Dynamic Games and Stochastic Optimization II

Organizer: Héctor Jasso Fuentes, Centro de Investigacion y de Estudios Avanzados del Instituto Politécnico Nacional
hjasso@math.cinvestav.mx

The aim of this session is to give a general view on the state-of-the-art in the areas of stochastic dynamic optimization and dynamic games. In particular, it enables researchers, academics, and students to shape a general picture of novel results, models, and applications with a large social impact. This series of talks is part of the annual event organized by the Mexican School of Stochastic Control.

Zero-sum Markov games in systems of interacting objects

Adolfo Minjarez Sosa, Universidad de Sonora
aminjare@mat.uson.mx

We are concerned with discrete-time zero-sum Markov games in systems composed of a large number of N ($N \sim \infty $) interacting objects (agents or particles), whose behavior is controlled by two players. Each object evolves randomly among a finite set of classes according to a transition law. At each stage, once the configuration of the system is observed, the players, independently, select their decisions and player 1 receives a payoff from player 2. Due to the large number of objects, the game is studied according to the mean field theory, that is, instead of analyzing a single object we will focus on the proportion of objects occupying each class.

Modeling of systems using Itô's stochastic differential equations

Beatris Escobedo Trujillo, Universidad Veracruzana
bescobedo@uv.mx

This talk deals with the modeling of systems subject to random perturbations. The main objective is to compare the experimentally measured trajectories with the solutions of the ordinary differential equation and the stochastic differential equation (SDE) which model the systems analyzed with the purpose of verify if the SDEs capture the random perturbations and therefore, are more appropriate to describes the phenomena with random noise. To this end, the Itô's calculus is used and numerical simulations of the SDEs are done in MATLAB using the Euler-Maruyama method. As an application of the SDEs, an optimal investment problem is solved in analytic form by following the standard dynamic programming technique.

Multidimensional scaling in the sphere using simulated annealing

Mario Villalobos Arias, Universidad de Costa Rica
mario.cr@gmail.com

In Multidimensional scaling what we want to do is to try to obtain a good representation of some individuals that are represented as vectors in

$\mathbb{R}^n$, in a space of low dimension $\mathbb{R}^p$, $p = 2 o 3.$ In this work, we present the preliminary results of a version in which the representation is in the Sphere, which we could say is an intermediate between $\mathbb{R}^2$ or $\mathbb{R}^3.$ To obtain the optimal representation the simulation annealing optimization heuristic is used, which has shown that very good results are obtained, and even better than with traditional optimization methods, in many applications.

Recent results on Markov decision processes with average cost criterion

Oscar Vega Amaya, Universidad de Sonora
ovega@mat.uson.mx

We present some recent results on the average optimal control problem for systems with Borel spaces, unbounded costs and weakly continuous transition kernel. The optimal control problem is addressed following two approaches: the first one is the vanishing discount factor approach, and the second one is a fixed-point approach.