cohorte estudiantil y para un curso escolar. La construcción del modelo tuvo en cuenta el comportamiento de indicadores tales como tasa de repitencia y cantidad de reincorporados por año académico y por cohorte estudiantil en la carrera de Agronomía de la Universidad Agraria de la Habana.

ESTIMATION OF TRANSIT DEMAND IN TRANSPORT SYSTEMS

L. H. Juárez and M. V. Chávez
Universidad Autónoma Metropolitana Iztapalapa, México.

We study the estimation of transit demand for a public transport network system. We propose a constrained least squares model with a quadratic objective function, which uses observed link volumes to update (estimate or adjust) origin-destination (O-D) demand matrices, which are *out of date*. In transportation planning applications, the O-D matrix is the input data that is most difficult and expensive to obtain. It is impossible to obtain this data directly and exactly, especially for large-scale networks, and it may be estimated by carrying out elaborate and expensive surveys, involving home- or road-based interviews or other complicated mechanisms. By contrast, observed link volumes can be obtained easily and with reasonable precision by simply counting the traffic at certain count-post links, either manually or automatically, using mechanical or inductive counting devices. In our proposal, the objective function incorporates the reference matrix (known *a priori*) and a penalized term that enforces the assigned volumes, obtained with the updated O-D matrix, to be equal to the measured link volumes. A new conjugate gradient algorithm is applied to minimize the resulting objective function. Computational results demonstrate that this new approach yields accurate results, it is faster than the correspondent traditional gradient descent method, and can be applied to large-scale networks. This demand model can be implemented in the standard transportation-planning package EMME/4.

FINANCIAL VALUATION OF INVESTMENTS INTO NEW MARKET SEGMENTS AND DECISIONS ON SEGMENT DEVELOPMENT

H.E. Klingelhöfer
Tshwane University of Technology, South Africa.

The paper offers an approach for the (financial) valuation of segment specific marketing activities and the market development as well as for ventures into new segments under the conditions of imperfect markets and uncertainty. By applying methods of investment appraisal, the model follows a two-steps approach, each of

which delivering information useful within the scope of marketing planning and controlling: the first step is suited to determining the optimal level of an enterprise's market activities in all established market segments. In order to do so, the interdependencies between market segments, production, and investments are taken into account. On this basis, the model's second step allows for supporting investment decisions on expansions into new market segments by calculating the price ceiling for such a venture. Applying duality theory of linear programming allows to identify the determinants of the income (1st step) and of the price ceiling (2nd step), and to derive formulas for a correct valuation with (corrected) net present values. Under certain conditions, they can also be used to easily evaluate and financially interpret the effects of parameter changes. Using sensitivity analysis supports these findings and allows for getting more information on the effects of these determinants.

RUIN PROBABILITY AND CLIMATE CHANGE

D. Kortschak, E. Masiello, and P. Ribereau
Université Lyon 1, France.

In the classical risk model, the arrival of claims is assumed to follow an homogeneous Poisson process. Obviously, in a climate change context, it is difficult to admit such an hypothesis since it would mean that there is not an increase in the number of climate catastrophes. We present here a exible model where both arrival times process and claims laws depend on times, allowing to obtain results for ruin probability in this particular non-stationary case. A simulation study will also be presented in order to investigate the behavior of the proposed estimator for the ruin probability.

A SHIFT SCHEDULING MODEL FOR A BANK IT STAFF

M. Labidi
King Saud University, Saudi Arabia.

In this paper, we address a real-world optimization problem; the scheduling of a Bank Information Technologies (IT) staff. This problem can be defined as the process of constructing optimized work schedules for staff. In a general sense, it requires the allocation of suitably qualified staff to specific shifts to meet the demands for services of an organization while observing workplace regulations and attempting to satisfy individual work preferences. A monthly shift schedule is prepared to determine the shift duties of each staff considering shift coverage requirements, seniority-based workload rules, and staff work preferences. Due to the large number of conflicting constraints, a multi-objective programming model has been proposed to automate the schedule generation process. The suggested mathematical model has been implemented using Lingo software. The results indicate that high quality solutions can be obtained within a few seconds compared to the manually prepared schedules.

EXISTENCE OF COMPETITIVE EQUILIBRIUM IN PIECEWISE LINEAR AND CONCAVE EXCHANGE ECONOMIES AND THE NON-SYMMETRIC NASH BARGAINING SOLUTION

S. Lahiri
PD Petroleum University, India.

In this paper we provide a simple proof of the existence of competitive equilibrium when utility functions are piecewise linear and concave. The corresponding competitive allocation turns out to be a non-symmetric Nash bargaining solution with the initial income of the agents valued at the equilibrium price vector as weights. In

a later section we provide a simpler proof of the same result using the Brouwer's fixed point theorem, when all utility functions are linear. In both cases the proofs pivotal step is the concave maximization problems due to Eisenberg and Gale and minor variations of it. In a final section we provide a proof of the same results for economies where agents' utility functions are concave, continuously differentiable and homogeneous. In this case the main argument revolves around the concave maximization due to Eisenberg. Unlike previous results, we do not require all initial endowments to lie on a fixed ray through the origin.

ON EXPONENTIAL DICHOTOMY OF NONAUTONOMOUS PERIODIC SYSTEMS

D. Lassoued

SAMM, Université Paris I Panthéon-Sorbonne, France.

We prove that a family of q -periodic continuous matrix valued function $\{A(t)\}_{t \in \mathbb{R}}$ has an exponential dichotomy with a projector P if and only if is bounded uniformly with respect to the parameter μ and the solution of the Cauchy operator Problem

$$\begin{aligned} Y(t) &= -Y(t)A(t) + e^{i\mu t}(I - P), \quad t \geq s \\ Y(s) &= 0 \end{aligned}$$

has a limit in $\mathcal{L}(C_n)$ as s tends to $-\infty$ which is bounded uniformly with respect to the parameter μ . Here, $\{U(t) : t, s \in \mathbb{R}\}$ is the evolution family generated by $f\{A(t)\}_{t \in \mathbb{R}}$, μ is a real number and q is a fixed positive number.

GRAPH BASED SEGMENTATION

Y. Linares Zaila and M.L. Baguer

Universidad de La Habana, Cuba.

Image processing and image analysis are often required in real life scenarios. Segmentation is one of the key concepts used and for which has not yet found a general solution that can be applied for every stage. Great attention has been paid in recent years to the development of algorithms, designed from different approaches which in some cases have achieved good performance for particular groups of images. In this paper a segmentation strategy based on graphs is proposed aimed to images resulting from a baggage scanner used by the General Customs of the Republic of Cuba. This strategy is a combination of the minimum spanning tree (MST) and the mixing regions approaches, it defines a new standard for the two-component merge that considers both global and local features of the image. A special color space for the Baggage Scanner images was consider in order to achieve better results for those images. The numerical experiments showed the effectiveness of the strategy for custom images and how it can be easily adapted to other image types such as natural images.

PROGNOSTIC FACTORS FOR CERVICAL CANCER PATIENTS IN TABASCO, MÉXICO

L.** López Segovia and D. Romero**

*Universidad Juárez Autónoma de Tabasco, Mexico.

**Hospital Juan Graham Casusus, Mexico.

We present a survival analysis of a sample of 119 patients with cervical cancer treated at the oncology unit HJG of Villahermosa, Tabasco, Mexico. All patients are treated with radiation therapy or chemotherapy, and were followed from diagnosis to last visit or until the relapse or death by cancer. Patients who relapsed or died by other causes than cancer, has a partial survival time, and were defined as patients censored. We study the

disease-free survival time (time to recurrence of cancer) and overall survival time (time to death from cancer) as response variables. A nonparametric analysis of survival is carried out with these data to evaluate the effectiveness of treatment and identify groups of patients with similar survival by its cancer characteristics. A semiparametric analysis is applied to identify statistically significant risk factors, such as, tumor type, stage, histology, treatment, age, among other. The results are compared with those obtained with a parametric analysis. Preliminary results show that patients with tumor stage IIIB have the highest risk for relapse than other patients. Patients who have tumor stage IIIB or proctitis present have the highest risk of death than rest.

A GAME-THEORETIC MODEL OF TOURNAMENT ORGANIZATION

V. Mazalov* and Y. Tokareva**

*Karelian Research Center of RAS, Petrozavodsk, Russia.

**Transbaikal State University, Chita, Russia.

We study the following non-cooperative n player game with non-zero sum. Players $\{1, 2, \dots, n\}$ submit projects for a tournament. Projects are characterized by the vectors $\{x^1, \dots, x^n\}$ from some feasible set S in the space \mathbb{R}^m . For instance, the description of a project can include required costs, implementation period, the number of employees, etc. A jury of m experts analyzes the incoming proposals and chooses a project by the following stochastic procedure. Each j^{th} - expert evaluates j^{th} -parameter of all projects and chooses one of them using the final-offer arbitration procedure with some distribution function. The distribution is known for participants of tournament. After that a voting procedure is used and the project k wins if at least p experts choose it ($p > m/2$). The equilibrium in this tournament game is derived for different parameters of the model.

NONPARAMETRIC REGRESSION: AN ALTERNATIVE TO THE SCATTER DIAGRAM

E. P. Menéndez, E. Gabriel, and S. Hernández

Universidad Veracruzana, Mexico.

In this paper is shown the possibility to use a nonparametric regression instead of a scatter diagram, when this last one cannot be used in order to obtain information about the shape of the model. In particular it is considered a logistic regression, and a single quantitative independent variable. The proposal is illustrated with two examples. One of them considers a scatter diagram that indicates a linear relationship between the values of the independent variable and the probabilities of success of an event. The other one presents a scatter diagram that evidences a nonlinear relation between them.

AN EXPERIMENTAL COMPARISON OF DEPTH MAP DENOISING ALGORITHM

D. A. Mesejo-León and J. A. Mesejo-Chiong

Universidad de La Habana, Cuba.

In recent years RGB-D cameras such as the PrimeSense technology based Kinect camera has spanned an increasing number of applications in entertainment, augmented reality and 3D reconstruction. However due to the low cost nature of the sensors the measurements made by them are highly noisy and contain outliers. In the image processing field there is a wide and varied literature on noise reduction. Taking this fact into account the objective of this work is to adapt certain algorithms of the image smoothing field for depth maps images and verify its effectiveness. It is our belief that a detailed analysis and comparison of these methods in the field

of depth map noise reduction will provide the basis for its selection according to the desired field of application and bring some insight on which direction to take for creating new techniques.

PROBABILITY DISTRIBUTION OF P-VALUE IN TESTS FOR THE MEAN OF ONE NORMAL POPULATION

P.A. Monterrey
Universidad del Rosario, Colombia.

Hypothesis tests are widely used in applications; however, in many cases those who use them don't know that p -values are random variables and that its probability distribution has great influence in data analysis results. Additionally, for some test p -value distribution remains unknown. There is a strong relationship between power function and p -value distribution, it is customary to introduce such a relationship in study design and in data analysis interpretation. This work summarizes some general properties of p -value distribution and this distribution in the case of test for the mean of one normal population, emphasizing the case where population variance is unknown

EFFECT OF PHYSICAL ACTIVITY ON ENERGY AND NUTRIENT INTAKE IN YOUNG UNIVERSITY STUDENTS: A BAYESIAN ANALYSIS

P. A. Monterrey* and Y. Cortés**
* Universidad del Rosario, Colombia.
** Pontificia Universidad Javeriana, Colombia.

Physical activity is one of the main actions in order to reduce the prevalence of obesity. High performance sport increases energy consumption but there is no conclusive evidence about the effect of physical activity to achieve a healthy life on energy intake. Two study groups made up of women was considered, one with physical activity according to recommended levels to maintain health and the other one not. The statistical analysis was made taking into account a mixed effects model. The statistical analysis was made taking into account a mixed effects model, the model's parameters was estimated by a Bayesian procedure. Main result was that physical activity to achieve a healthy life doesn't increase neither energy nor protein intakes. Reduction in energy intake could determine a negative caloric balance that favors the loss of body fat maintaining body mass. Although fat, carbohydrate and cholesterol intakes were increased in more active group.

STABLE NUMERICAL METHODS FOR TWO CLASSES OF STOCHASTIC DIFFERENTIAL EQUATIONS WITH MULTIPLICATIVE NOISE

C.M. Mora
Universidad de Concepción, Chile.

We introduce a new methodology for solving bilinear systems of stochastic differential equations (SDEs), which allows us to design first weak order numerical schemes that preserve for any step-size the almost sure exponential stability of the unknown solutions, under general conditions. Moreover, the new numerical methods also keep intact, roughly speaking, the possible property of being distant from 0. To achieve our main goal, we develop a new stable method for non-linear scalar SDEs. The good performance of the new schemes is illustrated by numerical experiments. The talk is based on a joint work with Hernan Mardones [Stable numerical methods for two classes of SDEs with multiplicative noise: bilinear and scalar. PreprintArXiv:1303.6316.].

DETECTION OF FLAT SURFACES IN THREE-DIMENSIONAL POINT CLOUDS CAPTURED BY THE MICROSOFT KINECT DEVICE

C. Paredes and O. L. Vera
Universidad de La Habana, Cuba.

Augmented reality (AR) refers to a system that combines a real scene with a virtual scene. When we add virtual characters to a scene they are placed at specific locations, in many scenarios this location is a planar surface such as a road, hallway floor, wall, etc. In this work we present a study of a set of algorithms, for detection of flat surfaces in three-dimensional point clouds obtained from the depth map captured by the RGB-D camera, Microsoft Kinect. Of all the literature consulted, three proposals were selected to implement. The first one is a method based on Hough Transform, the second strategy is based on RANSAC and the third solution is based on plane segmentation. In addition, a new algorithm based on K-Means is proposed. The proposed methods were evaluated using instances of a dataset established in the literature for plane detection and a study of the impact of the parameters in each algorithm was presented.

MÉTODOS DE AGREGACIÓN PARA CALCULAR ÍNDICES COMPUESTOS. OBTENCIÓN DE UN RANKING DE SOSTENIBILIDAD TURÍSTICA

V. P. Pérez León*, M. A. León Sánchez*, A. Hernández Santoyo*, F. M. Guerrero Casas**, and
R. E. Caballero Fernández***

*Universidad de Pinar del Río, Cuba.

**Universidad Pablo de Olavide, Sevilla, España.

***Universidad de Málaga, España.

The use of aggregation methods for rankings gives remarkable contributions for decision making process. According to this purpose, the present paper develops an algorithms combination for obtaining tourist sustainability rankings, such as DP2 Distance, Data Envelopment Analysis after Principal Component Analysis, Goal Programming Distance after Data Envelopment Analysis and Borda Count, the last one, used to obtain a total ranking by means of a partial ranking fusion related to the algorithms used. The study took place on the Cuban nature-based tourist destinations identified by the Cuban Ministry of Tourism. Results responds to the necessities and priorities established by decision makers and represent an important step to design new strategic actions, policies or other territorial or national projections.

REVIEW OF THE EFFECTS OF TWO-DIMENTIONAL, COMPUTATIONAL FILTERS ON THE PROCESSING OF PSEUDOSPECTRAL OF IMMERSSED BOUNDARY OF INCOMPRESSIBLE NAVIER-STOKES EQUATIONS

M. A. Phoulady, F. Sabetghadam, V. Esfahanian, and S. Sherafatmandjooor
Islamic Azad University of Science and Research of Tehran, Iran.

The main objective of the present research is to study the necessity and the ways of applying a family of mollifiers into the solution of the two-dimensional incompressible Navier-Stocks equations, using the Fourier pseudo-spectral embedded boundary methods, in order to eliminate the Gibbs oscillations and achieving higher degrees of accuracy. Which this regards, the approximation theory of functions by the Fourier series is briefly reviewed at first. After that, the Gibbs phenomenon, its origins and its effects on the numerical solutions are described. In the next chapter, different conventional methods for implementation of the complex boundaries into the numerical flow solutions are introduced, and their strength and weaknesses are discussed. At last, different numerical filters have been introduced among which, two of the most important ones, namely the

higher-order filters and mollifiers are described. This description is classified in one-dimensional and two-dimensional sections. In final part of this study, a detailed description of these methods with survey of several oscillated fields is resolved. Besides the issue of accuracy, efficiency of using mollifiers and comparison with other methods of smoothing filters is questions tried to be answered.

EULER'S METHOD REVISITED FOR LINEAR CONTROL SYSTEMS

A. Piétrus

Université des Antilles et de la Guyane, France.

Although optimal control problems for linear systems have been profoundly investigated in the past 50-60 years, the issue of numerical approximations and precise error analyses remains challenging due the bang-bang structure of the optimal controls. Based on a recent paper by M. Quincam-poix and V.M. Veliov on metric regularity of the optimality conditions for control problems of linear systems we obtained new error estimates for the Euler discretization scheme applied to such problems. It turns out that the accuracy of the Euler method depends on the "controllability index" associated with the optimal solution. The results extend and strengthen in many directions several recently published ones. The first part is about the problem, the second is concerned with some preliminaries about different concepts as Pontryagin maximum principles, controllability index, etc. The third part is devoted to the Euler discretization and its accuracy and at the end of the talk we give some numerical results and concluding remarks. The talk is based on a joint research with J.L. Haunschmied and V.M. Veliov.

ON THE EVALUATION OF VOTING POWER IN COMPANIES

G. Prause*,**

*Tallinn University of Technology, Estonia.

**Wismar Business School, Germany.

Concerning the financial evaluation of companies and company shares there exist a huge variety of approaches in literature. The majority of the existing concepts like the model of present net value or of Black & Scholes are focusing on the *financial value* of equity and a corresponding participation of the shareholder on the company profit. The *political value* of a share, i.e. evaluation of the voting power related to a company shares, represents a rather neglected topic. One main reason for that is related to the fact that the consideration of voting power of shares is rather a question for the SME sector than for bigger companies. When it comes to the concrete evaluation of voting power of company shares in the practical business life formalized methods like tables of additional correction values on the financial values are used. These approaches are not reflecting the specific situation in companies and they are rather based on empirical results than on a general mathematical approach. The paper will discuss a holistic approach for the evaluation of company shares based on mathematical game theory in order to develop model for integral evaluation of the *political value* and the *financial value* of company shares. The results of the mathematical approach will then be compared with the most often used methods for the evaluation of voting power of shares in business life in order to give recommendations for more realistic and fairer evaluation methods.

LA MIGRACIÓN EN LA FRONTERA SUR DE MÉXICO- GUATEMALA,

Priego Hernández, O., M. á. Ramírez Martínez, and J. F. García Rodríguez

Universidad Juárez Autónoma de Tabasco, Mexico.

México y Guatemala han compartido por mucho tiempo la frontera Sur en donde México es un país atractivo para los flujos migratorios de personas que provienen de Centroamérica. Los migrantes procedentes de siete países de Centroamérica deben cruzar el estado de Tabasco que es un paso obligado en su afán de llegar a México y dirigirse a los Estados Unidos de América. Este proyecto consiste en realizar un estudio diagnóstico de la problemática social, económica y cultural provocada por la migración de personas en esta región. Tiene como finalidad realizar un diagnóstico e identificar fortalezas y debilidades en la región para proponer políticas públicas y estrategias para mejorar las relaciones de la economía regional afectadas por falta de desarrollo social. En esta frontera la problemática que origina la migración crece cada día y amenaza en convertirse en un problema social para México por la falta de atención. En esta investigación se plantean políticas públicas y estrategias para mejorar las relaciones migratorias en esta región que permitan el desarrollo económico y seguridad para los migrantes. La metodología utilizada es de enfoque cualitativa mediante la aplicación de la técnica denominada *Bola de Nieve* para obtener información directamente de los migrantes.

MODELACIÓN BAYESIANA PARA LA ESTIMACIÓN DEL RIESGO RELATIVO DE MORIR POR CÁNCER DE LAS VÍAS RESPIRATORIAS EN CUBA EN EL AÑO 2011.

I. Raíces Cruz*, V. Sistachs Vega**, and A. Tuero Iglesias*

*Centro de Ingeniería Genética y Biotecnología, Cuba.

**Universidad de La Habana, Cuba.

En este trabajo se identifican los patrones de riesgo en la distribución geográfica en los 168 municipios de Cuba en el año 2011 para la mortalidad por cáncer de las vías respiratorias. Este trabajo aborda la utilización de modelos jerárquicos para la estimación del riesgo relativo (RR), específicamente los modelos: Log-Normal y Convolución. Además se empleó como criterio de selección de modelo: el DIC (Criterio de Información Deviance). Se empleó el software WinBUGS 1.4. Como resultados obtuvimos que los mapas obtenidos por el modelo Convolución evidencian claros patrones de la distribución geográfica del riesgo de morir por cáncer de las vías respiratorias en el 2011. Este modelo resultó ser seleccionado como el mejor.

STABILITY ISSUES FOR THE FIXED-POINT PROBLEM OF QOE-BASED CHARGING IN THE INTERNET

P. Reichl*** and P. Maillé**

*Institut Mines-Télécom/Télécom Bretagne, France.

** Université Européenne de Bretagne, France.

***University of Vienna, Austria.

Compared to traditional charging schemes for Internet services which are based on QoS (Quality of Service) differentiation, the recent paradigm change towards the user-centric notion of QoE (Quality of Experience) implies a significant increase in terms of complexity of the corresponding pricing models. This is mainly due to the fact that, with QoE, service tariffs become part of the user context and thus may have a fundamental impact on the user's expectations and quality perception. At the same time, user-perceived quality may also influence directly the demand function. In a network with constrained resources, both effects lead to a non-trivial feedback structure for the resulting prices whose stability properties are addressed in the present paper. Hence, we start with a brief review on fixed point models for QoS- vs QoE-based charging of Internet services, and summarize recent findings concerning the existence and uniqueness of fixed point solutions, which have been verified analytically as well as through comprehensive user trials for video streaming scenarios. Based on that, as a main contribution of this paper, we discuss the stability of the solutions and present some analytical

as well as numerical results. Essentially, we conclude that each model (price-sensitive users, quality-sensitive users, or a mix between them) feature exactly one stable solution, while further fixed points, if existing, turn out to be unstable. The paper concludes with an outlook on future work and a summary of lessons learned.

DEVELOPMENT AND ANALYSIS OF PROBABILISTIC ALGORITHMS FOR GENOME-SCALE METABOLIC RECONSTRUCTION

R. Reyes Chirino*, P. Fernández de Córdoba Castellá**, and J. Urchueguía Schölzel**

*Universidad de Pinar del Río, Cuba.

**Universidad Politécnica de Valencia, España.

The advances in molecular biology and genomic techniques, and the new bioinformatics tools that have enable access to thousands of biological data have propitiated the appearance of a new discipline called System Biology. One of the fundamental approaches of these fields is based on the reconstruction of genome-scale metabolic models, effort that today has not been automated. This process consists on listing and grouping the set of metabolic reactions of an organism, from the information available in different biological database. This project focused on the development and analysis of algorithms including decisions from probabilistic criteria. Consequently genomic-scale metabolic models can be reconstructed fulfilling the criteria of completeness of metabolic and uniqueness of metabolic pathways. As part of the algorithm it is discussed to include the additional metabolic reactions to the model. Their selection was based on the prevalence of metabolic reactions that appear in the alive systems in nature. Moreover, the presence of the same repeated metabolic reaction was considered, but related with different metabolic enzymes. Again a probabilistic approach was used to take the decision based on the uniqueness of the metabolic pathways considering unique biochemical reactions. The methodology used in the automation of this process was implemented manually for the reconstruction of the first genome-scale metabolic model of the photosynthetic microorganism, the *Synechocystis sp. PCC6803*. As a result, it was also obtained the *Computational Platform to Access a Biological Information* (COPABI) that can reconstruct genome-scale metabolic models following the above methodology.

SKEW GENERALIZED EXTREME VALUE DISTRIBUTION

P. Ribereau*, E. Masiello*, and P. Naveau**

*Université Lyon 1, France.

**Laboratoire des Sciences du Climat et de l'Environnement, IPSL-CNRS, France.

Following the work of Azzalini (Azzalini, A. (1985), A class of distributions which includes the normal ones. Scandinavian Journal of Statistics, 12, 171-178; Azzalini, A. (1986), Further results on a class of distributions wh [1] and [2]) on the skew normal distribution, we propose an extension of the Generalized Extreme Value (GEV) distribution, the SGEV. This new distribution allows for a better fit of maxima and can be interpreted as both the distribution of maxima when maxima are taken on dependent data and when maxima are taken over a random block size. We propose to estimate the parameters of the SGEV distribution via the Probability Weighted Moments method. A simulation study is presented to provide an application of the SGEV on block maxima procedure and return level estimation. The proposed method is also implemented on a real-life data.

TURING-HOPFPATTERNS IN HIGHER DIMENSIONS

M. Rodríguez Ricard

Universidad de La Habana, Cuba.

Diffusion-driven instabilities in reaction diffusion systems generated by the limit cycle which appears due to a Hopf bifurcation are considered. Twinkling patterns are to be expected provided close enough, or even equal, diffusion coefficients, even in spatial dimension two. Conditions for the appearance of Turing instabilities about the limit cycle in higher spatial dimension are given.

ÁRBOLES DE DECISIÓN BORROSOS, UNA IMPLEMENTACIÓN DE ANFIS Y SDT.

A. Rodriguez Romero*, V. Sistachs Vega**, and G. Joya Caparros***

*Energimport, Cuba.

** Universidad de la Habana, Cuba.

***Universidad de Málaga, España.

Este trabajo describe y valida una implementación en el lenguaje R de dos métodos que combinan conceptos de la lógica difusa y modelos basados en árboles de decisión, estas son técnicas de la Minería de Datos para la extracción de conocimiento de forma automática a partir de grandes bases de datos. Ellos son una extensión de los modelos clásicos basados en arboles de decisión donde la lógica difusa es aplicada, resultando en modelos más precisos y estables, que continan siendo interpretables. Los algoritmos fueron aplicados a dos bases de datos tomadas de la literatura y se compararon los resultados, aplicando también el algoritmo CART. Para validar los resultados se aplicó la técnica de validación cruzada; donde los algoritmos implementados tuvieron un mejor desempeño.

INDICADORES DE GESTIÓN, RESPONSABILIDAD Y DESEMPEÑO EN LA ADMINISTRACIÓN PÚBLICA DEL ESTADO DE GUERRERO, MÉXICO.

J. M. Sautto Vallejo*, A. Santiago Moreno*, C. N. Bouza Herrera**, and V. Campos Guzmán*

*Universidad Autónoma de Guerrero, Mexico.

**Universidad de la Habana, Cuba.

The purpose of this paper is to present the indicators developed to assess the planning and development of investment projects of the State of Guerrero, and responsibility in fulfilling its functions from the responsible agencies in implementing such projects. This work was developed in 2010 at the request of the Planning Committee of the State of Guerrero (COPLADEG). Projects are proposed and developed by Decentralized Public Organizations and state agencies. Intervene in project management as well as the agency responsible, COPLADEG, the Secretariat of Finance and Public Finance Indirectly. The inclusion of these indicators would be the Control Information System for State investment projects (SICI). System developed by a group of programmers COPLADEG. This paper justifies the proposal for these indicators.

GLARMA MODELS AND THE glarma R PACKAGE

D.J. Scott* and W. T M Dunsmuir**

*University of Auckland, New Zealand.

**University of New South Wales, Australia.

We review the theory and application of generalized linear autoregressive moving average observation driven models for time series of counts with explanatory variables and describe the estimation of these models using the Glarma R-package. Diagnostic and graphical methods are also illustrated by several examples.

MARCO DE TRABAJO PARA INVENTARIOS GEOESPACIALES.

S. Suárez Pacios

Universidad de La Habana, Cuba.

Los SIG son programas informáticos que facilitan la introducción, almacenamiento, recuperación, transformación, modelado, análisis, representación y salida de datos espaciales y tabulares del mundo real para garantizar la toma de decisiones en problemas de planificación y gestión. Los datos espaciales se referencian por puntos geográficos y se guardan como elementos primitivos gráficos. Los datos tabulares son atributos no gráficos de los elementos del mundo real, relacionados a los datos espaciales, los cuales se archivan en una base de datos. El presente trabajo expone la implementación de un marco de trabajo, configurable y extensible, que permite ir a campo, censar entidades con sus atributos y su posición geográfica y transferir luego a un SIG para su posterior explotación y análisis.

SIMULATED MODEL FOR MEASURING PERFORMANCE TELEMARKETERS ON A CALL CENTER

O. A. Tapasco Alzate* and J. A. Giraldo García**

*Universidad de Caldas. Colombia.

**Universidad Nacional de Colombia Sede Manizales, Colombia.

The present paper is aimed at proposing a model to support the administrative decision-making in a call center inbound call type. This hypothetical simulation model developed in ProModel R includes the choice by users of the service type required as television, phone or internet, or if the service is a home or business level, and the possibility to select from options to request information of the services offered by the company, making a complaint or report of a technical failure in the contracted service. Based on secondary information collected of input distributions that enable the simulation of the random behavior of the phenomenon and conducting experimental runs under a 2^k design. The proposed design allows evaluating different scenarios that include both technical factors such as the number of phone assistance lines and the number of telemarketers, so distinctive factors associated with the ability of operators such as work experience, gender and type of training performed. The model obtained allows evaluation of the effects of the studied factors on system performance variables such as service rates and abandonment rates of the system, and the average time spent in queue and time of service delivery.

EVALUATING REVERSE LOGISTICS ALTERNATIVES BY USING ANALYTIC NETWORK PROCESS WITH BOCR

C. Toledo Hernández*, F. A. Marins**, R. Cespón Castro***, and J. A. R. Durán*

*Federal Fluminense University, Brazil.

**So Paulo State University, Brazil.

***Universidad Marta Abreu de Las Villas, Cuba.

The Reverse Logistics (RL) activities are gaining importance in Brazilian companies. However, a relevant problem is to select RL activities using criteria of immediate and long-term effects for the organization. These situations can be treated as being Multi-Criteria Decision-Making (MCDM). In this work we adopted the Analytic Network Process (ANP) as the analytical technique of a MCDM problem that can be formulated when we have interest in to identify existing relationships between RL activities. The strategic criteria were included into the model to rate benefits (B), opportunities (O), cost (C) and risks (R). Here we present an analysis of sustainable practices identified in publishing companies, operating in Brazil. The results indicated that ANP-BOCR is an adequate method to select alternatives RL.

CONSTRAINT BASED CURVE MANIPULATION WITH CUBIC A-SPLINES,
A.I. Toledo*, W. Morales Lezca*, S. Behar Jequín*, and J. Estrada Sarlabous**.

*Universidad de La Habana, Cuba.

*ICIMAF, Cuba.

In geometric modeling or graphic design applications the interactive manipulation of geometric properties, such as position, tangency and curvature is crucial. The conventional methods do not provide direct control *at arbitrary points on the curve*. Users may have some control at a few specific points and this control strongly depends on the representation of the curve. For instance, Bezier curves offer direct representational control of position and tangency at the endpoints of its sections, but not at its interior points. Users control properties on the interior of the curves indirectly by manipulating the control vertices or by complicating the curves through subdivisions. In this work, we introduce methods to provide a more direct and intuitive control of a cubic A-spline curve: the first method permits to assign a tangent direction to a prescribed interior point, while the second assigns a prescribed line as the tangent line at some interior point. These are basic tasks in the constraint-based curve manipulation and in the present work we demonstrate that they may be efficiently solved using cubic A-spline curves.

METAHEURISTICS FOR SEQUENCING MULTIPLE MIXED-MODEL ASSEMBLY LINES IN A LEAN
MANUFACTURING ENVIRONMENT

M. M. Ushizima*, F.A. Marins*, A.A. Chaves**, A.L. Sanches***, and J.A. Montevechi****

* Universidade Estadual Paulista UNESP, Brazil.

**Universidade Federal de Sao Paulo, Brazil.

***Universidade So Francisco, Brazil.

****Universidade Federal de Itajubá, Brazil.

Since that lean manufacturing concepts have been adopted, several studies dealing with the effective utilization of Mixed-Model Assembly Lines (MMAL) have been focused on the sequencing of such lines. The MMAL must have flexibility to produce different models in given sequences and obtain benefits, such as constant consumption of parts or subassemblies, thus minimizing the scaling of kanbans, the intermediate stocks, and also the workload level at each station to minimize line stoppages. In situations where it is possible to produce many different models, production based on market forecast becomes unviable, even with the use of computational resources, which makes the products sequencing in the MMAL a differential. This paper deals with the MMAL in multiple lines in a lean manufacturing environment, where an operational structure of several domestic suppliers (kanbans) supports many MMAL simultaneously, so that all the assembly lines can receive parts or sub-assembly from all the suppliers. To optimize this system, the sequencing must seek to minimize the distance between the real consumption and the constant ideal consumption of parts or subassemblies, thereby reducing the scaling of kanbans and intermediate stocks. To solve the sequencing problems, the Variable Neighborhood Search and the Iterative Search Local methods were applied. Instances from the literature and also generated instances were tested, thus allowing to comparing the methods to each other and with other methods presented in the literature. Analyzing the results obtained, it was observed that the ILS was more efficient, obtaining better solutions in less time.

APLICACIÓN DEL CATPCA PARA EL ESTUDIO DE LA SOSTENIBILIDAD DE LA EMPRESA
PECUARIA VALLE DEL PERÚ

Y. Vázquez Alfonso, C. W. Guerra Bustillo, O. E. Sánchez León, and L. Domínguez Orta.

Universidad Agraria de La Habana, Cuba.

El presente trabajo se desarrolló en la Empresa Pecuaria Valle del Perú, del municipio San José de las Lajas, provincia Mayabeque y tuvo como objetivo aplicar el Análisis de los Componentes Principales para datos categóricos para el diagnóstico y establecimiento de estrategias de análisis de la sostenibilidad en la misma. Se recopiló la información de las dimensiones sociales, económicas y ambientales a través de la base de datos de los indicadores de la Empresa, siendo procesada y analizada mediante el cálculo del índice de la sostenibilidad por dimensión y general a través del software ANSOST1.0 y el modelo de la Estadística Multivariada Análisis de Componentes Principales para datos categóricos (CATPCA) implementado en el software SSPS versión 22.0. Las variables que más se destacan son las relacionadas con la composición de los recursos humanos, el género y las económicas. Estos resultados son de gran utilidad para los directivos de la empresa debido a que pueden tomar mejores decisiones sobre el comportamiento de las actividades fundamentales de la empresa.

REVISIÓN SISTEMÁTICA DE LOS MÉTODOS DE IMPUTACIÓN DE DATOS FALTANTES Y SU EFECTOS EN LAS ESTIMACIONES.

C. Viada* and C. Bouza** et al.

*Centro de Ingeniería Molecular, Cuba.
Universidad de La Habana, Cuba.

En el desarrollo teórico de la mayoría de técnicas y modelos estadísticos no se tienen en cuenta algunas cuestiones que surgen en su aplicación práctica, en concreto, un problema al que con seguridad se ha enfrentado cualquier analista de datos es el de los datos faltantes, también denominados perdidos o incompletos. En la práctica estadística es frecuente encontrar muestras con datos que no han podido observarse. En este artículo se comparan mediante aplicaciones a los ensayos clínicos las propiedades de distintas estrategias de inferencia a partir de muestras con datos faltantes según un patrón arbitrario. Se estudian desde métodos heurísticos hasta métodos basados en verosimilitudes, bajo distintos mecanismos para la no respuesta y con variables de características dispares. Se analiza el efecto sobre las estimaciones puntuales y la cobertura de los intervalos de confianza.

A STUDY ON DIFFUSION IN ARTICULATED HUMAN MOTION TRACKING BY PARTICLE FILTERING

G. Yero Paz, L. River 'on Valdés, and O. L. Vera Pérez
Universidad de la Habana, Cuba.

A common solution to the articulated human motion tracking problem is the Particle Filter, specifically the Annealed Particle Filter, which uses the cooling schedule from Simulated Annealing to progressively refine the results. A main concern of this algorithm is the generation of new solutions. The present work will review three ways to diffuse solutions over the search space. Two of them will be constant variance schemes: one uses a scalar parameter and the other uses a vector to control the solution generation diffusion. Since these schemes require parameters, a statistical analysis will be performed in order to find the best parameter set. The remaining scheme is dynamic and it doesn't require any parameters. In this case the diffusion is controlled by the last solutions found by the algorithm. These three methods will be compared using the HumanEVA dataset. The vectorial variance scheme is expected to perform better than the scalar one, since the variance is specific for every joint angle. It should yield less non-feasible solutions, so it should be faster. Recent investigations have shown that the dynamic scheme works better than the other methods in other case studies, for example, tracking the motion of a computer generated arm. Early experiments lead to believe that it should be the best option for the problem at hand.

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