2 - Optimization of Services in Health Care Delivery: Study, Modelization and Minimization of Outpatients' Waiting Time at Hospital Eugenio Espejo

Sandra Gutierrez, Escuela Politecnica Nacional, Ladron De Guevara E11-253, Quito, 17-01-2759, Ecuador, sgutier@epn.edu.ec, Diego Recalde, Ana Guevara, Maria Rivadeneira

We present the case of Hospital Eugenio Espejo. Our goal is to improve the process of attention to outpatients, minimizing waiting times on all processes associated within a medical appointment. The analyses were done via simulation, optimization and statistical techniques. Our contribution is a model to describe the process of delivering medical care to outpatients at H.E.E. as well as policies to improve services applicable to other health care institutions.

3 - A New Approach for Healthcare Simulation

Francisco Ramis-Lanyon, Professor, Universidad del Bio-Bio, Av. Collao 1202, Concepcion, Chile, framis@ubiobio.cl, Liliana Neriz, Jose Sepulveda

This paper presents the advantage of using an object-oriented modeling approach versus the traditional process oriented approach of discrete-event simulation in order to decrease patient waiting time, improve patient flow, better utilize physicians, nurses, and other resources to satisfy the demand for healthcare services.

4 - System Dynamics Applied to Emergency Rooms

Rodolfo Medina Ramirez, Industrial Engineering Chair, Universidad Politecnica de Aguascalientes, Prol. Mahatma Ghandi Km. 2, Col. San Francisco del Arenal, Aguascalientes, 20280, Mexico, rodolfo.medina@upa.edu.mx, Jose Antonio Vázquez-Ibarra, Hector Alfonso Juarez-Lopez, Ricardo Armando Gonzalez-Silva

Ever-growing demand in emergency rooms requires effective strategies to deliver on time critical healthcare services. Modelling and simulating a public hospital emergency room helped to configure attention priorities in order to assure attention to real urgencies without dimishing quality of non-urgent patients care.

■ WA10

Aula 357- Third Floor

Graphs Theory, Algorithms and Applications V

Cluster: Graphs Theory, Algorithms and Applications
Invited Session

Chair: Eugen Mandrescu, PhD, Holon Institute of Technology, 52 Golomb Str., Holon, Israel, eugen_m@hit.ac.il

1 - The Nullity of Complete Product of Regular Graph

Domingo Quiroz, Professor, Universidad Simón Bolívar, Valle de Sartenejas, Baruta, Caracas, DC, 89000, Venezuela, dquiroz@usb.ve, Teresa Tesoro

The nullity of a graph is defined to be the multiplicity of the eigenvalue zero in the spectrum of the adjacency matrix of the graph. We obtain the nullity of the complete product of two regular graphs knowing the nullity of each factor, this result allows us to determine the nullity of several families of graphs.

2 - On the Number of Barycentric Ramsey

Felicia Villarroel, Professor, Universidad de Oriente, Avda. Universidad. Dpto Matemáticas, Cumaná, 6101, Venezuela, feliciavillarroel@gmail.com

One will settle down a method for the calculation of the exact values of the number of barycentric Ramsey for a abelian group of order n greater than or equal to 2, and a graph with k sides; using the theorem of Harary and combinatory theory.

3 - The Independence Polynomial of Antiregular Graphs

Eugen Mandrescu, PhD, Holon Institute of Technology, 52 Golomb Str., Holon, Israel, eugen_m@hit.ac.il, Vadim Levit

A graph with at most two vertices of the same degree is called antiregular (Merris 2003), maximally nonregular (Zykov 1990) or quasiperfect (Behzad, Chartrand 1967). A generating function whose k-th coefficient equals the number of independent sets of size k in a graph is known as its independence polynomial (Gutman, Harary 1983). We derive closed formulae for independence polynomials of antiregular graphs and deduce that these graphs are uniquely defined by their independence polynomials.

■ WA11

Aula 362- Third Floor

Optimization

Contributed Session

Chair: Ivan Derpich, Universidad de Santiago de Chile, Volcan Lanin 205 Las Condes, Avda Ecuador 3769 Estacion Central, Santiago, Chile, ivan.derpich@usach.cl

1 - On the Existence of Solution to an Optimization Problem

Fernando Garagorry, Senior Researcher, Embrapa, CP 02294, Brasilia, DF, 70343-970, Brazil, fernando.garagorry@embrapa.br

An abstract formulation of an optimization problem is proposed. This includes classical mathematical programming problems, as well as multi-objective optimization and several solution concepts in game theory. A necessary and sufficient condition for the existence of a solution to that problem is presented.

2 - Dual Optimization Problems in Max-algebra

Karel Zimmermann, Professor, Charles University in Prague, MFF UK, Malostranske nam. 25, Prague, 11800, Czech Republic, karel.zimmermann@mff.cuni.cz, Martin Gavalec

Dual pairs of linear optimization problems in (max, .)-algebra are studied and similar properties as in the classical dual linear programming problems are proved. It is shown that a dual pair of problems posseses both weak and strong duality properties. Modifications to further problems, which are linear with respect to other pairs of operations, such as (max, +), (min, .), (min, +), are described. A unifying framework for dual pairs of linear problems in max-algebra is proposed.

3 - A New Approach for Global Optimization of MINLP Problems

Miguel Bagajewicz, Professor, University of Oklahoma, 100 E. Boyd St., T335, Norman, OK, 73019, United States of America, bagajewicz@ou.edu, Débora Faria

We first present three novel bound contraction (not branch and bound) methods for global optimization (GO) of problems that contain bilinear terms (extendable to rational problems). Next, the method is extended to deal with complex nonconvex algebraic and non-algebraic terms. Our three bound contraction procedures rely on discretization, continuous bounding, and subspace elimination. We show applications to industrially relevant problems (water allocation, pooling and generalized pooling).

4 - A New Algorithm for LP Based in Interior Augmented Directions

Ivan Derpich, Universidad de Santiago de Chile, Volcan Lanin 205 Las Condes, Avda Ecuador 3769 Estacion Central, Santiago, Chile, ivan.derpich@usach.cl, Jose Grandon, Fernando Paredes

The algorithm needs a feasible point over some of the constraint. First we find a direction belonging to the resection cone of the constraints that are actives in the before point. When the point is not an extreme point of the polyhedron we add a new constraint of the form where is the value of the objective function in the available point. Then we project this direction until stop in the first hyperplane and then repeat the same procedure.

■ WA12

Aula 363- Third Floor

Topics in Supply Chain Management

Cluster: Supply Chain Management
Invited Session

Chair: Mumin Kurtulus, Assistant Professor, Vanderbilt University, 401 21st Avenue South, Nashville, TN, 37203, United States of America, mumin.kurtulus@owen.vanderbilt.edu

1 - Optimization of the Forest and Bio Energy Supply Chain in Sweden

Peter Lohmander, Professor Doctor, SUAS, University Campus, Umea, SE-90187, Sweden, Peter@Lohmander.com

The joint supply chain of the forest and energy industries in Sweden is investigated. The complete chain is optimized in order to maximize the total expected present value over a 50 year horizon. A multi period quadratic programming model solves the complete problem in a few seconds and sensitivity analysis is rapidly performed. Adaptive decisions may be included in the supply chain optimization model. The earlier and later decisions are affected by future price risk in the product markets.