Artificial Intelligence
CS 534
Fall, 2018

When: 6:00 pm -8:50 pm, Mon
Where: Room HL116
Who: Dr. Dmitry Korkin, Associate Professor of Computer Science and Director, Bioinformatics and Computational Biology program
Office: BL22 @ Fuller Labs; TA's office: TBA
Email: dkorkin@wpi.edu
Note: Email is the best way to reach me to make appointments or ask questions.
Be persistent: if I don't reply the same day, try again!
Office Hours: Noon-1pm, Mondays; Office hours of TA: TBA
Please let me know beforehand when you will decide to come for an office hour.
Textbook and other materials:

- Stuart J. Russell and Peter Norvig. "Artificial Intelligence: A Modern Approach" (3rd Edition)
- Lecture materials
- Conference and journal papers

Goals of the course

1. Students will acquire knowledge on the concepts and problems from classical as well as state-of-the-art areas of AI
2. Students will develop a deeper understanding of some of the most important methods and algorithms in AI
3. Students will learn how to critically read and peer-review scientific publications from the leading AI journals and conferences
4. Students will learn to work in a team and jointly apply their skills to solve real-world problems

Basic units

Unit 1. Introduction & History
- A. History of AI
- B. Intelligent agents

Unit 2. Searching (2 classes)
- A. Classical search algorithm for problem solving
- B. Advanced search algorithms. Adversarial search. Constraint satisfaction

Unit 3. Reasoning with logical agents (2 classes)
- A. Logical agent. Propositional logic
- B. First-order logic

Unit 4. Learning (3 classes)
- A. Basic principles. Unsupervised Learning
- B. Supervised learning
- C. Advanced learning concepts. Deep learning. Reinforcement learning

Unit 5. Probabilistic Reasoning (2 classes)
A. Graphical models

Unit 6. Natural language processing (1 class)
A. Basics of NLP. Grammars. Applications

Course Organization

PowerPoint files and supplementary documents corresponding to most lectures will be available on WPI Canvas before the class. This class will require intermediate Python programming skills, since throughout the course students will implements, as a part of their assignments, some classical AI algorithms.

Assignments
Each Unit will be followed by an assignment. The assignment will be due before the first class of the next Unit (that is, any time by 5:59 PM). You will turn complete assignments to the TA. Some questions will require programming and running some classical algorithms. Others will require demonstrating your understanding of underlying theory. An additional part of the assignment will be writing a peer-review and answering questions on a conference or journal paper.

The problems sets should be done individually. You can work on the problem set and discuss solutions with as many other students as you want, but each student must write up and submit an individual problem set.

Project
There will be a course-long team-based project related to answering an important biological question using bioinformatics tools you learn throughout the class. The teams, each of size 3-4 students, will be formed and propose a topic to me. The topic will be evaluated and modified if necessary. The examples of topics include but are not limited to studying function of a particular gene from structural and systems perspective, the genetic basis of a particular disease, or evolutionary study of a specific molecular pathway. Each proposed topic should be driven by a specific biological hypothesis that you aim to answer. The hypothesis should be clearly formulated. The project will be evaluated by the project paper and peer-evaluations (submitted via a special form). There will be more detail available about the project available later in the course. **Each team member is expected to have an equal contribution to the project.**

Evaluation

400	Assignments (5 assignments x 80 pts/assignment)
300	Midterms (2 midterms x 150 pts/midterm)
75	Project presentation
225	Project paper (Proposal: 50, Beta version: 100, Final version: 75)
1000	Total possible points

A=900-1000; B=800-899; C=650-799

Web Page on Canvas

The Canvas course page will have a copy of this syllabus and other course materials, PowerPoint slides, assigned problem sets, papers, and some links to other web pages of interest.

Accommodations

If you need course adaptations or accommodations because of a disability, or if you have medical information to share with me, please make an appointment with me as soon as possible.

Academic Honesty

Integrity is extremely important in all aspects of life, and is highly valued at WPI. The WPI Academic Honesty policy can be found at:
http://www.wpi.edu/Pubs/Policies/Honesty/policy.html
For this class, academic honesty would include working on each problem in the problem set individually, and refusing to 'give' other students problem or source code set answers. Copying answers or solutions from the external sources is strictly prohibited (note: the internal source is your brain). Discussing the problems on the Canvas Forum Board is encouraged.