

Stochastic chains: Hitting, returning and long range dependence

Local: Sala de seminários DEs-UFSCar.

Horários: 9-12h et 14-17h

Palestrantes:

- Miguel Abadi (USP)
- Renato Gava (UFSCar)
- Rodrigo Lambert (UFU)
- Alejandra Rada (USP)
- Daniel Takahashi (Princeton)
- Edgardo Ugalde Saldanã (Universidade de San Luis Potosí)

Descrição:

This one-day thematic session is about stochastic chains, Markovian or not. The two main topics, hitting/returning time statistics and long range dependence. These topics at the intersection of probability theory, statistical physics and dynamical systems, and they are the subject of intense contemporary research, both theoretical and applied.

The hitting (*resp.* returning) time statistics of a stochastic process is the distribution (or approximated distribution) of the first time the process visits (*resp.* returns to) a state, or a sequence of states, or more generally, a part of its state space. A large body of the literature on the subject is concerned with identifying the proper scaling to a Poisson approximation, while other works try to identify the exact distribution.

Long range dependence means non-markovianess. It is of primary importance because several phenomenon, in statistical physics, finance, neuroscience, biology, computer science, etc... have been proved to exhibit non-Markovian dependence. On the other hand, long range stochastic chains are challenging models from a mathematical point of view and several basic questions are still being actively studied, notably related to existence and uniqueness of the measure, CLT, mixing properties and so on.

Below, we detail the contents of the talks of the thematic day, all related to the above described areas.

Programa:

09h00-09h50 Daniel Takahashi

10h00-10h30 Coffee Break

10h30-11h20 Edgardo Ugalde Saldanã

11h30-12h20 Renato Gava

12h30-14h00 Almoço

14h00-14h50 Alejandra Rada

15h00-15h50 Rodrigo Lambert

16h00-16h30 Coffee Break

16h30-17h20 Miguel Abadi

Títulos e resumos das palestras

- Daniel Takahashi

TBA

- Edgardo Ugalde Saldanã

Título: Projective Convergence of measures

Resumo: I will speak about a distance for processes, based on Hilbert's protective distance, which we recently introduced. I will explain how our distance compares to the *-weak distance and to Ornstein's d-bar distance. Among other things, we prove that our distance is strictly stronger than the *-weak distance, but it is not comparable with Ornstein's d-bar distance. We also prove that all g -measure is the limit, with respect to our distance, of its Markovian approximations and how the ergodicity and mixing the limiting g -measure is relate to the speed of convergence of the Markovian approximations. I will finish by formulating some problems we are currently working on. This is a work in collaboration with Liliana Trejo and is based on early works in collaboration with Leticia Ramirez and Jean-Rene Chazottes.

- Renato Gava

Título: A martingale approach to waiting time problems in i.i.d. and Markov trials.

Resumo: Consider a sequence of i.i.d. (or Markov dependent) trials where each trial produces a letter from a finite alphabet. Given a collection of words (patterns), we look at this sequence till the stopping time τ at which one of these patterns occurs as a run. The idea of the talk is to discuss the martingale approach introduced by Li (1980) and further developed by Pozdnyakov (2008). This technique allows us to compute the mean and the generating function of τ explicitly and the probability that a given pattern is the first one to occur.

- Rodrigo Lambert

Título: On the shortest path between two observables.

Resumo: We consider two discrete time stationary stochastic process over a finite or countable alphabet. For each pair of n -cylinders we define $T(2, n)$ as the minimum number of steps the process takes to go from one cylinder to another.

- For two independent ergodic processes with positive entropy we prove that $T(2, n)$ concentrates its mass for large values of n .
- For ψ - g regular processes we prove a large deviation principle.
- We also show that the fluctuations of the shortest path function converges (only) in law, when the two processes are Beta-mixing.

- Alejandra Rada

Título: First Return Time of the sequence under β -Mixing conditions.

Resumo: We consider the set of finite sequences of length n over a finite or countable alphabet χ . We consider the function defined over χ^n , $n - T_n$ where T_n is "the first return". Abadi and Lambert, computed the exact distribution and the limiting distribution of the $n - T_n$ when the sequence is generated by independent and identically distributed random variables.

The talk is about a generalization of the work done by Abadi and Lambert to processes that verify the β -Mixing condition and $\{X_n\}_{n \in \mathbb{N}}$ takes values over finite or countable alphabet.

- Miguel Abadi

Título: Hitting times in a leakage and fire model.

Resumo: We consider a family of discrete time absorbing stochastic process taking values on an uncountable space. The process suffers a leakage and fire effects along its evolution. We characterise the behaviour of the process, in particular we show that the system ceases activities, presenting a dynamical phase transition.