CS 789.001 Genetic Algorithms and Neural Networks
University of Nevada, Las Vegas
Spring 09, call#05936
TR 4:00 - 5:15 pm, BEH 107

Course Objective Evolutionary computing has been used in engineering, particularly in optimization, to solve computationally hard problems. With experience, genetic algorithms can be applied as a general purpose method across disciplines.
The course introduces the concept of genetic algorithms, shows how and why these algorithms work, and discussed some of the recent software tools such as MIT's GALib.
The course proceeds to include other adaptive methods, such as simulated annealing, tabu search, and neural networks, especially as they relate to genetic algorithms.

Professor
Dr. Wolfgang W. Bein
Phone: (702) 895-1477
Internet: bein@cs.unlv.edu, http://www.cs.unlv.edu/∼bein/
Office: TBE B 372 E
Office Hours: Tuesday 2:30 pm - 4:00 pm, Wednesday 4:00 pm - 7:00 pm, Thursday 2:30 pm - 4:00 pm.

Course Page
http://www.cs.unlv.edu/∼bein/teaching/adaptive/

Textbooks
Mitchell, An Introduction to Genetic Algorithms, MIT Press, 1998, ISBN 0-262-63185-7 Goldberg, Genetic Algorithms, Addison Wesley, 1989, ISBN 0-201-15767-5.

Examinations and Assignments

Assignments : Written home work assignments and programming projects under C++ using gcc and GALib. (count for 40% of the grade).

Quiz : Tuesday, February 10, 4:00 pm; (counts for 10% of the grade).

Midterm 1 : Thursday, Tuesday March 10 4:00 pm; (counts for 15% of the grade).

Midterm 2 Thursday, April 2, 4:00 am; (counts for 15% of the grade).

Final Exam (cumulative, covers all material) : Tuesday, May 5, 6:00 am (counts for 20% of the grade) (cumulative, covers all material).

There are no make-up tests.

Topics

1. An Overview of Combinatorial Optimization
2. An Introduction to Genetic Algorithms
3. Theoretical Foundations of Genetic Algorithms
4. Genetic Algorithms in Engineering and Optimization
5. Genetic Algorithms in Natural Evolution
6. Simulated Annealing and Tabu Search
7. Artificial Neural Networks
8. Evolving Neural Networks
9. Implementing Genetic Algorithms:

   GALib

   (optional) Genetic Algorithm Optimization Toolbox (GAOT) under Matlab.

Other Reading

Aarts (Editor), Lenstra (Editor), Local Search in Combinatorial Optimization, Wiley-Interscience Series in Discrete Mathematics and Optimization. John Wiley & Sons, 1997

Flake, The Computational Beauty of Nature, MIT Press, 1998.

Golden, Mathematical Methids for Neural Network Analysis and Design. MIT Press, 1996

von Neumann, The Computer and the Brain. Yale University Press, 1958