This is a pretty simple assignment. You will do something you do every day, 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 thats 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 thougholy investigated in the operation research community. This approah 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.

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

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

# 1. Informally describe what a linear combination is and how it will

relate to our resturant matrix.

A linear combination is an expression of a set of terms that is

constructed by multipying the terms by some constant and adding the

results to form a singal scalar

Ex: Vector [1,2,3,4,5] ; scalars/coefficients [a,b,c,d,e]

Linear\_Combination = a\*1 + b\*2 + c\*3 + d\*4 + e\*5

# 2. Choose a person and compute(using a linear combination) the top restaurant

for them. What does each entry in the resulting vector represent.

# 3. 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?

# 4. Sum all columns in M\_usr\_x\_rest to get optimal restaurant for all users.

What do the entry’s represent?

# 5. 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.

# 6. Why is there a difference between the two? What problem arrives? What

does represent in the real world?

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

# 8. Find user profiles that are problematic, explain why?

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

# 10. Should you split in two groups today?

# 11. Ok. Now you just found out the boss is paying for the meal. How should

you adjust. Now what is best restaurant?

# 12. Tommorow you visit another team. You have the same restaurants and they

told you their optimal ordering for restaurants. Can you find their

weight matrix?