Advanced Topics in Artificial Intelligence

Course Description

Learning Objectives
At the end of the course students will be able to:

• Describe Neural Networks Models
  o Implement Feed-forward Neural Networks using Math Lab
  o Implement Back propagation Neural Networks using Math Lab
  o Implement Feed-forward Neural Networks in a high level programming language
  o Implement Back propagation Neural Networks in a high level programming language

• Describe Fuzzy Logic
  o Understand the difference between traditional Logic and Fuzzy Logic
  o Implement membership functions using Math lab
  o Apply concepts of Fuzzyfication

• Describe Genetic Algorithms
  o Explain the strategies used by Genetic Algorithms
  o Describe how Genetic algorithms are applied in optimization problems

Major Course Requirements

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<th>Research paper</th>
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<td>Project</td>
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<td>Midterm Exam</td>
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<td>Class participation</td>
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Class Format: The class will have a face to face and online component.

Research Paper:
A research topic will be assigned to a group of 3 students. The topics are Neural Networks, Fuzzy Logic, and Genetic Algorithms. Each group has to write a research paper. The research paper must have: Title, Abstract, Introduction, Topic description including definitions, applications (examples), Tools, Conclusion and Bibliography. The bibliography needs to have at least 15 references including journals, conference papers. Times new roman 12; 5 pages, 1.5 space

Project
Each group has to implement a small application of the topic assigned for the research paper. Examples are the use of Math lab to implement a neural network, or fuzzy logic. Demonstrations of an open source tool is also a possibility.

Midterm Exam-
The midterm exam will be a take home exam. The exam will consist of three or four questions that each student has to answer individually.

Class Participation
Every week a set of questions will be posted online. Students have to answer each question. In addition, students have to read and respond to 5 student posts expanding what has already been discussed.

Syllabus
1. Neural Networks
   a. Introduction to Artificial Neural Networks
   b. Feed
2. Fuzzy Logic
3. Genetic Algorithms
4. Intelligent Agents