

Assigning Teams

Integer Linear Programming

[GITHUB.COM/AARONARCADE/TEAM_SCHEDULING_ILP](https://github.com/AARONARCADE/TEAM_SCHEDULING_ILP)

Objective

To determine best placement of members on teams given certain parameters polled through the application and to keep the model simple and increase complexity only as needed, maintaining sustainability of the optimization script.

Steps

1. Decide determinants (and their weights) of a quality team
2. Keep algorithm design simple for anyone to edit as needed
3. Parse data from past EI application form responses as testing data
4. Model set covering relations
5. Code model and insert parsed data
6. Evaluate and return to design if needed

1 - Determinants (points relative to each group)

1. Preference for project
 1. 3 points for great interest
 2. 2 points for interest
 3. 1 point for no interest
 4. 0 points for unknown
2. Seniority
 1. Proportional cost under average year of all members
3. Previous EI involvement
 1. Proportional cost under average previous EI experience of all members

2 - Simple Algorithm Design

It is likely only preference is needed for determining a feasible team within reason of other non-considered factors such as match between skillset needed and members' majors or topics of interest. To simplify the process of making a long-term solution, the script will return information on each team, allowing for determining if further complexity is required to assist the building of a more desirable feasible set of team assignments. First optimization will only include Preference for project. If needed, seniority will be added. All values will be evaluated regardless of complexity of model.

3 - Parsing past form response data

Beginning with project preference and seniority, I have made a dictionary for the model to read for Luke's top, secondary and tertiary choices of projects and their respective scores in the model. The remaining values of year and of average year status will be determined as the entire member list is parsed.

```
{ 'name': 'Luke M--',  
  'projects': { 'Africa House': 2,  
                'Agape Youth and Family Center': 3,  
                'Camp Kudzu': 1,  
                'Draw Change': 1,  
                'Giving Kitchen': 1,  
                'La Amistad': 2,  
                'Rebuilding': 1,  
                'Southface': 2,  
                'WonderRoot': 2},  
  'year': 1}  
Average year of all members: 1.7273
```

4 - Modeling the set covering relationship

Constraints/additional parameters to consider:

- Number of members per team?
- Assume everyone needs to be on a team?
- Max seniors per team?
- Gender?
- Needed skillset for team?

5 - Coding the ILP model

github.com/aaronarcade/Team_Scheduling_ILP

- Repo link for project
- Demo data included (names redacted to protect identities)

6 - Evaluation

TBD