CS 4649/7649
Robot Intelligence: Planning

Final Project Information Session

Sungmoon Joo

School of Interactive Computing
College of Computing
Georgia Institute of Technology
Final Project

• To expose students to research in planning
• Makes up 40% of the grade

• CS7649 Graduate Projects:
  - work in groups (max. 4) on a project that is relevant to their research goals.
  - students are welcome to expand on active projects in their own research labs.
  - final decisions on topics will be made through discussion with the instructor.
  - deliverables: proposal, final report (conference-style paper), final presentation
Final Project

- CS4649 Undegraduate Reviews:
  - undergraduates take the role of reviewers for the projects*.
  - once the topic selection/grouping is done, reviewers will be assigned to each project
  - for the assigned project, reviewers will monitor the progress/research activities, and will be required to review the project proposal, final report & presentation
  - in addition to the assigned project, reviews on the presentation of other projects are required (presentation review sheets will be provided).
  - deliverables: proposal review report, final review report, final presentation reviews
    (e.g. For a reviewer assigned to project A: proposal/final report/presentation reviews for project A + presentation reviews for the rest of the projects B, C, D...)
  - will be graded based on the thoroughness of their reviews and understanding of the project topics

* given the option to participate in the projects directly and be graded as graduate students.
Deliverables Summary

CS7649
- Project Proposal (2-3 page long)
- Project Final Report (conference-style paper)
- Presentation (10~15min, depends on total number of project teams)

CS4649
- Two options:
  Case #1 Participating in a project.
  Case #2 Taking a reviewer role.
- For case #1, same as CS7649
- For case #2:
  (i) proposal review, (ii) final report review, → for the assigned project
  (iii) presentation reviews → for all presentations

• Simulation of conference/journal paper writing
• Collected reviews will be delivered to the project members
Suggested Timeline

• CS7649
  - project topic decision, grouping: Due Oct. 23
  - project proposal: Due Oct. 30, 2-3page (motivation, technical gap, approach, expected result)
  - project final report: Due Dec. 4, 23:59pm, conference-style paper (format is on the course web)
  - project presentation: Dec. 11, 11:30am - 2:20pm
* there may be meetings between project teams and the instructor to see if projects are progressing as scheduled.

• CS4649
  - project reviewer assignment: Oct. 28
  - proposal review report: Due Nov. 6
  - project review report(for the assigned project): Due Dec. 11, 11:30am
  - project presentation review*(for all presentation): Due Dec. 11, 2:20pm
* presentation review sheets will be provided
Proposal review report will answer the following questions (at least)

[1] What is the project about?

[2] Does the proposal describe motivation and overview of the work?

[3] Why is the work significant and worth a final project?
   : Why do we care about the problem? What are the potential benefits from the work?
   : What is the problem (technical gap) that needs to be solved?

[4] Is the proposed approach novel?

[5] Is the expected result feasible?
Review Report (final report)

Project final review report will answer the following questions (at least)

[1] What is the paper about?
[2] What about the work is original, novel, and unique?
[3] Why is the work significant and is this enough to warrant presentation?
[4] Does the work describe its underlying theoretical principles?
[5] Are these principles well explained and correctly applied?
[6] Does the paper provide compelling (experimental) evidence?
[7] Are the experiments/simulations well conceived, sufficient in scope, and statistically significant?
[8] Does the work contain adequate technical detail to confirm its correctness?
[9] Does the work report on what was learned?
[10] Is the presentation/final report logically organized?
Project final review report will answer the following questions (at least)

[11] Is the presentation/writing understandable?
[12] Does the abstract succinctly summarize the main ideas and results of the work?
[13] Does the introduction provide motivation and overview of the work?
[14] Are figures informative and clear with proper labeling?
[15] Are the captions explanatory of the figure content?
[16] Does the summary/conclusion meaningfully describe the contribution and result?
[17] Are adequate citations made for prior work or controversial statement?
[18] Is the bibliography complete?
[19] Comments/suggestions to the authors?
[20] Comments to the instructor?
Planning applications

Planning is everywhere !!

Logistics
http://transportnalogistika.blog.com/

Games

Mike Stilman: NAMO
Andrew Y. Ng: Helicopter flying
N. Amato: Protein folding

Robot Task/Mission Planning, Motion Planning, Legged robot footstep planning, Controls, Navigation, Bio-medical applications...
Examples: IROS2014 papers

Some of the papers with keyword ‘planning’

- Motion Planning under Uncertainty for Medical Needle Steering Using Optimization in Belief Space
- Unifying Multi-Goal Path Planning for Autonomous Data Collection
- Coverage Planning with Finite Resources
- Coordination in Human-Robot Teams Using Mental Modeling and Plan Recognition
- A Probability-Based Path Planning Method Using Fuzzy Logic
- Multi-Goal Path Planning Based on the Generalized Traveling Salesman Problem with Neighborhoods
- Informed RRT*: Optimal Sampling-Based Path Planning Focused Via Direct Sampling of an Admissible Ellipsoidal Heuristic
- Integrating Multiple Soft Constraints for Planning Practical Paths
- Sampling-Based Trajectory Imitation in Constrained Environments Using Laplacian-RRT*
- The Anatomy of a Distributed Motion Planning Roadmap
- A Framework for Formal Specification of Robotic Constraint-Based Tasks and Their Concurrent Execution with Online QoS Monitoring
- Reactive Switching Protocols for Multi-Robot High-Level Tasks
- A Compositional Approach to Stochastic Optimal Control with Co-Safe Temporal Logic Specifications
- A Constraint-Based Method for Solving Sequential Manipulation Planning Problems