Milestone Report 1: Restaurant Collaborative Recommendation System

Problem: Your client is a food delivery service or food review application that wants to predict what its users want to eat given a variety of factors. As a consumer, people often have a hard time choosing what restaurant to go to due to the many options to choose from. I am tasked with what kinds of foods people would prefer given their drinking habits, budget, ethnicity, etc. and recommend different restaurants or cuisines.

Audience: Consumers that have a hard time choosing what restaurants to go to. Potential food companies interested in this. Land developers looking to attract certain restaurateurs to open a restaurant in a particular area that has a certain demographic.

Dataset: <https://data.world/uci/restaurant-consumer-data>

Approach: Combine datasets, deal with any null values seen, use some kind of regression to predict what features impact people’s decisions the most when choosing certain restaurants, and build a collaborative recommendation system that would recommend people certain restaurants.

**Data Cleaning:**

Loading Datasets: I loaded several datasets using pd.read\_csv from the UCI Database. Upon inspecting, I noticed some ambiguous data as the Rcuisine column, which appeared both in user\_cuisine and cuisine. Since there was no readme file or information for each of the datasets, I decided to omit the user\_cuisine data, and use the cuisine dataset, user profile dataset, and ratings dataset.

Merging datasets: I decided to merge the datasets, first merging the user\_profile and ratings datasets under the userID column. I then used the merged dataset and merged it with the cuisine dataset on placeID.

Dealing with missing values: Checking through several of the columns, many of them have a ? value, which indicates an unanswered question the user had. In order to fill the question marks, I calculated the probabilities of each of the values and used np.random.choice to assign a random value at the probability based on all the values.

Feature engineering: To quantify the categorical variables, I changed the smoker, drink level, dress preference, etc. columns to numeric values under new columns. I then selected the newly converted numeric values as well as the other quantitative variables under dataframe df\_cat.

**Exploratory Data Analysis and Inferential Statistics:**

Data Visualizations: Using a heatmap, I checked for correlations between all of the variables. With the exception of food\_ratings and service\_ratings, none of the variables exhibited much correlation to rating. I also used a scatterplot with latitude and longitude differentiated by ratings and I found that many of the higher rated areas congregated in the same location. I drew histograms for the height and weight columns to see if they were normally distributed. While I

Checking collinearity: I checked collinearity between ratings with food ratings and ratings and service ratings to see which one contributed more to the overall rating. Food had a slight edge in this case.

Checking distributions: I wrote a function check\_distributions, which would print a statement on whether or not a variable was normally distributed based on the p\_value of the chi-square test. I found that weight and cuisine were not normally distributed, while height was.

**Findings**: Based on the latitude, longitude graph, higher rated restaurants tend to congregate around the same location. This may be due to the clientele and what part of the city the restaurants are located in. Food ratings weighted very slightly better at predicting overall rating than service ratings.