# Decision Making With Matrices

# This is a pretty simple assignment. You will do something you do everyday, but today it will be with matrix manipulations.

# The problem is: you and your work friends are trying to decide where to go for lunch. You have to pick a restaurant that’s best for everyone. Then you should decided if you should split into two groups so everyone is happier.

# Despite the simplicity of the process you will need to make decisions regarding how to process the data.

# This process was thoroughly investigated in the operation research community. This approach can prove helpful on any number of decision making problems that are currently not leveraging machine learning.

# You asked your 10 work friends to answer a survey. They gave you back the following dictionary object.

people = {'Jane': {'willingness to travel':

'desire for new experience':

'cost':

'indian food':

'mexican food':

'hipster points':

'vegetarian': }

}

# Transform the user data into a matrix(M\_people). Keep track of column and row ids.

# Next you collected data from an internet website. You got the following information.

restaurants = {'flacos':{'distance' :

'novelty' :

'cost':

'average rating':

'cuisine':

'vegetarians':}}

# Transform the restaurant data into a matrix(M\_resturants) use the same column index.

# The most important idea in this project is the idea of a linear combination.

# Informally describe what a linear combination is and how it will relate to our restaurant matrix.

# Choose a person and compute(using a linear combination) the top restaurant for them. What does each entry in the resulting vector represent?

# Next, compute a new matrix (M\_usr\_x\_rest i.e. an user by restaurant) from all people. What does the a\_ij matrix represent?

# Sum all columns in M\_usr\_x\_rest to get the optimal restaurant for all users. What do the entries represent?

# Now convert each row in the M\_usr\_x\_rest into a ranking for each user and call it M\_usr\_x\_rest\_rank. Do the same as above to generate the optimal restaurant choice.

# Why is there a difference between the two? What problem arrives? What does it represent in the real world?

# How should you preprocess your data to remove this problem.

# Find user profiles that are problematic, explain why?

# Think of two metrics to compute the disatistifaction with the group.

# Should you split in two groups today?

# Ok. Now you just found out the boss is paying for the meal. How should you adjust? Now what is the best restaurant?

# Tomorrow you visit another team. You have the same restaurants and they told you their optimal ordering for restaurants. Can you find their weight matrix?