1 Instructions

This term project is a *project proposal* that involves (computational) game theory in some shape or form. The flavor of the project should be close to that of workshop paper, though the volume of work can be less. That is, the goal is to propose an interesting topic with preliminary results showing why this is an interesting direction. You can think of it as a pitch to your advisor as to why you may be justified in spending more time/resources on this topic. Since this is a term project, it is also possible to comment why (especially for experimental work) you realized this idea was turned out to be not a good one. You are highly recommended to work on something that is related, even tangentially, to your own research area.

This component will constitute **40%** of your final grade. The project will be done in groups of **2-4**. Please do not exceed the group size or work individually without my expressed permission.

2 Milestones

Topic selection You are required to submit a roughly **2 page "proposal-proposal"** outlining the rough idea of what you intend to do. This is primarily to make sure that the topic chosen is relevant to the class. After topic selection, I will give some feedback (ideally a green light) or begin a short discussion if there are any concerns about the topic.

The deadline for the topic selection is **3 October**. State the names of group members **clearly**.

Final report You are required to submit **a 5-6 page report** detailing your proposal. This should read like a workshop or short paper. Exceeding the page limit by a a small amount is okay, but do try to be concise. The report should state clearly what the problem is, contain a short, carefully chosen literature review on the most closely related pieces of work, and identify exactly where or what areas are novel. You are also required to perform some preliminary work, and give a rough (but still non-trivially existent, unlike some published papers) outline of future directions that could possibly spin this into a full paper.

The deadline for the final report is **to be decided**.

3 Grading

The grade you obtain will depend entirely on your final report. Half your project grade will be on the background, literature review and problem statement, while the other half will be the actual project content. You are required to describe at least one paper as existing work (in a non-trivial manner) and state explicitly at least one novel aspect of your work.

While the topic selection and review by me will not affect your grades, you are still advised to take it seriously and clarify any doubts as soon as possible.

4 Topics

Applied/Practical

- Solve-a-game and comment on solutions, observations. Think of a game occurring naturally in your research, recreation or security, attempt to solve it and report some results. For this sort of project, I suggest you choose to work on a *small enough game*, one whose game size can be parameterized. I will require that you identify properties of the game you have chosen that you think will make solutions/solvers interesting. You should *not* spend much time on coding the engine/specification of the game, as that is only a small part of the project. The focus is on the solving part of things.

- Formulate-a-game. Unlike solving a game, the focus here is on game *formulation*. Take a real-world application, e.g., security, and formulate this as a game. Be creative. Players may not be "physical" objects or robots. Think about what payoffs should be, what equilibrium concept is relevant (you can certainly go beyond what is in class), what information structures are present etc. Solving the game is still important, but secondary, so try to start small. Are there any interesting things that you can say about the solutions of the game? Are there any phase transitions? Special cases? Any findings?

In general, think about what makes your game/setting interesting or unique, and focus your time and effort on modeling or solving it. It is okay to massively oversimplify other aspects that are already covered elsewhere by prior work. Remember, this is a term project and your time is limited. Do not be overly ambitious. If the project indeed looks promising, you (or we) can always continue working on a paper submission after the class is over. A proposal is meant to see if it's interesting enough dedicate more resources into this topic.

Theoretical/Algorithmic Note that even though this is a project "proposal", it is important to have some preliminary results or at least concrete reasons to believe this is an interesting direction. For instance, you cannot say "lets solve P=NP", cite some buzzwords and leave it at that. I do not expect much pure theory projects, but am okay with it if students are interested. What is much more likely are algorithmic contributions. If you are interested in creating new algorithms for game solving (or related topics), please make sure to be very clear about current state of the art. While you are only proposing methods, make sure you *showcase some promise*, e.g., by looking at a special case where a proposed direction seems to do well either in theory or practice.

What is explicitly not allowed

1. Survey papers
2. Vision papers
3. Papers not about games, or games that are way out of syllabus, e.g., combinatorial game theory