TRADITIONAL AND NON-TRADITIONAL OPTIMIZATION TOOLS

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TYPE OF COURSE : Rerun | Elective | UG/PG
COURSE DURATION : 8 Weeks (24 Jan' 22 - 18 Mar' 22)
EXAM DATE : 27 Mar 2022

INTENDED AUDIENCE : Students belonging to all disciplines of Engineering and Science and practicing Engineers can take this course

INDUSTRIES APPLICABLE TO : RDCIS, Ranchi CMERI, Durgapur, and others

COURSE OUTLINE :

At the beginning of this course, a brief introduction will be given to optimization. The principle of optimization will be explained in detail. The working principles of some traditional tools of optimization, namely exhaustive search method, random walk method, steepest descent method will be discussed with suitable numerical examples. The drawbacks of traditional tools for optimization will be stated.

ABOUT INSTRUCTOR :

Prof. Dilip Kumar Pratihar received BE (Hons.) and M. Tech. from REC (NIT) Durgapur, India, in 1988 and 1994, respectively. I obtained my Ph.D. from IIT Kanpur, India, in 2000. I received University Gold Medal, A.M. Das Memorial Medal, Institution of Engineers' (I) Medal, and others. I completed my post-doctoral studies in Japan and then, in Germany under the Alexander von Humboldt Fellowship Programme. I received Shastri Fellowship (Indo-Canadian) in 2019 and INSA Teachers' Award 2020. I am working now as a Professor (HAG scale) of IIT Kharagpur, India. My research areas include robotics, soft computing and manufacturing science. I have published more than 275 papers and book-chapters. I have written the textbooks on "Soft Computing" and "Fundamentals of Robotics", co-authored another textbook on "Analytical Engineering Mechanics", edited a book on "Intelligent and Autonomous Systems", co-authored reference books on "Modeling and Analysis of Six- legged Robots"; "Modeling and Simulations of Robotic Systems Using Soft Computing"; "Modeling and Analysis of Laser Metal Forming Processes by Finite Element and Soft Computing Methods" and "Multibody Dynamic Modeling of Multi-legged Robots". My textbook on "Soft Computing" had been translated into Chinese language in 2009. I have guided 22 Ph.D.s. I am in editorial board of 10 International Journals. I have been elected as FIE, MASME and SMIEEE. I have completed a few sponsored (funded by DST, DAE, MHRD) and consultancy projects. I have filed two patents.

COURSE PLAN :

Week 1: Principle of Optimization; Traditional Methods of Optimization; Binary-Coded Genetic Algorithm (BCGA)

Week 2: Binary-Coded Genetic Algorithm (BCGA) (contd.); Schema Theorem of BCGA; Constraints Handling; Real-Coded GA

Week 3: Faster Genetic Algorithms; Scheduling GA

Week 4: Scheduling GA (contd.); Simulated Annealing; Particle Swarm Optimization

Week 5: Multi-Objective Optimization; Intelligent Optimization Tool

Week 6: A Practical Optimization Problem solved using different Traditional and Non-Traditional Optimization Tools

Week 7: Solutions of a Practical Optimization Problem (contd.); Genetic Algorithm as Evolution Tool

Week 8: Genetic Algorithm as Evolution Tool (contd.); Summary of the Course