Conferencias Plenarias

Conferencia 1: Desafíos y oportunidades en IO desde problemas de recursos forestales

Conferencista: Andrés Weintraub Pohorille, Universidad de Chile.

Resumen

Desde varias décadas se ha usado con mucho éxito modelos de Investigación de Operaciones en problemas del área forestal. Estos problemas han ido desde planificación de largo plazo a programación de operaciones de cosecha y transporte, protección de medio ambiente y de vida silvestre.

Los enfoques más usados han sido modelos de PL y PL con variables 0-1, modelos estocásticos, simulación y métodos heurísticos. Un aspecto interesante ha sido la necesidad de desarrollo de modelos y algoritmos necesarios para enfrentar y poder resolver problemas reales. En esta charla se discute cuáles han sido estos desafíos, cómo se han resuelto y se enfatiza cuáles son problemas que aún están abiertos. Problemas que no han sido solucionados aún y pueden ser objeto de investigación.

Conferencia 2: Metaheuristics for the vehicle routing problem: Fifteen years of research

Conferencista: Gilbert Laporte, Canada Research Chair in Distribution Management, HEC Montreal, Canadá.

Abstract

Over the past fifteen years several powerful mastaheuristics have been developed for the Vehicle Routing Problem (VRP). The best methods are based on tabu search, variable neighbourhood search, genetic search and ant algorithms. Much progress has been accomplished since the publication of the first tabu search heuristic for the VRP in 1989. Several methods have been proposed, but not all have been equally successful. In this talk I will provide an overview of some of the best algorithmic ideas proposed over the past fifteen years, and I will also mention some ideas that did not work so well.

Conferencia3: Level packing in two dimensions

Conferencista: Silvano Martello, University of Bologna, Italy.

Abstract

Given a set of rectangular items, two-dimensional packing problems call for packing them, without overlapping, either into the minimum number of given identical rectangular containers (2-D Bin Packing) or into a strip of given width and minimum height (2-D Strip Packing). The variant of these problems where it is imposed that the items have to be packed by levels has both theoretical and practical interest.

We review classical results on level-based approximation algorithms and recent results on mathematical models, lower bounds, polynomial-time approximation schemes and metaheuristic approaches.

Conferencia 4: On the calculation of a feasible point of a non-convex set described by equality and inequality constraints with applications in global and multiobjective optimization.

Conferencista: Jurgen Guddat, Humboldt-Universitat Berlin, Germany.

Abstract

We consider the set $M=\{x\in R^n \mid h_i(x)=0, i\in I, g_j(x)\leq 0, j\in J, \|x-x^0\|^2 - p \leq 0\}$

where $I=\{1,\dots,m\}$, $J=\{1,\dots,s\}$, x^0 arbitrarily chosen and p sufficiently large (chosen by the user).

We assume $f, h_i, g_j \in C^3(R^n,R)$, $i\in I$, $j\in J$. The algorithm that finds a feasible point of M or gives the information that M is empty constructs a sequence of one-parametric optimization problems and is based on path-following methods and jumps. We show applications of this algorithm in global and multi-objective optimization.

Conferencia 5: Semi-infinite Programming and related Problems

Conferencista: Georg Still, University of Twente, Department of Mathematics, the Netherlands.

Abstract

A semi-infinite program (SIP) is an optimization problem in finitely many variables on a feasible set described by infinitely many constraints.

Such problems arise naturally in a large number of applications from approximation theory, robotics, mathematical physics, statistics and economics.

We intend to provide a tour d'horizon on this subject. In particular the following topics will be discussed:

• Connection between convex optimization and linear semi-infinite programming.
• Optimality conditions for SIP and related methods for the numerical solution of the problems.
• Applications of semi-infinite optimization.
• New developments in semi-infinite optimization and relations between SIP and Bilevel Programming and Mathematical Programs with Equilibrium Constraints.

Conferencia 6: Infinite dimensional economies. Historical survey and last results

Conferencista: Monique Florenzano, University Paris, France.

Abstract

The general equilibrium model for an economy with a finite number of consumers, a finite number of producers, and a finite number of commodities has been extensively studied for fifty years. Existence and optimality properties of equilibria have been stated under weaker and weaker assumptions. The model is general enough to accomodate several situations of economic life whose formulation goes beyond the initial standard model. To allow for a possibly infinite dimensional commodity space is one of these indispensable extensions, motivated by the application of results to intertemporal equilibrium, uncertainty, finance, problems of location or of differenciation of commodities, models of asset pricing. To deal with these different problems requires appropriate definitions of the commodity and price spaces and an appropriate equilibrium notion. We will present the different settings in which equilibrium existence theorems have been obtained, in relation with the economic problem they have contributed to solve.

Conferencia 7: "Some examples of Constraint Programming/Mathematical Programming Cooperative Schemes for Combinatorial Optimisation"

Conferencista: Philippe Michelon. Université d'Avignon, Avignon, France.

Abstract

Issued from Artificial Intelligence, Constraint Programming is now widely used for solving Combinatorial Optimisation Problems. Indeed, methods where "classical" Mathematical Programming and Constraint Programming techniques have been embedded are now numerous and address problems arising from very different fields such as Network Design, Scheduling, Timetabling, Vehicles Routing etc. The aim of this talk is to illustrate some of these cooperative schemes. We shall first recall some of the Constraint Programming features and illustrate how the modeling phase of a problem can be different in Constraint Programming and in Mathematical Programming. We shall then introduce several ways of combining advantages of both approaches.

Conferencia 8: Kuhn-Tucker Constraint Qualifications in Generalized Semi-Infinite Programming

Conferencista: Jan Rueckmann, Universidad de Las Américas, Puebla, México.

Abstract

We consider the class of nonlinear generalized semi-infinite programming problems (GSIP); semi-infinite means that the variables belong to a finite-dimensional Euclidean space and the feasible set is

basically defined by infinitely many inequality constraints which depend additionally on the set of decision variables and all involved functions are assumed to be continuously differentiable. A generalized semi-infinite programming problem is defined as follows:

(GSIP) minimize $f(x)$ $x \in M$ $M := \{x \in R^n \mid g(x,y) \leq 0, \forall y \in Y(x)\}$.

Obviously, each element of the set Y(x) represents an inequality constraint. Note that the difference to a (standard) semi-infinite programming problem is that in the standard case the set Y(x) does not depend on x.

Recently, the classes of semi-infinite and generalized semi-infinite programming problems have become very active research areas in applied mathematics. Several engineering problems lead to optimization models of this type; exemplarily, we refer to Chebyshev and reverse Chebyshev approximation problems, maneuverability of a robot, design and design centering problems, minimax problems, defect minimization for operator equations, robust optimization, optimal layout of an assembly line, wavelets and semidefinite programming.

We discuss various optimality conditions and constraint qualifications for (GSIP). In particular, we introduce extensions of the Kuhn-Tucker constraint qualification (which is based on the existence of a tangential continuously differentiable arc) to the class (GSIP) and prove a corresponding Karush-Kuhn-Tucker theorem. Furthermore, we present several examples which illustrate for (GSIP) some interrelations between the considered extensions of the Kuhn-Tucker constraint qualification, the Mangasarian-Fromovitz constraint qualification and the Abadie constraint qualification.