Evaluating Intelligent Game Design Techniques

CSC591
Fall 2010
TTh 12:50–2:05

Instructor: Dr. David L. Roberts (robertsd@csc.ncsu.edu), 2254 EBII, 919-513-7182
Office hours: T 2:30-3:30, W 2:30-3:30
Course Webpage: http://www.csc.ncsu.edu/faculty/robertsd/csc591f10/

Course Text: There is no official text for this course, although we will cover some of the topics from the following books:


Course prerequisites:

- Graduate standing in Computer Science
- Familiarity with the topics from a graduate-level artificial intelligence (CSC 520/521/720) or machine learning course (CSC 522/791M) and/or a graduate level human computer interaction course (CSC 554) are recommended, but not required.

Course Purpose: In this course we will examine Artificial Intelligence (AI) and Machine Learning (ML) algorithms for computer games as well as techniques for effectively evaluating these algorithms using players rather than simulations. We will look both at how these algorithms can be used to engineer intelligence into games and how these methods can reduce the effort required to design and implement games. Topics involving user studies and human computer interaction techniques will also be discussed, including study design, evaluation metrics, and basic statistics for data analysis. Although there are games in which computers play head-to-head, in this course we will focus on games as a playable artifact for humans. In doing so, we will study evaluation methodologies for the AI and ML techniques discussed in the course from a user’s (either player’s or designer’s) perspective. We will focus discussions on applying the evaluation methodologies we learn to the AI and ML for games techniques we read about in the published literature.

Course Objectives: By the end of the course, you should be able to accomplish the following:

- Articulate interesting and verifiable research questions describing the use of AI or ML techniques for computer game design.
• Understand the importance of human-subjects evaluations for games and the ethical considerations that must be adhered to when conducting those evaluations.

• Critically assess published literature on the applications of AI and ML to computer game design problems.

• Implement basic AI or ML techniques for playing or authoring computer games.

• Design, implement, and analyze the results of a human-subjects experiment to evaluate the effectiveness of an AI or ML game design technique.

Policies and Procedures

Academic Integrity: Students are required to follow NCSU policy. “Academic dishonesty is the giving, taking, or presenting of information or material by a student that unethically or fraudulently aids oneself or another on any work which is to be considered in the determination of a grade or the completion of academic requirements or the enhancement of that student’s record or academic career” (NCSU Code of Student Conduct). It is the instructor’s understanding and expectation that the student’s submission of any assignment means that the student contributed to the assignment in question (if a group assignment) and that they neither gave nor received unauthorized aid (if an individual assignment). Authorized aid on an individual assignment includes discussing the interpretation of the problem statement, sharing ideas or approaches for solving the problem, and explaining concepts involved in the problem. Any other aid would be unauthorized and a violation of the academic integrity policy. This includes referring to homework from previous semesters. Any computer work submitted must be completed on your own personal computer or from your own NCSU account to avoid confusion about the origin of the files, and no sharing of files in any way is allowed on individual assignments and no inter-group sharing is allowed on group assignments. All cases of academic misconduct will be submitted to the Office of Student Conduct. If you are found guilty of academic misconduct in the course, you will be on academic integrity probation for the remainder of your years at NCSU and may be required to report your violation on future professional or school applications. More information can be found online at www.ncsu.edu/provost/academic_regulations/integrity/reg.htm.

Homework: Students will submit homework individually. The assignments will either be posted on the course webpage or distributed in class. If you are unable to attend class, it is your responsibility to determine if an assignment was given.

Late Homework: Completed assignments should be turned in by the beginning of the class period on the date they are due. For assignments for which email submission is requested, emails should be sent before the start of the class period on the date they are due. Late assignments will receive a five point deduction for every day late they are up to a maximum of five days. Any assignments six or more days late will be given a zero.
Homework Grading: Homework assignments will be given full credit for timely completion. Missing components or lateness will be penalized accordingly.

Exams: This course has no exams.

Readings and Presentations: We will read papers from the literature in AI, ML, HCI, and games. Every student will be expected to present a paper from the AI or Game literature and lead a discussion about the design of an effective evaluation experiment. Students will be expected to present a paper of their choosing, highlighting all of the relevant details. Additionally, they will be expected to critically assess the paper, pointing out strengths and/or weaknesses of the approach and the evaluation. Lastly, students will lead a discussion in the course about the paper and present their ideas for an evaluation methodology for that paper.

Course Project: Students will primarily be evaluated using a semester-long group project on a topic of their choosing (approved by the instructor). Details about the project, grading desiderata, and deadlines can be found on the course webpage and will be distributed in class. Students are highly encouraged to work closely with the instructor on their project or to seek a separate faculty mentor. Periodically throughout the semester, students will be asked to present updates on their project progress to the class. These updates will count as homeworks and not contribute to the project grade.

Attendance: Attendance at class sessions is optional; however, class participation will count significantly toward your final grade. Documented medical excuses or other excused absences will not count against class participation grades. Conference travel or other scholarly duties discussed well in advance of a missed session may be excused at the discretion of the instructor.

Calculation of course grade: A weighted average grade will be calculated as follows:

- Class Participation = 10%
- Homeworks = 20%
- Paper Presentation = 10%
- Course Project = 60%

Note: It is mathematically impossible to pass this course without completing a project. The course grades will be determined as follows:

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<thead>
<tr>
<th>Score</th>
<th>Grade</th>
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<tbody>
<tr>
<td>≥ 97.0</td>
<td>A+</td>
</tr>
<tr>
<td>93.0 – 96.9</td>
<td>A</td>
</tr>
<tr>
<td>87.0 – 92.9</td>
<td>A-/B+</td>
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<tr>
<td>83.0 – 86.9</td>
<td>B</td>
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<tr>
<td>77.0 – 82.9</td>
<td>B-/C+</td>
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<tr>
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<td>C</td>
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<tr>
<td>67.0 – 72.9</td>
<td>C-</td>
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<tr>
<td>≤ 67</td>
<td>F</td>
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Students with disabilities: Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 919-515-7653. See also the web page on disability services for students (http://www.ncsu.edu/dso/).
Schedule

The schedule is subject to change pending student interests and background. Room has been left in the schedule to cover additional topics in experimental design as well as artificial intelligence and machine learning, or to spend additional time on specific topics of interest. The schedule will be kept on the course webpage and updated periodically to reflect changes as the semester progresses. It is the student's responsibility to check the schedule regularly for changes. The instructor will communicate any changes in deadlines to students in a timely manner via email and announcements in class. Note, it is the student’s responsibility to check their official NCSU email address at least once daily. Failure to do so does not excuse missed deadlines.