Project Proposal

Motivation

Applications of voting are commonly seen in day to day life. From deciding among dinner choices to electing a leader for the country, we want to select an outcome that maximizes common interests of all concerned parties. Voting rules are designed to help us make such decisions based on preferences of agents. However, none of them are perfect in all dimensions.

In this project, we hope to tackle a seemingly simple problem of planning a vacation with friends. Though this seems like a very basic problem, rich analysis under different scenarios will allow us to potentially extend this model to a wide range of problems.

Description

1. The model setup

Suppose a group of friends are deciding on places to visit in Europe during their vacation. Each individual is given a fixed number of choices and a limited time and money budget. We make the following assumptions about the base model setup (we wish to relax some of these for further analysis):
  • Every person has a strict preference over all the given choices
  • Every person prefers these choices to any other choices for vacation spots
  • Every person has not visited any of these places before
  • Weight difference between choices is the same across each person's type
  • Temporary situations and world news like epidemics and bombings do not affect preferences

2. Empirical Study

To choose the best plan for the vacation, we plan on using at least three voting rules. We want to incorporate the Clarke's mechanism, and device two others that are related to majority and pairwise elections but also concentrating on fairness. Each of these rules will have their own advantages and disadvantages and we hope to compare them by examining the data collected from sample surveys.

We will gather sample data through surveys sent to students in the class. The first round of survey aims to collect information about each student's preference over the entire set, while the second round we

plan to assign a budget to each student and have them spend it on their preferred destinations. In each round each student votes once completely unaware of the mechanism and a second time knowing about the mechanism. (An additional variation we want to add, time permitting, is to pick our destinations without ignoring travel time and distance between cities.)

We plan on developing linear programs for each of the three voting rules we use, as a means of evaluating the information we gather from the surveys. We would also like to look into how the problem scales, and whether it is solvable in polynomial time or if it is NP-Hard.

3. Goal

Based on empirical evidence, we would like to understand and analyze the different types of outcomes we get with each of these voting rules. We want to maximize "happiness" while being fair. As an extended research, see if our observations from here would have any implications for other voting problems. As a minimum, we will at least have an idea and working model to decide on the best vacation plan with our friends.