CS 335 Introduction to Artificial Intelligence

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Overview

Objective: This couse will introduce students to seminal algorithms in artificial intelligence research and will encourage creativity in using those algorithms. Students should be able to look at a problem that requires an intelligent Agent and both (a) figure out appropriate techniques for a solution and (b) implement one of those techniques.

Instructor: Francisco Iacobelli

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At: Lech Walesa Hall 3056

When: Mondays from 6:00 – 9:250pm.

Textbook: Artificial Intelligence. A modern approach. By Russel and Norvig. 3rd edition.

Office Hours: Check the course calendar.

Conditions to take this course :

- You must be able to save documents as PDF and pictures as PNG or JPEG.
- You need to have a digital camera (or a camera phone with at least 2 mega pixels. Basically any smartphone will do)
- You will have to allocate some time to go over the content online and also to take a few tests online. The tests will require about 2 hours.

Topic, Objectives and Readings

Introduction/Intelligent Agents

- **Objective**: Understand what AI is and why it is problematic to define it. Also understand what is the difference between an intelligent agent vs. other kinds of agents.
- **Contents**: AI History, Intelligent Agents.
- **Readings**: Chapter 1 and 2.

Problem Solving by Searching

- **Objective**: Demonstrate understaining of search spaces and informed and heuristic search
- **Contents**: Breadth-First search, uniform cost search, A*, hill climbing and genetic algorithms.
- **Readings**: Chapter 3 and 4.1

Adversarial Search

- **Objective**: Understand how adversarial search and game playing works.
- **Contents**:Optimal Deicison, Imperfect Real Time and Parially Observable games.
- **Readings**: Chapter 5.

Constraint Satisfaction Problems

- **Objective**: Students understand how to implement constraints in their algorithms.
- **Contents**: Constraint Propagation and Backtracking
- **Readings**: Chapter 6.

Knowledge Based Agents

- **Objective**: Understand the concept of Knowledge Based Agents
- **Contents**: Propositional Logic applied to agents
- **Readings**: Chapter 7.

First Order Logic and Inference in FOL.

- **Objective**: Demonstrate understanding of first order logic expressions and algorithms for inference.
- **Contents**: knowledge base, facts, unification, chaining and resolution.
- **Readings**: Read Chapter 8 (refresher) and 9.

Planning [Optional unit]

- **Objective**: Understand the basics of agents that plan their actions
- **Contents**: Planning as a state-space search. Deterministic and non-deterministic domains. Multiagent planning
- **Readings**: Chapter 10-11

Knowledge Representation

- **Objective**: Understand Ontologies and ways to represent knowledge.
- **Contents**: Knowledge based, Truth Maintenance Systems.
- **Readings**: Chapter 12

Quantifying Uncertainty

- **Objective**: Demonstrate understanding of probabilities and Bayes Rule.
- **Contents**: Probabilities, Bayes Rules.
- **Readings**: Chapter 13

Probabilistic Reasoning

- **Objective**: The student demonstrates understanding of Bayesian Networks, Inference and clustering algorithms. Students learn the Naive Bayes classifier.
- **Contents**: Bayesian Networks, Exact and approximate inference.
- **Readings**: Chapter 14

Making Simple Decisions

- **Objective**: Students must understand Utility as a metric of performance as well as understanding Markov Decision Processes.
- **Contents**: Utility, MDPs
- **Readings**: Chapter 16 – 17.3

Probaboilistic Reasoning over Time

- **Objective**: Demonstrate proficiency and understanding the representation of time in Bayesian networks
- **Contents**: Markov models. Forward-Backward algorithm, Viterbi, Kalman Filters
- **Readings**: Chapter 15

Making Complex Decisions

- **Objective**: Students understand how to enhance Markov Decision Processes to incorporate partially observable problems.
- **Contents**: POMDP, Game theory
- **Readings**:

Learning From Examples

- **Objective**: Students understand how a bayesian classifier works and how a K-Nearest Neighbors work. They will understand how to compute similarity in multidimensional vectors.
- **Contents**: Naive Bayes, KNN
- **Readings**: Chapter TBD.

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Grading

Item	Weight
Assignment Average	60%
Midterm Average	20%
Final Exam	20%

Weighted Average	Course Grade
90% or higher	A
80% – 89%	B
70% – 79%	C
60% – 69%	D
0% – 59%	F

Every Class

Come prepared, google the topics, read the book and, of course, do the homework on your own.

Late Work Policy

No late submissions will be accepted.

Academic Integrity

Students are required to abide by Northeastern Illinois University's academic integrity policy. Failure to adhere to this policy will likely result in a failing grade in the class and / or expulsion from the University.

Web Link to Emergency Information

It is recognized that a safe university environment is a shared responsibility of faculty, staff, and students, all of whom are expected to familiarize themselves with and cooperate with emergency procedures. Emergency Procedures and Safety Information can be found on NEIUport on the MyNEIU tab or at:

Main campus: `http://www.neiu.edu/~neiutemp/Emergency_Procedures/MainCampus/`

El Centro(English version): `http://www.neiu.edu/~neiutemp/Emergency_Procedures/ElCentro/`

El Centro(Spanish version): `http://www.neiu.edu/~neiutemp/Emergency_Procedures/ElCentro_Spanish/`

CCICS: `http://www.neiu.edu/~neiutemp/Emergency_Procedures/CCICS/`

Chicago Teachers Center(CTC): `http://www.neiu.edu/~neiutemp/Emergency_Procedures/CTC/`

University Center at Grayslake: `http://ucenter.ehclients.com/pdfs/UCLCEmergencyPreparedness.pdf`