Kanpur Genetic Algorithms Laboratory (KanGAL) Announces

A Short Course on

Genetic Algorithms for Engineering Optimization



Mechanical Engineering Department

Indian Institute of Technology Kanpur

20–22 JULY, 2005

Coordinator: Prof. Kalyanmoy Deb

http://www.iitk.ac.in/kangal/course

Genetic Algorithms for Engineering Optimization

INDIAN INSTITUTE OF TECHNOLOGY KANPUR

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Objectives

Genetic algorithms (popularly known as GAs) have now gained immense popularity in real-world engineering search and optimization problems all over the world. Due to globalization of our economy, Indian industries are now facing design challenges not only from their national counterparts but also from the international market. To survive in the steep competition, they can no longer afford to adopt just any feasible solution obtained usually by trial-and-error means, they have to choose an *optimal* solution which is best (from cost, performance, safety, etc.) compared to any other solution.

Genetic algorithms are computerized search and optimization methods that work very similar to the principles of natural evolution. Based on Darwin's survival-of-the-fittest principles, GA's intelligent search procedure finds the best and fittest design solutions, which are otherwise difficult to find using other techniques. GAs are attractive in engineering design and applications because they are easy to use and they are likely to find the *globally* best design or solution, which is superior to any other design or solution. Some of the GA applications include mechanical component design, structure design, process design, planning, job shop scheduling, VLSI design, control systems, electrical power systems, pattern recognition, classification problems, protein folding, neural network design, operations research, and machine learning. GAs are also suitable for multi-objective optimal design problems, involving multiple objectives.

This short course is designed to introduce a number of popular optimization methods used in design, emphasize the importance of optimization in engineering activities, introduce the working principles of GAs, present GA applications/case studies from a wide variety of engineering problems. Adequate hands-on exposure on computer simulations and relevant softwares (PC-based) will be

participants can use GAs in their day-to-day activities.

This course is offered once every year at IIT Kanpur and is one of its kind in India. All instructors are world-renowned experts in the area actively doing consultancy studies with Indian industries in the area. Participants will learn the state-of-the-art GA techniques and will have an opportunity to have an hands-on experience computer softwares.

Who shall Attend?

Anyone interested in using optimization techniques in their day-to-day engineering problem solving activities.

Topics

- Introduction to Optimal Design
- Need of Optimization in Design
- Optimization Methods
- Genetic Algorithms
- Advanced GA Techniques (multi-objective optimization, scheduling, global optimization)
- Engineering and Management Case Studies using GAs
- Tutorials/Laboratory Exercises

A book, relevant papers, and softwares will be provided to each participant for a better understanding and future reference to most of the above topics. Adequate time will be spent to discuss solution procedure of specific problems of interests to the participants. In the past, such discussions led to development of very efficient and useful solution techniques and softwares.

Coordinator

Prof. Kalyanmoy Deb has been working on GAs for last *16* years and has worked with pioneers in the field in Europe and USA. Prof. Deb is primarily responsible for introducing GAs in Indian academia and industries. He is an author of two text-books on optimization (Wiley: London and Prentice-Hall: Delhi). He has written over 130 book chapters and articles on GAs. He is associate editors of all three journals in the field and editorial board member of Engineering Optimization journal. He is also actively engaged in working with industries in India and abroad (such as STMicroelectronics, Italy and Metso Paper Company, Finland). Prof. Deb and other renowned faculty members at IIT Kanpur will be the instructors for the course.

Persons interested in attending the course should fill the attached registration form and send it with a cheque or draft worth Rs. 8,000/- (Rs. 6,000/- for academic participants and Rs. 4,000/- for students with a limited number of seats with a valid identity card) in favour of Coordinator, Continuing Education Program, IIT Kanpur, payable at the State Bank of India, IIT Kanpur to the following address before 6 July, 2005[1]:

Kalyanmoy Deb
Kanpur Genetic Algorithms Laboratory
Department of Mechanical Engineering
Indian Institute of Technology
Kanpur, PIN 208016, U.P.
Voice: (0512) 2597205 (O), 2598310 (H)
Fax: (0512) 2597408, 2590007
Email: deb@iitk.ac.in

A limited number of rooms are available in IIT guest house on a first-cum-first-serve basis. A number of hotels are also available in the city. The registration fee includes course materials, GA softwares, computer/library facilities, and refreshments.

For more information, please visit our web site
`http://www.iitk.ac.in/kangal/course`

Way to IIT Kanpur

IIT Kanpur is located north of Kanpur Central Railway Station at about 16KM away at the side of Delhi-Calcutta GT Road. Taxi (Rs. 150) and auto (Rs. 70) services are available from the railway station on hire. Nearest airports are in Lucknow (120 KM) and Delhi (440 KM).

Kanpur GA Laboratory (KanGAL)

After being established in 1997, KanGAL has provided a platform for doing research in Genetic Algoithms in India. Having trained more than 150 participants from industries/academia in India over past 10 years, KanGAL has state-of-the-art GA techniques for engineering optimization for single and multiple objectives. For more information about KanGAL activities and its industrial research, please visit http://www.iitk.ac.in/kangal/pub.htm.

[1] A pre-registration can be made by contacting Prof. Deb at the address above

Registration Form

Genetic Algorithms for Engineering Optimization

Indian Institute of Technology, Kanpur

20–22 July, 2005

Name: .....

Designation: .....

Address: .....

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Phone: .....

Fax: .....

Accommodation Desired: Yes/No

Cheque Number: .....

Bank: .....

Send this form and the cheque/Bank draft worth Rs 8,000/- (Rs. 6,000/- for academic participants, Rs. 4,000/- for students) payable to **Coordinator, Continuing Education Program, IIT Kanpur** at State Bank of India, IIT Kanpur to Kalyanmoy Deb, Department of Mechanical Engineering, Indian Institute of Technology, Kanpur, UP 208016 before 6 July, 2005.

Many institutes use Prof. Deb's book on optimization.
Know Genetic Algorithms – a nature-inspired procedure
from Prof. Deb himself in 3-days. Do not miss this once-a-year opportunity.

Please mail this form to the following address

Kalyanmoy Deb, deb@iitk.ac.in
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