

## Tutorial No. 2 (INDICON 2008)

# Convex Optimization and Its Applications

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**Duration:** Half day (9:30 AM to 1:00 PM), 11 Dec 2008

**Venue:** L13

### Abstract

In recent years, convex optimization techniques are being used to solve many computational problems efficiently in Science and Engineering. The goal of this tutorial is to give an overview of the basic concepts of convex sets, convex functions and an introduction to convex optimization problems in different disciplines of Science and Engineering. An outline of two basic methods of solving optimization problems, viz. (1) the ellipsoid method and (2) the interior point method will be given. The formulation of convex optimization problems as Linear Matrix inequalities in Systems and Control will be highlighted using MATLAB as a solution kit. Mathematical formulations of convex optimization problems appearing in two important areas of Computer Science in Machine Learning and Software Verification are provided as an illustration of the power of this approach.



**Prof. Kanti B Datta**

### Biography of Prof. Kanti B Datta

Prof. Kanti Bhushan Datta was awarded M.Tech. degree with specialization in Electrical Machines and Power Systems, and Ph.D. and D.Sc. degrees with specialization in Control Systems in 1963, 1972 and 1999 respectively by Calcutta University. He served the D.V.C. as an Assistant Electrical Engineer for about two years (1964-1965), the Department of Applied Physics for seventeen years (1965-1982) as a Lecturer and then as a Reader, and Department of Electrical Engineering, IIT, Kharagpur for nineteen years (1982-2001) as a C.S.I.R. Pool Officer, Assistant Professor and finally as a Professor. As a Visiting Research Fellow, Prof. Datta visited the Department of Applied Mathematics, Comenius University, Bratislava, Slovakia (1975-1976) and Eindhoven University of Technology, Department of Mathematics and Computing Sciences, Holland, (1979-1980). During 1980-1982, he served the Institute of Control Engineering, National Chiao Tung University, Hsinchu, Taiwan, as a Visiting Expert. Prof. Datta was a Visiting

Professor in Northern Illinois University, Department of Mathematics (2001-2002) and an Affiliate Professor in Washington University in St. Louis, System Science and Mathematics (2002-2004).

Prof. Datta was a Recipient of 1974 S. K. Mitra Memorial Award- the highest award by the Institution of Electronics and Telecom. Engineers, India; 1974 Ma Kali Sahay Overseas Fellowship by the Calcutta University for higher studies in Slovakia and 10th Kharazmi International Award by Iranian Organization of Science and Technology, Iran, 1997. He is a Senior Member of IEEE (NY), a Life Fellow of Institution of Engineers (India) and Institution of Electronics and Telecommunication Engineers(India), a Life Member of Systems Society of India, a Member of American Mathematical Society and a Fellow of Indian National Academy of Engineering. He was a nominator of Japan Prize during 1988-2001. Prof. Datta served as a Honorary Editor of Journal of Institution Electronics and Telecommunication Engineers (India) and of PARITANTRA, a Journal of Systems Society of India.

### **Biography of Dr. Dibyendu Baksi**

Dibyendu received his BE degree in Electrical Engineering in 1985 followed by ME in 1987 specializing in Control Systems from Jadavpur University, Calcutta. After working in the software industry for a few years, he subsequently received his PhD in Electrical Engineering for a dissertation on decentralized control from Indian Institute of Technology, Kharagpur in 1995. He then worked as a Scientist with the Control Systems Division of Indian Space Research Organization in Bangalore, India. Since then, he has worked in the software industry as a Software Engineer, Team Lead, Architect and Senior Architect for a number of companies starting with Siemens Information Systems Limited, Philips Software Center, Sun Microsystems and Scientific Technologies in India and USA. His main area of practical expertise is in architecting, designing and managing enterprise class large scale software systems and their development. He has been a main Architect for some of the critical large scale medical informatics projects for the federal government in USA. Currently, he is with Emergint Technologies in Atlanta, GA, USA leading their efforts in engineering vertical messaging solutions for the healthcare industry. His research interests are in the areas of formal software verification and applied numerical optimization. He is a frequent speaker at medical informatics and software architecture conferences and has some recent publications in refereed international journals in formal verification.