ABSTRACTS

1. Prof. Qamrul Hasan Ansari

(i) VECTOR EQUILIBRIUM PROBLEMS

In this talk, we present the mathematical theory of vector equilibrium problems. The main focus is given on the existence theory for solutions of different kinds of vector equilibrium problems.

2. Prof. Fabian Flores Bazan

(i) A GENERAL CLASS OF VECTOR FUNCTIONS WITH APPLICATIONS IN VECTOR OPTIMIZATION

(ii) GORDAN-TYPE ALTERNATIVE THEOREMS WITH APPLICATIONS IN MATHEMATICAL PROGRAMMING

Several notions of generalized convexity for vector functions would be introduced and then their usefulness in vector optimization would be discussed.

3. Prof. Davinder Bhatia

(i) OPTIMAL CONTROL THEORY-I

(ii) OPTIMAL CONTROL THEORY-II

Optimization problems studied in Mathematical Programming are usually static in the sense that time does not enter into consideration. However, in many practical applications of mathematical programming, it has been found that time is a factor that cannot be ignored. Thus, it is becomes imperative to study the theory that involves optimization over an interval of time, viz. 'Control Theory'.

In this presentation, we focus on the counterparts of some useful static aspects of mathematical programming in the continuous case. The presentation is organised as follows. A general control problem is formulated and some basic concepts in control theory are introduced. Various types of necessary conditions for the existence of solution to the control problem with constraints which appear in the form of an integral as well as for the control problem in which constraints are not in the form of an integral are discussed. Lagrangian function is introduced. Necessary and sufficient conditions are presented. A multiobjective control problem is introduced and two types of duals for the same are presented. As an application of the above results, a method to solve a constrained dynamic game problem is presented.

4. Prof. Nirupam Chakraborti

(i) MULTI-OBJECTIVE PREDATOR-PREY ALGORITHM AND EVOLUTIONARY NEURAL NETWORK

A genetic algorithms based multi-objective optimization technique was utilized in the training process of a feed forward neural network, using noisy data from an industrial iron blast furnace. The number of nodes in the hidden layer, the architecture of the lower part of the network, as well as the weights used in them were kept as variables, and a Pareto front was effectively constructed by minimizing the training error along with the network size. A Predator-prey algorithm efficiently performed the optimization task and several important trends were observed.

(ii) COUPLING DATA MINING AND MULTI-OBJECTIVE EVOLUTIONARY NEURAL NETWORK

Available data for a large number of ABB_{2B} compounds were subjected to a rigorous study using a combination of Principal component analysis technique, Multi-objective genetic algorithms and Neural networks that evolved through Genetic algorithms. The identification of various phases and phase-groups were very successfully done using a decision tree approach. Since in this case the variable hyperspaces for the different phases were highly intersecting in nature, a cumulative probability index was defined for the formation of individual compounds, which was maximized along with Pauling's electronegativity difference. The resulting Pareto-frontiers provided further insight into the nature of bonding prevailing in these compounds.

5. Prof. Suresh Chandra

(i) PORTFOLIO OPTIMIZATION

(ii) OPTIMAL TRADING STRATEGIES

6. Dr. Joydeep Dutta

(i) OPTIMALITY CONDITIONS FOR CONVEX OPTIMIZATION-I

(ii) OPTIMALITY CONDITIONS FOR CONVEX OPTIMIZATION-I

In this survey we begin by describing some important types of convex optimization problem which includes, linear programming, conic programming, semidefinite programming, semi-infinite ions and robust convex programming. Then we describe the important tools needed to study optimality and duality in convex optimization with an emphasis on the conjugate and the subdifferential of a convex function. Then we describe various optimality conditions which include the very first ones to the very recent developments in optimality conditions for a convex optimization problem. We also study the optimality conditions for the special problems like conic programming, semidefinite programming, semi-infinite convex programming and robust convex optimization.

7. Prof. Sat Gupta

(i) OPTIMIZATION IN STATISTICAL ESTIMATION THEORY WITH A FOCUS ON SAMPLING METHODS

In many statistical estimation problems, one has to optimize the likelihood function with respect to many parameters. In regression analysis, the number of these parameters can run into hundreds depending on the number of predictors. The nature of the response surface can further complicate the optimization process. In this talk we will discuss various situations of this type but will focus on the optimization problem as it relates to ***Randomized Response Techniques* (RRT)**, an important data acquisition technique in survey sampling when the researcher wants to collect data on highly sensitive questions such as tax evasion, drug use, or child abuse. A variation of the RRT models is the ***Two-Stage Optional RRT Model*** where the researcher has to decide on the proportion (***T***) of subjects who should be asked to provide a truthful response in Stage 1. One might think that higher the value of ***T***, better it will be. However, this is not so in ***Two-Stage Optional RRT Models.*** We will note that the optimum value of ***T*** depends on the sensitivity level of the survey question.

The focus of this talk will be on optimization issues related with these models. We will examine how the optimality of the sample size and of ***T*** affects the estimation variance of the main parameters of a ***Two-Stage Optional RRT Model.***

8. Prof. Nicolas Hadjisavvas

(i) TOPICS ON GENERALIZED MONOTONICITY-I

(ii) TOPICS ON GENERALIZED MONOTONICITY-II

An elementary theorem in first year Calculus says that a differentiable real-valued function defined on an interval is convex, if and only if its derivative is increasing.

In these two talks we will see how this result can be generalized: “Convex” will be replaced by “generalized convex”, “increasing” will become “generalized monotone”, and the derivative will be replaced by a (generalized) subdifferential. We will provide all necessary definitions and present a selection of results, from older to very recent ones. We will also present some other topics, such as the application of generalized monotone operators to a specific kind of algorithm for solving variational inequalities (namely, the cutting plane method) where in fact we will find exactly the class of operators that fits the algorithm. Also, we will present the generalization of the notion of maximal monotone operator to pseudomonotone operators, and some of its consequences.

9. Prof. Hang-Chin Lai

(i) ON MINIMAX PROGRAMMING: REAL VARIABLE AND COMPLEX VARIABLE OBJECTIVE PROGRAMMING PROBLEMS

We introduce the minimax theorems and minimax programming for both real valued and complex functions. Then we will discuss some properties and dual problems of fractional and nonfractional programming problems.

(ii) ON MINIMAX PROGRAMMING: SET VARIABLE OBJECTIVE PROGRAMMING PROBLEMS

Here we consider a finite atomless measure space (X,A,μ) with $L_1(X,A,\mu)$ separable, and the objective function is defined on A. Then we will introduce some interesting ideas of optimization for set functions.

10. Prof. G. M. Lee

(i) ε-OPTIMALITY CONDITIONS FOR CONVEX SET-VALUED OPTIMIZATION PROBLEMS

Recently, there have been intensive researches for set-valued optimization problems which consists of set-valued maps and sets. To get optimality conditions for solutions of set-valued optimization problems, we need generalized derivatives (epiderivatives) for set-valued maps and so, most of researchers have used contingent derivatives (epiderivatives) which are defined by contigent cones. From computational view, most of algorithms give us ε-solutions (approximate solutions) of optimization problems. Thus many researchers have studied optimality conditions for ε-solutions for scalar optimization problems and vector optimization problems. However, there are very little results for optimality conditions for ε-solution (approximate solution) of set-valued optimization problems. Moreover, it seems that contigent derivatives (epiderivatives) are not suitable for getting optimality conditions for ε-solutions of set-valued optimization problems.

The purpose of this talk is to define ε-subgradients for set-valued maps with the radial epiderivative and to establish optimality conditions for ε-solutions of convex set-valued optimization. In this talk, ε-subgradients for convex set-valued maps are defined. We prove an existence theorem for ε-subgradients of convex set-valued maps. Also, we give necessary ε-optimality conditions for an ε-solution of a convex set-valued optimization problem (CSP). Moreover, using the single-valued function induced from the set-valued map, we obtain theorems decribing the ε-subgradient sum formula for two convex set-valued maps, and then give necessary and sufficient ε-optimality conditions for the problem (CSP).

Most of results in this talk come from the paper ”On ε-Optimality Conditions for Convex Set-Valued Optimization Problems” written by Gue Myung Lee and Le Anh Tuan and published in Taiwanese Journal of Mathematics (Vol. 13, No. 6A, pp. 1787-1810).

11. Prof. Lai-Jiu Lin

(i) VARIATIONAL RELATION PROBLEMS WITH APPLICATIONS

In this paper, variational relational problems are studied. From the existence theorems of these types of problems, we study some existence theorems of variational inclusion problems, equilibrium problems, Nash equilibrium problem,f ixed point theorems, Ekeland's variational principle and differential inclusion problems.

(ii) KKM THEORY AND FIXED POINT THEORY WITH APPLICATIONS ON OPTIMIZATION

In this talk, we will introduce KKM theorem, maximal element theorem, Fixed point theorems, stational point theorem. We give some of their applications in equilibrium problems, variational inclusion problem, variational relational problems and Ekeland's variational principle.

12. Prof. Dinh The Luc

(i) DUALITY IN LINEAR PROGRAMMING: SCALAR AND VECTOR PROBLEMS

Extension of duality from scalar programming to vector programming is one of the most challenging issues of vector optimization. A number of properties of the scalar duality are no long true for the vector one. In this lecture we study a general scheme of dual construction for vector problems and its links with other dualities widely used in the today literature. Open questions on this topic are discussed.

(ii) SECOND-ORDER OPTIMALITY CONDITIONS FOR NONSMOOTH PROBLEMS

The aim is to show how to apply a nonsmooth subdifferential technique to obtain second-order optimality conditions when the data of an optimization problem are not smooth. This technique is illustrated via the so-called pseudo-Jacobian of vector functions, but it remains true for any subdifferential that satisfies certain properties.

13. Prof. Juan Enrique Martinez-Legaz

(i) ABSTRACT CONVEX ANALYSIS AND ITS ECONOMIC APPLICATIONS-I

(ii) ABSTRACT CONVEX ANALYSIS AND ITS ECONOMIC APPLICATIONS-II

This article presents an approach to generalized convex duality theory based on Fenchel-Moreau conjugations; in particular, it discusses quasiconvex conjugation and duality in detail. It also describes the related topic of microeconomics duality and analyzes the monotonicity of demand functions.

14. Dr. Aparna Mehra

(i) MODELING UNCERTAINTY IN OPTIMIZATION PROBLEMS

The fuzzy set theory offers opportunity to model subjective imaginations of decision maker as precisely as described by decision maker thereby allowing an adequate mapping of real problems. But the classical fuzzy sets are not the only means to model linguistic uncertainties in problems. Recent years have witnessed emergence of new structures within the framework of fuzzy theory to handle the intricacies of imprecision. Among them, the intuitionistic fuzzy sets and the type-2 fuzzy sets hold promising future. Through this article we aim to share some issues related to modeling two kinds of uncertainties using type-1 fuzzy sets and type-2 fuzzy sets.

15. Dr. Shashi Kant Mishra

(i) GENERALIZED CONVEXITY AND OPTIMIZATION

In this talk, the focus is on convex functions and its generalizations. Some important properties of generalized convex functions are given. The role of generalized convex functions in nonlinear programming is shown. Finally, some applications in economics are given.

16. Prof. Nguyen Dong Yen

(i) PARAMETRIC OPTIMIZATION PROBLEMS AND PARAMETRIC VARIATIONAL INEQUALITIES-I

(ii) PARAMETRIC OPTIMIZATION PROBLEMS AND PARAMETRIC VARIATIONAL INEQUALITIES-II

This two-part talk describes some aspects of the author's and his coauthors' research on optimization problems and variational inequalities during the last 18 years (1992-2009). The focus point is made on parametric problems and qualitative results (stability, sensitivity of the solution set and the alike objects when the problem undergoes small perturbations).