MMI 706

Reinforcement Learning

Thursday, 09:40, II-06, Spring 2024

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This syllabus is subject to change depending on the course progress during the semester.

Course Objectives:
Via this course and by the successful completion thereof, the students will:

- be familiar with reinforcement learning concepts,
- gain ability to apply recent techniques in reinforcement learning to different games,
- be able to implement and modify the algorithms in reinforcement learning,
- be able to learn the current trends in reinforcement learning, read related research papers and have a thorough understanding of the recent methodologies,
- gain the ability to creatively apply their current knowledge to produce new and original thoughts, ideas, processes in the field of reinforcement learning.

Textbook(s):

- Sutton, Richard S., and Andrew G. Barto. Reinforcement learning: An introduction. MIT press, 2018.

References:

- CS234: Reinforcement Learning, Stanford University
- UCL Course on RL by David Silver
- Intelligent control through learning and optimization by Emo Todorov

Grade Distribution:

Midterm Exam	20%
Final Exam	30%
Term Project	25%
Assignments and Quizzes	15%
Attendance	10%

Course Policies:

- **Assignments**
  - Students are expected to work independently. **Offering** and **accepting** solutions from others is an act of **plagiarism**, which is a serious offense and **all involved parties will be penalized according to the Academic Honesty Policy**. Discussion amongst students is encouraged, but when in doubt, direct your questions to your professor.
  - **No late assignments will be accepted unless agreed upon in prior**.
- **Attendance and Absences**
  - Attendance is expected and will be taken each class. You are expected to attend all of the classes unless you have a valid excuse. Attendance score constitutes 10% of the overall course grade.
  - Students are responsible for all missed work, regardless of the reason for absence. It is also the absentee's responsibility to get all missing notes or materials.

Tentative Course Outline:
The weekly coverage might change as it depends on the progress of the class.

Week	**Topic(s)**
Week 1	Introduction to Reinforcement Learning
Week 2	Multi-Armed Bandits Finite Markov Decision Processes
Week 3	Dynamic Programming Monte Carlo Methods
Week 4	Project Phase I Presentations
Week 5	No Class
Week 6	Midterm Exam
Week 7	Temporal-Difference Learning - Part I
Week 8	Ramadan Feast
Week 9	Project Phase II Presentations
Week 10	Temporal-Difference Learning - Part II
Week 11	Combining Multiple Learners and Reinforcement Learning
Week 12	n-step Bootstrapping
Week 13	On-policy Prediction with Approximation
Week 14	Final Project Presentations