

CSCI/ENGR-8940: Computational Intelligence

(Some Programming Required)

Description (GA/PSO/NN/FL: Heuristic Search and Decision Making)

Genetic Algorithms are heuristic search routines that are guided by a model of Darwin's theory of natural selection or the survival of the fittest. The basic idea behind the genetic search strategy is to generate solutions that converge on the global maximum (i.e., the best solution in the search space) regardless of the "terrain" of the search space. Particle Swarm Optimization incorporates a swarm of "particles" that "fly" through the search space toward the optimal. Artificial Neural Networks simulate decision making based on a structural model of the brain including neurons and their connections. Typically, training occurs in order to allow the neural network to derive correct solutions when given unseen data. Fuzzy Logic expands on the notion of crisp set membership to aid approximate decision making.

Instructor: Don Potter

Office: GSRC-113 (enter through 111)

Phone: 542-0361

Hours: By Appointment, Drop In, or _____

Notes: If you stop-by or call and I'm NOT available, then be sure to leave a note (I'll be glad to email/call you back).

Text

Computational Intelligence - Concepts to Implementations by Eberhart & Shi

References (typical GA & NN related texts):

- 1) *Handbook of Genetic Algorithms*
by Davis
- 2) *Neural Networks for Statistical Modeling*
by Smith
- 3) *Genetic Algorithms in Search, Optimization, and Machine Learning*
by Goldberg

Current literature and other items. Start by browsing tutorials on the web. Feel free to check into Robert Smith's GA introduction paper. NN and GA overviews have appeared in *Science* and *Scientific American*. You may also want to look into EnCog, WEKA, NeuroShell, and GA packages.

Grading:

Assignments	55%	(homework, reports, projects, and presentations)
Midterm Exam	20%	(around February 26th)
Final Exam	25%	(around May 5th: noon)

Policies

Each student is expected to do his/her own work. Any evidence of academic dishonesty will not be tolerated, and will be subject to disciplinary action. Be sure you are familiar with the University's academic honesty policy as well as the CS departmental policy (attached).

NOTE: The course syllabus provides a general plan for the course; deviations may be necessary.

**Computer Science
Departmental Policy Statement
Academic Honesty**

The Computer Science Department recognizes honesty and integrity as necessary to the academic function of the University. Therefore all students are reminded that the CS faculty requires compliance with the conduct regulations found in the University of Georgia Student Handbook. Academic honesty means that any work you submit is your own work.

Common forms of academic dishonesty against which students should guard are:

1. Copying from another student's test paper or laboratory report, or allowing another student to copy from you;
2. Fabricating data (computer, statistical) for an assignment;
3. Helping another student to write a laboratory report or computer software code that the student will present as his own work, or accepting such help and presenting the work as your own;
4. Turning in material from a public source such as a book or the Internet as your own work.

Three steps to help prevent academic dishonesty are:

1. Familiarize yourself with the regulations.
2. If you have any doubt about what constitutes academic dishonesty, ask your instructor or a staff member at the Office of Judicial Programs.
3. Refuse to assist students who want to cheat.

All faculty, staff and students are encouraged to report all suspected cases of academic dishonesty. All cases of suspected academic dishonesty (cheating) will be referred to the Office of Judicial Programs. Penalties imposed by the Office of Judicial Programs may include a failing grade in the course and a notation on the student's transcript. Repeated violations are punishable by expulsion from the University. For further information please refer to the UGA Code of Conduct.