Midterm Project

Due Friday, March 15 at 11:59 pm.

In this class, we have gone over principles of decision analysis, using tools such as payoff matrices, decision trees, sensitivity tables, and more to figure out the best decision to make in a given scenario. Now, you will need to apply these concepts to a real life situation while playing board games. The first part of this project is an in-class board game activity, which will take place in **LeFrak 1208 on Thursday, February 28 and Tuesday, March 5.** Please make sure you do not go to the usual classroom on those days! During these days, a selection of board games will be provided, as well as board games that have been pre-approved and brought in by other students.

The second part of this project involves writing a paper describing the decisions you made in the board game activity.

Requirements

You will write a **two-page double-spaced paper** using decision analysis to analyze scenarios encountered in a board game. Your paper must include:

- An **Introduction** describing the game.
- A **Decision Analysis** including at least one payoff matrix and/or decision tree, clearly defining the alternatives, possible future events (and their probabilities), and consequences.
- A **Conclusion** justifying your decision(s) and possibly including a sensitivity analysis.
- A **Discussion** of the possible pitfalls and/or considerations of your decision analysis.

You do not need to have these in separate section titles, but make sure you include at least a paragraph for each. **The payoff matrix and/or decision tree is the only figure that can be included within the text and must take up no more than half a page.** You may include both within the text as long as they take up no more than half a page combined. In addition to the above, you must include all additional figures/graphs/charts/pictures at the end in an appendix.

Introduction

You must provide a description of the game you are writing about. You do not need to provide a comprehensive overview of all the rules, but make sure you include enough so that someone who does not know the game can understand the decisions analysis aspects of your paper. For example, if you are writing about poker, you do not need to provide a ranking of all poker hands, but you should explain the relevant ones to your problem.

Decision Analysis

You must look at either a single decision point or a series of decision points for your paper. Make sure you describe the alternatives, possible consequences, possible future events, and probabilities associated with possible future events.

When considering alternatives, you do not need to include every single possible alternative — you may simply include the only options you would seriously considering, such as the top two or three, or simplify the alternatives down. For example, you do not need to include every single possible increment to raise in poker, and you can simplify the alternatives down to something like "Fold", "Call", or "Raise".

You may not know the exact probabilities associated with each possible future event. In these cases, you should include your best guesses. Make sure you justify these guesses! For example, if you assign a low probability to an event, explain why you think it's unlikely to happen in the context of the game.

When you are considering what to do in a game, the "outcome" of the decisions and future events might be losing or winning the game rather than a money or point value. In these situations, you can assign a value of 1 (for winning) and 0 (for losing). Alternatively, you might want to think about the *utilities* associated with winning or losing. For example, in poker, it might be possible that you value winning with a bluff higher than winning with a better hand, even if the money amount is the same.

Conclusion

You should clearly state what decision(s) you choose, with an explanation how you reached it. You must state the decision rules you considered and ended up using (I expect most of the time, you will use the expected value decision rule). In addition, if there is any uncertainty in the probabilities or outcomes (that is, you had to guess or estimate), you should do a sensitivity analysis to see how your decision might change as the probabilities or outcomes vary.

Discussion

You must include a discussion of possible ways your decision analysis might have gone wrong. This might be related to the sensitivity analysis, and can expand on why you might have been wrong in your estimates of probabilities and/or outcomes. It can also include a discussion of what decision you did make in the actual game if it was not the same as in the decision analysis. For example, you might think about how the concept of a sunk cost played into the decision you actually made and discuss how it might have affected whether you made the right decision or not.

You can also include a short statement about what happened, but remember: **A bad outcome does not necessarily mean you made the wrong decision, and a good outcome does not necessarily mean you made the right decision!**

Figures and Pictures

Please include all figures and pictures you used in your paper (other than the payoff matrix and/or decision tree) in the end as an appendix. In particular, you should include any figures that go over the half page limit for the main body, as well as any additional supporting figures or charts, such as strategy tables. Any graphics used to describe the game should also go here, including pictures of the game state at a particular decision point. Note that you may refer to these figures within the text by including a parenthetical note (e.g. See Appendix Figure 1).