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Posters

An Approximation in Law of the First Hitting Time of a Sum of Independent Indicator Random Variables

Adilson Simonis
IME-USP

Abstract: We let $X_i : 1 \leq i \leq n$ denote a sequence of independent random variables with $\mathbf{P}(X_i = 1) = 1 - \mathbf{P}(X_i = -1) = p_i$, where $0 < p_i < 1$ for all $i \geq 1$. Let S_0 be an arbitrary integer and for $1 \leq n < \infty$ we let $S_n = S_0 + \sum_{i=1}^n X_i$.

Consider, for $A > S_0$ and $B > S_0$, the first time τ at which the partial sum S_n reaches level A or level $-B$. We consider approximations to $\mathbf{P}(S_\tau = A/S_0 = 0)$ and to the probability distribution of τ . Despite there are many methods available, we pay attention to the use of techniques in an operator framework as in Le Cam.

In addition, some examples of application of these results are presented and questions for further investigations are posed.

Statistical Variation of the Approximations to the Ruin Probability

Adrian Hinojosa
UFMG

Abstract: We consider the ruin probability for the classical risk process and some of their approximations. Regarding the approximations as functions of the parameters of the distribution of the claims we use some sensitivity analysis to study the statistical variation of the approximation.

Conglomerados Estocásticos no Processo de Exclusão Simples Simétrico

Adriana Uquillas
IME-USP

Abstract: Consider the one-dimensional nearest-neighbor symmetric simple exclusion process starting from a Bernoulli product measure associated to a smooth profile such that the interval $[-j, j]$ has high probability of being occupied, for j an integer bigger or equal to one. We study the first time for which the particle initially at the origin can move. We present an inferior and a superior bound for the distribution of this time.

A Nonlinear Stochastic Differential Equation Model of Fatigue crack

Adriano Siqueira
EEL-USP

Abstract: This poster presents a Stochastic Differential Equation for prediction of fatigue crack damage in metallic materials. The model used allows estimation of the current damage state based on the property of the SDE: $dX_t = aX_t^b dt + s.X_t dB_t$, where a, b and s are parameters to be determined. The model results have been verified with experimentally data of fatigue cracks for pure titanium.

Non-parametric curve estimation of an autonomous vehicle trajectory

Adriano Zanin Zambom
UNICAMP

Abstract: Suppose that an autonomous vehicle has to move from point A to point B and that there are obstacles (such as rocks, trees, etc) in the way. The objective is to find the best (in some sense) trajectory from point A to point B avoiding the obstacles where we assume that the vehicle cannot have rough trajectories. Suppose also that the sensors detect obstacles with some random error measurement. That is, instead of seeing the obstacle field we

observe a point process. Then, using B-splines we propose a optimization with a penalization function.

Statistics for Point Processes

Alejandra Andrea Tapia Silva
Universidad de Valparaíso

Abstract: The goal of this work is to present numerical results for point and confidence interval estimators for the cumulative intensity function of a Nonhomogeneous Poisson process, considering the interesting properties of these: strongly consistent and asymptotically exact, respectively; when the number of realizations tends to infinity.

Simulations and approximation for a particle process

Alex Ramos
UFPE

Abstract: Toom presented a process with one-dimensional local interaction in discrete time, where components are enumerated by integer numbers and each component has two states, “minus” and “plus”. At every time step two transformations occur: the first one turns every minus into plus with probability β . The second one: whenever a plus is a left neighbor of a minus, both disappear with probability α . Toom proved that this process is ergodic for β greater than $\alpha/2$ and non-ergodic for β less than $\alpha^2/250$. We used a mean-field approximation of this process to obtain a transition curve between the areas where the process is ergodic vs. non-ergodic. Also we studied a finite approximation of the same process using Monte Carlo simulation and obtained another transition curve. These two curves are close to each other. We studied the neighborhood of the latter critical curve. Finally, we have shown that near zero the latter curve has a positive slope.

Comparison of the performances of the estimators of the methods of maximum likelihood and the method of the moments for the parameters of the inverse gaussian distribution.

Alexandra Johanna Esteban López
UFPE

Abstract: Many statistical procedures suppose that the data follow some type of defined mathematical model by means of an equation in which their parameters are not known, being these calculated or estimated from the information obtained in a study planned for such a purpose. Different procedures exist to estimate the coefficients of a model of regression, or to estimate the parameters of a distribution of probability. Two very known methods are the method of maximum likelihood and the method of moments.

The inverse gaussian distribution with two parameters is very used and versatile, having numerous applications in diverse fields, in this work a comparison between two methods of estimation of the parameters of this distribution appears, using simulation of Monte-Carlo, in sizes of sample $n = 10, 20, 50, 100$ and 200 .

Finding that for the parameter of location (μ) both methods present estimates near the real value of the parameter, in any size of sample. The method of maximum likelihood always has minor mean quadratic error. And for the parameter of scale (l) and small sample size the two methods of estimation present bias, but this bias reduces when increasing the size of sample. Authors: Alexandra Esteban López, Edwin Giron Amaya.

Limit Theorems for an Epidemic Model on the Complete Graph

Alexandre Leichsenring
IME-USP

Abstract: We study the following random walks system on the complete graph with n vertices. At time zero, there is a number of active and inactive particles living on the vertices. Active particles move as continuous-time, rate 1, random walks on the graph, and, any time a vertex with an inactive particle on it is visited, this particle turns into active and starts an independent

random walk. However, for a fixed integer $L \geq 1$, each active particle dies at the instant it reaches a total of L jumps without activating any particle. We prove a Law of Large Numbers and a Central Limit Theorem for the proportion of visited vertices at the end of the process. The arguments rely on the theory of density dependent Markov chains.

Uniqueness without regeneration scheme for chains with unbounded variable length memory

Alessandro Gallo
IME-USP

Abstract: We consider a certain class of unbounded context trees which have been introduced by Divanilda Maia Esteves in her Phd Thesis (March, 2007). D. Maia found a condition which implies the existence of a regeneration scheme for the stationary process consistent with the trees. Considering the same class of trees, we give a condition which allows us to keep the uniqueness of the stationary consistent process, without the regeneration scheme.

Gibbs Random Graphs

Anatoli Iambartsev
IME-USP

Abstract: We study Gibbs random fields on the complete graph $G = (R, E)$, where R is a local finite set in d dimensional Euclidean space, and it stands for vertices of G . E is the set of all edges. Any edge can be open or closed. For any configuration of open edges we introduce the energy which is proportional to the length of open edges, it is positive for any two open edges having the same vertex (edge collision), and it is also positive if vertex degree is equal to zero (monomer). We show that the ground state is a configuration which contains only monomers and dimers (isolate edge). Under some condition we proved that there is no percolation in this model when temperature is positive.

Scenery reconstruction in polynomial time

Angelica Pachón
Bielefeld University

Abstract: Assume a random walk moving around on a landscape and making observation thereof. The landscape is called scenery. We assume that we can only have the observations made by random walk. We show that a finite piece of scenery can be reconstructed in polynomial time with high probability. That means that we only have finite many observations. The number of observations we are allowed to see is polynomial in the length of the piece we reconstruct. We also show how to implement such a reconstruction algorithm in practise. All this is done in the context of a 3-colour scenery seen along a simple random walk.

Stationary and nonequilibrium fluctuations in boundary driven exclusion processes

Aniura Milanés Barrientos
UFMG

Abstract: We prove nonequilibrium fluctuations for the boundary driven symmetric simple exclusion process. We deduce from this result the stationary fluctuations.

All Particle Processes Without Collisions Have A Fixed Point

Calitéia Sousa
UFPE

Abstract: We consider a class of particle processes with a finite number of types of particles, which we call Processes Without Collisions or PWC for short. As the discrete time goes on, any particle may die or transform itself into one or several particles of any types with certain probabilities, but there are no collisions, that is every transformation applies to only one particle and probabilities of its transformations do not depend on other particles. This excludes predator-prey and sexual relations, but includes death and asexual reproduction with possible mutations. Due to this restriction, positions of particles are irrelevant and we do not mention them.

If the number of particles tends to infinity, the behavior of the process becomes deterministic after normalization. In fact, this approximation is often used in demography and other sciences. Our intention is to prove that the resulting dynamic system has a fixed point and that under additional conditions the fixed point is unique and the system tends to it from any initial condition. Besides, this approach raises some questions about the manner in which some books on populational dynamics have been written.

Functional Data Analysis: smoothing techniques and covariance structure

Camila Pedroso Estevam de Souza
UNICAMP

Abstract: Advances in modern technology have facilitated the collection and analysis of high-dimensional data, or data that are repeated measurements of the same subject. When the data are recorded densely over time, often by machine, they are typically termed functional or curve data, with one observed curve (or function) per subject. The statistical analysis of a sample of n such curves is commonly termed functional data analysis, or FDA. Conceptually, functional data are continuously defined. Of course, in practice they are usually observed at discrete points. There is no general requirement that the data be smooth, but often smoothness or other regularity will be a key aspect of the analysis, in some cases derivatives of the observed functions will be important. In this project smooth techniques based on splines functions are presented and discussed. Summary statistics for functional data are presented, such as mean and variance functions. Studies about the covariance structure are also showed.

On the moments of the first meeting time of two random walks in random environment

Christophe Gallesco
IME-USP

Abstract: We consider two independent random walks in random environment and we first give an estimate for the tail distribution of the first

meeting time of the two RW. Then we use this estimate to obtain results about the moments of the first meeting time of the two RW. Writing $E(T^a)$ the moment, we show that $E(T^a)$ is finite for $a < 1$ and infinite for $a > 1$.

Scaling limit for a drainage network model

Cristian Favio Coletti
IME-USP

Abstract: We consider a two-dimensional drainage network model which can be roughly described as a random graph where each vertex is open or closed with probability p or $1 - p$, respectively. The open vertices represent the water sources. An open vertex is connected to the closest open vertex in the next level. In case of nonuniqueness, we choose anyone of the closest vertices with equal probability and independently of everything. This model was introduced by Gangopadhyay, Roy and Sarkar. By verifying criteria derived by Fontes, Isopi, Newman and Ravishankar, we show that, when properly rescaled, and under the topology introduced by those authors, the drainage network model converges to the Brownian motion. Joint work with Luis Renato Gonçalves Fontes and Erasmo Sousa Dias.

On the Granger Causality and Mutual Information

Daniel Takahashi
IME-USP

Abstract: Granger causality measure (GCM) is a directional measure of dependence between wide-sense stationary processes. It has wide applicability in biological and statistical sciences as a measure of interaction between multiple phenomena mainly because it has a natural interpretation as a measure of information flow from one process to another. The aim of this work is to show how this last idea can be formalized relating GCM to the concept of mutual information between Gaussian wide-sense stationary processes. Some of its generalizations are discussed and a number of biological and physical application will be shown.

Markov approximation and consistent estimation of unbounded probabilistic suffix trees.

Denise Duarte
UFMG

Abstract: We prove the weak consistency of a modification of Rissanen's algorithm Context which estimates the length of the suffix needed to predict the next symbol, given a finite sample. We consider infinite order chains whose transition probabilities depends on a finite suffix of the past. These suffixes are of variable length and the set of the lengths of all suffix is unbounded. We assume that the probability transitions for each of these suffixes are continuous with exponential decay rate. For these chains, This generalizes to the unbounded case the original result proved for variable length Markov chains

Empirical evaluation of the test T of significance of parameters in simple linear regression using Monte Carlo simulation and estimation bootstrap.

Edwin Giovanni Giron Amaya
UFPE

Abstract: It is of common interest of the diverse areas of the knowledge to explain a characteristic for that they participate of one same context. One very efficient technique for modeling of this situation is the regression. This technique is conducted by some assumptions that validate its results. However, the negligence with the verification of the assumptions results in the inconsistency of the analysis of the results. Amongst the situations of the bad use of the regression, it is pertinent to speak regarding that one where the quality of the adjustment is verified although to have not the satisfaction of the assumption of the not-correlated residues (spurious regression). This situation was studied by [Box], in 1971. A powerful used computational tool in the study of such situation is the Monte Carlo simulation. Through it if it can verify the behavior of tests of significance of the parameters of the regression in diverse situations. In short, one perceived that this test if does not show satisfactory when it is come across with situations where the residues are correlated. The objective of this work is to inside simulate some

situations of two contexts. One where the assumptions of the model are satisfied and another one where they it are not. It is, from then on, to compare, in percentile terms, the developments inside of the two contexts. When the assumptions of simple the linear regression are kept, the rejection rates are good empirical estimates for the established values of significance. This indicates that test T is shows consistent. In the case of the spurious regression, the rejection rate quickly increases with the size of the sample, leading the conclusions missed on the significance of the parameter and the true existing relation between the variable. This is explains because the test T takes in consideration the esteem of the variance of the residues, but, as these are correlated, the variance is sub-estimate and statistics T tends to assume great values, exceeding the critical value and taking the great rates of rejection, indicating the significance statistics between the variable. This coincides with the results gotten for [Sun], 2004. Authors: Edwin Giron Amaya, Alexandra Esteban López, Solange Dos Santos, Abraão Do Nascimento.

Multivariate Generalized Beta Type 1 Distribution

Erika Alejandra Rada Mora
 Universidad de Antioquia

Abstract: Let X_1, \dots, X_{r+1} be independent random variables having a standard gamma distribution with respective parameters $\alpha_1, \dots, \alpha_{r+1}$ and define $Y_i = b(X_i / \sum_{i=1}^{r+1} X_i)^{1/a}$, $i = 1, \dots, r$ where $a \neq 0$, $b > 0$ are constants. Then (Y_1, \dots, Y_r) follow multivariate generalized beta tipe 1. The idea is to show several properties of this distribution.

Random walk systems on \mathbb{Z}

Fábio Machado
 IME-USP

Abstract: We study random walks systems on \mathbb{Z} whose general description follows. At time zero, there is a number $N \geq 1$ of particles at each vertex of \mathbb{N} , all being inactive, except for those placed at the vertex 1. Each active particle performs a simple random walk on \mathbb{Z} and, up to the time it dies, it activates all inactive particles that it meets along its way. An active particle

dies at the instant it reaches a certain fixed total of jumps ($L \geq 1$) without activating any particle, so that its lifetime depends strongly on the past of the process. We investigate how the probability of survival of the process depends on L and on the jumping probabilities of the active particles.

Estimation of seasonal fractionally integrated processes under additive outliers

Fabio Alexander Fajardo Molinares
UFES

Abstract: This paper discusses the estimation of fractionally integrated processes with seasonal components under additive outliers. In order to estimate the fractional parameters, we used the methodology proposed by Reisen, Rodrigues and Palma (2005), using a robust estimator of the autocovariance function proposed by Ma and Genton (2000). For comparison purposes, the semi-parametric method introduced in Geweke and Porter-Hudak (1983) and Porter-Hudak (1990) are also considered. As indicated by the Monte Carlo simulations, the performance of the estimators proposed is good even for small sample sizes.

A family of random walks with geometric lifetime

Fabio Marcellus L. S. M. Lopes
IME-USP

Abstract: We study the following process on \mathbb{Z} , for discrete time. At time zero, there is a particle at origin that describes a simple random walk with steps geometrically distributed ($Geo(1 - p)$). Each time a particle returns to the origin it creates a copy, which means, another particle which describes the same process. An emerging question is about the surviving probability of that process as a function of the parameter p , in particular the existence of a critical p^* below what the process dies as sure. We found a critical value analytically and by simulations, and calculated the surviving probability as a function of the parameter p .

Strong Nash equilibria of random players

Fernando Pigead de Almeida Prado

USP-RP

Abstract: In this Poster we analyse the limit set of “Strong Nash Equilibrium” (Alman 1959) of a specific game with many players and two strategies.

Each player chooses one of two possible strategies, 1 or -1 ; if the player i chooses the strategy $s_i \in \{1, -1\}$, then she gets the pay-off

$$U_i(s) = \frac{N(s_i; s)}{N} + hs_i + \sigma e_i$$

where $s = (s_1, s_2, \dots, s_N)$ and $N(s_i; s)$ denotes the number of components of s that have the same value as s_i ; for example: $N(-1; (1, -1, -1)) = 2$; h and σ are real parameters with $\sigma > 0$ and e_1, e_2, \dots are i.i.d. continuous random variables with mean 0 and variance equal to 1.

It is interesting to see that there are many “Strong Nash Equilibria” $x > 0$, where $h < 0$. That this game has at least one Strong Nash Equilibrium is due to Le Breton (1997).

Rate of convergence of penalized likelihood context tree estimators

Florencia Leonardi

IME-USP

Abstract: We find upper bounds for the probability of error of penalized likelihood context tree estimators, including the well-known Bayesian Information Criterion (BIC). Our bounds are all explicit and apply to trees of bounded and unbounded depth. We show that the maximal decay for the probability of error can be achieved with a penalizing term of the form n^a , where n is the sample size and $0 < a < 1$. As a consequence we obtain a strong consistency result for this penalizing term.

Point Traffic Model

Fredy Castellares
UFMG

Abstract: We introduce a particle traffic model which is continuous in space and time, which we denominate the Point Traffic Model. The point process distributes the particles on a straight line R following a Poisson process of parameter λ and the marks are the waiting time for the particles to change from velocity 0 to velocity -1 . Each particle waits a random time which has an exponential distribution of average 1 to move for the first time. After this time, the particles move with velocity -1 forever or, in the opposite case, will be stopped if they meet a particle blocking their way. In this case the velocities return to 0 and remain blocked until the particle or particles blocking the way have left. From this moment the unblocked particle waits a further random time with an exponential distribution before moving. At every instant of time we will have particles which move the blocked particles to velocity -1 . We prove that if $\lambda < 1$ the distance between particles converge almost surely to the distance between the exits of a client in a stationary queue $M/M/1/\infty$ associate to the systems.

Selection of important nodes and “features trees” in random trees

Georgina Flesia
CIEM-CONICET

Abstract: We address the problem of selection of important nodes and “features trees” in supervised and unsupervised classification. This is the correlate of the problem of selection of (important) variables that helps to explain a classification method when data are in high-dimensions. In this poster, we introduce the problem, state some definitions and propose future work. We follow the approach developed recently by Fraiman, Justel and Svarc.

Construction of Limit Measures

Geraldine Góes Bosco
USP-RP

Abstract: We have used our results in “Exponential Rates of Convergence in the Multidimensional Law of Large Numbers: a constructive approach” (in preparation) to construct limit measures on non-amenable graphs and also to construct some elements of the family of random cluster measures.

Testing equality of functions using kernel estimators

Gregorio Atuncar
UFMG

Abstract: We define a distance between two functions to test the equality of functions. We are interested mainly in the case of two intensity functions. We carried out intensive simulations to evaluate the performance of a test defined in the work.

A Limit of an Improper Integral Depending on One Parameter

Iesus Diniz
IME-USP

Abstract: In this short article we will calculate the following limit of an improper integral that depends on one parameter $\lambda \in \mathbb{R}^+$:

$$\lim_{l \rightarrow 0^+} \int_0^{\infty} \exp(-l \mathcal{K}[(x+l)^n]) l \mathcal{K} n x^{n-1} dx$$

This is an interesting example where one can not interchange the order of the limit and the integral symbols. Through a nice application of elementary tools such as change of variables in integrals and the binomial formula, one is able to obtain this limit.

This problem has arisen from the calculation of a lower bound for a probability of theoretical interest in the study of multidimensional Poisson point processes which is written:

$$\lim_{l \rightarrow 0} \int_0^\infty \exp(-lv_n(1)[(r+l)^n - r^n]) lv_n(1) nr^{n-1} \exp(-lv_n(1)r^n) dr$$

where $v_n(1)$ is the volume of the n dimensional ball with radius one, λ is the Poisson intensity, l is the distance between two distinguished points in \mathbb{R}^n and r is the distance from the first point to the closest occurrence in the Poisson point process. In this note we show that this limit is equal to one.

A 1D-Ising model with long range

Immacolata Merola
Universita' dell'Aquila Italy

Abstract: It is well known that a one dimensional Ising spin system with ferromagnetic long range interactions which decay as $|x - y|^{-2+\alpha}$, $\alpha \in (0, \frac{1}{2}]$ exhibits a phase transition. To study the phase coexistence region we consider a finite volume $2L + 1$ with mixed boundary conditions ($-$ on the left and $+$ on the right). Using a geometrical description for the spin configurations si , we define a “phase-separating” point and we study its statistical properties.

A methodology for the classification of bivariate data through its dependence structure with application to linguistic

Jesus Garcia
UNICAMP

Abstract: We propose a methodology for the classification of bivariate data through its dependency structure using copula theory. To model the dependence, we developed an algorithm that uses maximum likelihood to choose the best fitting copula from a library of biparametric and bivariate copula models. Then, to classify the data, it evaluates the distribution of the parameters estimators using bootstrap. We apply our algorithm to a

linguistic problem on which the marginal distributions are not useful for classification and we show that the dependence structure fitted is a good classifier in order to discriminate several languages.

Probability Density Functions of the Wavelet Coefficients of a Wavelet Multidimensional Poisson Intensity Estimator

José Carlos Simon de Miranda
IME-USP

Abstract: We determine the probability density functions of the wavelet coefficient estimator $\hat{\beta}_\eta = \int \psi_\eta dN$ in the wavelet series expansion $\hat{p} = \sum \hat{\beta}_\eta \psi_\eta$ of non homogeneous multidimensional Poisson processes intensity functions.

Random series in $L^p(X, \Sigma, \mu)$ using unconditional basic sequences and l^p stable sequences: A result on almost sure almost everywhere convergence

Juan Miguel Medina
Universidad de Buenos Aires y CONICET

Abstract: We study the almost sure almost everywhere convergence of random series of the form $\sum_{k \in \mathbb{N}} a_k f_k$ in general sigma finite Lebesgue Spaces $L^p(X, \sigma, \mu)$, where the a_k 's are centered random variables and the f_k 's constitute an unconditional basic sequence. We show that under suitable conditions the almost sure convergence in the norm topology of one of these series implies converges almost everywhere $[\mu]$ almost sure. Some of these results are related to (3). References: (1) Kahane, J.P. "Some random series of functions", Cambridge, 1993.(2) Lindenstrauss, J. Tzaferi, Classical Banach spaces. Two vpls. Springer, 1996. (3) Medina J.M. Cernuschi F.B. "Random series in $L^p(X, \Sigma, \mu)$ using unconditional basic sequences and l^p stable sequences: A result on almost sure almost everywhere convergence", To appear en Proc A.M.S.

Two-scale contact process

Lamia Belhadji
Universite de Rouen

Abstract: Particle systems are usually defined on a homogeneous graph, the interaction neighborhoods of sites of the graph are linked each other by translation. In this work, we study the contact process on a non homogeneous graph designed to model the interactions within metapopulations. The d -dimensional lattice is turned into a “chessboard” through the superposition of a mesoscopic lattice on the usual microscopic lattice. Each site of the mesoscopic lattice is the center of a square of the chessboard. Interactions occur at both site (microscopic) level and square (mesoscopic) level. The superposition of two interaction levels induces two birth rates, called microscopic and mesoscopic birth rates. Similarly, deaths occur at both levels: individual deaths at microscopic level, and mass extinctions (destruction of all the particles contained in a given square) at mesoscopic level. Our “two-scale” contact process can be viewed as a metapopulation model describing the evolution of a set of interacting local populations. We study the effect of coarseness, defined as the ratio of the mesoscopic scale over the microscopic scale, on the survival probability of the particle system. We find that, in the absence of mass extinctions, particles are more likely to spread out as coarseness increases, even if the mesoscopic birth rate decreases significantly with the square size. In the presence of mass extinctions, coarseness has only a limited effect.

Exit times of n -strings: A construction using a Markov chain.

Liliam Cardeno
IME-USP

Abstract: Given a stochastic process and a n -string A , we investigate the probability P_A of the exit time from A . Under good mixing conditions it is known that P_A is bounded away from 0, while the probability of A , $Pr(A)$ decreases exponentially fast. We constructed an example in which P_A goes to zero. Moreover, we show that the ratio $P_A/Pr(A)$ can converge to zero or a constant or ∞ .

On the truncated anisotropic long-range percolation on \mathbb{Z}^2

Luciana Miranda
UFMG

Abstract: Consider the following bond percolation process on \mathbb{Z}^2 : each vertex $x \in \mathbb{Z}^2$ is connected to each of its nearest neighbour in the vertical direction with probability $p^\nu = \varepsilon > 0$; and in the horizontal direction each vertex $x \in \mathbb{Z}^2$ is connected to each of the vertices $x(i, 0)$ with probability $p_i \geq 0$, $i \geq 1$, with all different connections being independent. We prove that if p_i 's satisfy some regularity property, namely if $p \geq 1/(i \ln i)$, for i sufficiently large, then for each $\varepsilon > 0$ there exists $K \equiv K(\varepsilon)$ such that for truncated percolation process (for which $\tilde{p}_i = p_i$ if $i \leq K$ and $\tilde{p}_i = 0$ if $j > K$) the probability of the open cluster of the origin to be infinite remains positive. This poster is based on a work of V. Sidoravicius, D. Surgailis and M.E. Vares.

Application of moderate deviation techniques to prove Sinai's Theorem on RWRE

Marcelo Ventura Freire
EACH-USP

Abstract: We apply the techniques developed in (Comets & Popov, 2003) to present a new proof to Sinai's theorem (Sinai, 1982) on one-dimensional random walk in random environment (RWRE), working in a scale free way to avoid rescaling arguments and splitting the proof in two independent parts: a quenched one, related to the measure $prob$ conditioned on a fixed, typical realization ω of the environment, and an annealed one, related to the product measure $Prob$ of the environment ω . The quenched part still holds even if we use another measure (possibly dependent) for the environment.

Topology and dynamics of complex networks

Marcio Argollo de Menezes
Universidade Federal Fluminense

Abstract: We'll expose results on the topology of some complex networks and show how the topology of transportation networks, where the dynamics is given by an optimization principle, can depend on the flow being transported. Experiments on metabolic networks confirm our analysis.

Application of the Variable Length Markov Chains on measurements of energies from the acoustic signal of speakers of different languages

Márcio Luis Lanfredi Viola
UNICAMP

Abstract: In this work, we applied Variable Length Markov Chains (VLMC) in a linguistic problem. Precisely, we considered the energies coming from acoustic signal of speakers of diverse languages (English, Japanese, Spanish, Dutch, Polish, French, Italian, Catalan). These energies were grouped according to three different frequency classes. We compared the probabilistic tree between each frequency class and between the frequency classes of different languages.

A Detection Method of Significant Clusters in Non-Homogeneous Spatial Poisson Process

Marcos Santos
UFMG

Abstract: We present a method for detection of significant regions in space and time with high density of events, for non-homogeneous spatial point Poisson processes. The method is based on the association of the events and marks and a permutation test in order to determine if the detected clusters of marks can reasonably have occurred by chance. We use the stochastic domination technique to determine an upper bound to the size of the associated marks, in order to avoid percolation. An example of application of the method with real data of crimes will be presented.

An inequality for oriented 2- D percolation

Mariela Sued

UBA - Universidad de Buenos Aires

Abstract: We consider a Bernoulli oriented percolation model on the subgraph of \mathbb{Z}^2 consisting of the points whose coordinates add up to an even number. In this model, each point $(m; n)$ of this graph is the origin of two oriented bonds whose end points are $(m + 1; n + 1)$ and $(m - 1; n + 1)$. We show that the probability that there is an open path from $(0; 0)$ to $(2i; 2n)$ decreases strictly as i increases from 0 to n . Joint work with Enrique Andjel.

Fitting Copulas using Kendall Plot

Marta Cristina Colozza Bianchi

UNICAMP

Abstract: A general formula is given for computing the distribution function K of the random variable $H(X, Y)$ obtained by taking the bivariate probability transformation (BIPIT) of a random pair (X, Y) with distribution H . It has been recognized that the distribution function K contains useful information about the dependence structure underlying H , including that K is related to the population value of Kendall's rank correlation coefficient. This communication, beyond, to present concepts about BIPIT and its distribution function K , also suggests a graph called Kendall Plot that can help detect the presence of dependence and the best fitted copula in a random sample from continuous bivariate distribution. This graph adapts the concept of probability plot to the detection dependence. It is based at computing an integrate that depends the K . The biggest challenge is computing integrate for specific functions K . Of particular interest is to test the fitting for independence and some Archmedean Copulas using pseudo-random observations with different dependence structure.

An approximate version of the Loeb-Komlós-Sós conjecture

Maya Stein
IME-USP

Abstract: Loeb, Komlós, and Sós conjectured that if at least half the vertices of a given graph G have degree at least some $k \in \mathbb{N}$, then G contains each tree with k edges as a subgraph. Using Szemerédi's regularity lemma, we can prove an approximate version of this conjecture for large graphs, if k is at least linear in $n = |V(G)|$. This is joint work with D. Piguet.

The Law of Large disordered numbers (large deviations for short recurrence)

Miguel Abadi
UNICAMP

Abstract: Over a psi-mixing process we consider the function $T(A)/n$ in the limit of large n , where $T(A)$ is the first overlap of a string of length n . Saussol et al. proved that this function is constant almost everywhere. We prove upper and lower general bounds for its large deviation function. Under mild assumptions we compute the large deviation function directly and show that the limit corresponds to the Rényi's entropy of the process. We finally compute the free energy function of $T(A)/n$. We illustrate our results with a few examples.

Universal compression using sparse markov chains

Nicolás Fraiman
Centro de Matemática, UdelaR

Abstract: TBA

Comparison of the V-box control chart opposite to the Shewhart 3-sigma chart, when a process is under control.

Olga Patricia Reyes Flórez
UFPE

Abstract: In this job a new control chart no-parametric is presented, its name is Vertical Box control chart. Dont exist formal test of the behavior of the chart, then, we propose a comparison with the Shewharts chart. Different scenarios were simulated of the different levels of the parameters were changed in the V-Box chart. The results were explored and a model was proposed to pronostic the ARL0 when a process is in control.

The different combinations from the parameters of the V-Box chart generate ARL0 variable what does to the unstable chart, of such form that the Shewharts chart has an advantage considering that in ARL0 terms the chart is stable.

The disk-percolation model on graphs

Pablo Martín Rodríguez
IME-USP

Abstract: We study a percolation model on an infinite graph G whose dynamics is described at follows. Assign independently to each vertex v of G a random radius of infection R_v with geometric distribution with parameter $(1 - p)$. At time zero, only a fixed vertex of G is declared infected and, at time $n > 0$, a vertex becomes infected if it is within distance R_v of some vertex v previously infected.

We consider the critical value of p above which this growing process continues indefinitely with positive probability. We obtain a sufficient condition on G for phase transition. In addition, we study the model on spherically symmetric trees and we prove that the critical parameter of the homogeneous tree of degree d behaves asymptotically as $1/2d$.

Autoregressive Hidden Markov Models to the Analysis of Ions Channels Activity

Paula Andrea Avello Fernández
Universidad de Valparaíso

Abstract: The goal of this work is to propose a Markov Chain with correlated noise to model single ion channel currents that have been recorded with the patch clamp technique from cell membranes.

Scaling limit for the Bouchaud trap model on the hypercube

Paulo Lima
IME-USP

Abstract: We derive results for the Bouchaud trap model in the hypercube at low temperature. This is a continuous-time simple symmetric random walk on hypercube that waits an exponential time with a random rate with distribution in the domain of attraction of a stable law of exponent $\alpha < 1$. The results arise to a scaling limit called K -process, roughly, a Markov process in a denumerable state space which enters finite sets with uniform distribution.

Harmonic Deformation of a Poissonian Delaunay Graph

Rafael de Mattos Grisi
IME-USP

Abstract: We present a harmonic deformation of a Delaunay triangulation of a Poisson point process in \mathbb{R}^2 . This deformation is given by a function $\phi(x, N)$ depending on the Poisson process N and on $x \in N$.

A test for directional uniformity: Applications to high-dimensional sphericity

Ricardo Fraiman
Universidad de San Andrés

Abstract: We consider the setup of directional data. We propose a new test of uniformity based on random projections. Applications to sphericity test for data in high dimensions are considered, where the usual tests (based on the determinant of the correlation matrix) does not work. Some real data examples are also considered.

Leading Pollicott-Ruelle Resonances and Transport in Area-Preserving Maps

Roberto Venegeroles
IF-USP

Abstract: The leading Pollicott-Ruelle resonance is calculated analytically for a general class of two-dimensional area-preserving maps. Its wavenumber dependence determines the normal transport coefficients. In particular, a general exact formula for the diffusion coefficient D is derived without any high stochasticity approximation and a new effect emerges: the angular evolution can induce fast or slow modes of diffusion even in the high stochasticity regime. The behavior of D is examined for three particular cases: 1) standard map; 2) sawtooth map; and 3) a third case of map with nonlinear rotation number. Numerical simulations support this formula.

Ruin probability with cash flow and investments governed by diffusion processes

Roger Silva
UFMG

Abstract: The problem of ruin has been largely investigated under different assumptions for the stochastic process modeling the reserves of an insurance company. In Norberg (1999), the author considers a risk business with investments of the reserves, so that the cash flow and the cumulative interest rate

are diffusion processes with coefficients depending on time and on the current cash balance. He obtains a partial (resp. ordinary) differential equation for the ruin probability in finite (resp. infinite) time. In this work we investigate the regime of validity for this approximation by comparing the numerical solution of the mentioned partial differential equation with the values obtained by simulation for the probability of ruin of a classical risk process with investments, for different kinds of claims distributions. We perform the same kind of comparison for the probability of ruin in infinite time. In this case the solutions are exact and a change of measure technique must be applied in order to perform the simulations, see Asmussen & Nielsen (1995).

Donsker type theorem for the Rosenblatt process

Soledad Torres
Universidad de Valparaiso

Abstract: We prove a Donsker type approximation theorem for the Rosenblatt process, which is a selfsimilar stochastic process exhibiting long range dependence. By using numerical results and simulated data, we show that this approximation performs very well. We use this result to construct a binary market model driven by this process and we show that the model admits arbitrage opportunities. Joint work wit Ciprian Tudor

Critical Percolation on Any nonamenable group has no infinite open clusters

Thais Sadala de Brito
UFMG

Abstract: We show that independent percolation on cayley graph of non-amenable group has no infinite components at the critical parameter. This result was obtained in Benjamini, Lyons, Peres and Schramm (1999) as a collorary of a general study of group-invariant percolation. The goal here is to present a simpler self-contained proof that easily extends to quasitransitive graphs whit a unimodular automorphism group. The key tool is mass-transport method, which is a technique of averaging in noamenable settings.

Short-time price oscillations as an intrinsic property of markets with interacting heterogeneous consumers

Vladimir Belitsky
IME-USP

Abstract: We suggest a stochastic process that models time evolution of an ensemble of consumers. The modeling of consumers' decisions in respect to whether to consume or not, and the social influence on individual consumptions employs the ideas of the Statistical Mechanics and the Interacting Particle System area of the Stochastic Processes. The particular features which combination makes our model be different of those created by similar modeling approaches, are: (1) there is a negative feedback of the demand on the consumed product price, and the price update increment is proportional to the demand for the product; (2) the idiosyncratic willingness to pay for the product of any consumer is a uniformly distributed random variable centered at the market value of the product. We show that short-time fluctuations of price and demand are present in this model for a wide range of model's parameter values. Our study suggests that such fluctuations are caused by two intrinsic and ultimate properties of the consumption in a society: the social interaction and the heterogeneity of individual preferences.