CS1951k - Final Project

Due (Code + Writeup): Friday, May 12 @ 10pm

Oral Presentations: Thursday, May 11 @ 9am (Coffee + Donuts will be served)

This course has focused on both the theoretical literature in and practical applications of algorithmic game theory. To that end, the final project has both a theoretical and practical component, as described below. Your job is to pick a game (one of the AdX or Spectrum Auction varieties) via a google form to be released after lab, and then complete these theoretical and practical tasks for your choice of game.

1. **Theoretical**: Construct a model for a simplified version of both the game and behavior of other bidders. Compute, and describe intuitively, an optimal strategy in your simplified version of the game. We leave the particular simplifications up to you, but ideally they would be simple enough that you can analyze optimal behavior, but complicated enough that it bears enough of a relationship to the original game that your results will be meaningful. Note: if you try out a model and it turns out not to be useful, include that in your writeup! We want to see (at least some of) your process, not just your conclusions.

2. **Practical**: Construct a bot to participate in the real game, using your theory to shape the design of your bot. Describe your bot’s strategy by answering the following questions: What assumptions did you make in constructing your model that are violated in the real game? Is there a way to relax them slightly so that you can more accurately reason about behavior in the real game? For this step, you should of course not feel required to solve for (even approximately) optimal behavior. ¹

3. Describe how your theoretical model combined with your answers to the practical questions led you to your bot’s design. For everything that your bot does, you should say whether it was a direct result of the optimal strategy you derived in your simplified game, or why you were forced to diverge from that strategy, and how any heuristics you implemented are intended to compensate for its deficiencies.

Feel free to refer to our presentation about the Lemonade Game and/or Prediction Markets (if one is ready in time) for guidance as to how to approach these two complementary parts of the project. If you are taking this course as a capstone, you are required to do this assignment twice: for one AdX game, and one Spectrum Auction game.

¹ If you manage to do so, then you should iterate on your solution to the project. That is, your response to this part should become part of your theory story, and you should have another go at this question!