

Computer Programming: Artificial Intelligence

Instructor Info

Name: Cameron Alston

Email: calston@ucsc.edu

Classroom: Mayfield Phi Sig Computer Lab

Course Synopsis

Artificial Intelligence has been a goal of computer science ever since the dawn of computing. This course will explore some of the modern computational techniques used to engineer machines capable of rational decision making, perception, and learning. Topics will include knowledge representation, logic, search algorithms, constraint-satisfaction problems, and machine learning. Students will have hands-on programming assignments to implement many of the algorithms introduced in the course.

Prerequisites

- Computer programming experience.
- Math and statistics experience.
- A passion for learning and technology.

Textbook

Artificial Intelligence: A Modern Approach (3rd Edition) by Peter Norvig and Stuart Russel

Tentative Schedule

Week 1

Topics

- Course Introduction
 - Blogs
 - Project selection
- What is AI? (Chapter 1)
 - History
 - Present
 - Future
- Java Crash Course
 - Data Structures
- Algorithms Crash Course
 - Pseudocode
 - Big-O
 - Sorting
- Agents (Chapter 2)

- Rationality
- Environments
- Types of agents

Assignments

- Bubble Sort/QSort
- Vacuum Cleaner World

Week 2

Topics

- Problem Solving by Search (Chapter 3/4)
 - Types of problems
 - Types of search
 - Heuristics
 - Hill climbing/gradient descent
- Adversarial Search (Chapter 5)
 - Minimax
 - Alpha-beta pruning
- Logic (Chapter 7/8/9)
 - Knowledge representation
 - Propositional logic
 - First order logic

Assignments

- Alpha-beta Chess
- Prop logic solver

Week 3

Topics

- Learning (Chapter 18)
 - Decision trees
 - Neural networks
 - Regression
 - Support vector machines
- Current AI Topics
 - Deep learning
 - Video game AI
 - NLP

Assignments

- ANN image classifier
- Final project work