

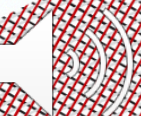


# Yelp Steakhouse Business Analysis

STAT 628 Module 3 Group 6

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# Outline

- Introduction
- Tips Analysis by Word Frequency
- Attributes Analysis by ANOVA
- App Introduction
- Conclusion and Discussion



# Introduction

- Goal:

Our goal is analysis the yelp data for steakhouse business and give data-driven recommendations.

- Approach:

We mainly used linear regression, Analysis of Variance (ANOVA) and counted word frequency.

- Data Set:

Yelp data set of steakhouses business in OH, PA, WI, and IL.



# Data Overview

- Star Rating:

The average rating by customers for each restaurant by star from 1 to 5.

- Attributes:

Attributes are features of the restaurants, such as whether it serves alcohol, whether it provides delivery.

- Tip:

Tips are short comments by the customers, such as “friendly service!”, or “I love their salad.”



# Tips Analysis: Preprocess

1. Combined all texts of tip and removed all marks and numbers.
2. Removed all stop words.
3. Remove unspecific adjectives and verbs, such as 'good' or 'love'.
4. After above processing, the left words are mostly nouns related to steakhouses.
5. Separated to two groups, food- or service-related.



# Food-related Words

Mainly categorized to:

1. **Steak Quality**
2. **Dinner Procedure:** such as appetizer, side dishes, we found especially desserts are popular.
3. **Meat other than beef:** we found especially sea foods are popular.
4. **Special Foods:** sushi, Italian foods.
5. **Drinks:** bartender and cocktails, especially martini.



# Service-related Words

Mainly categorized to:

1. **Friendly and fast service.**
2. **Requirements for reservation and delivery.**
3. **Opening time:** Brunch is a good idea.
4. **Price:** We recommend setting relatively high prices for high-quality ingredients and designing some affordable dishes.



# Attributes Analysis

In this part, we will

- Extract Steakhouse business data from *business.json*.
- Pre-process the data and split attribute information.
- Select important attributes and fit linear model.
- Provide business suggestions based on attributes analysis.





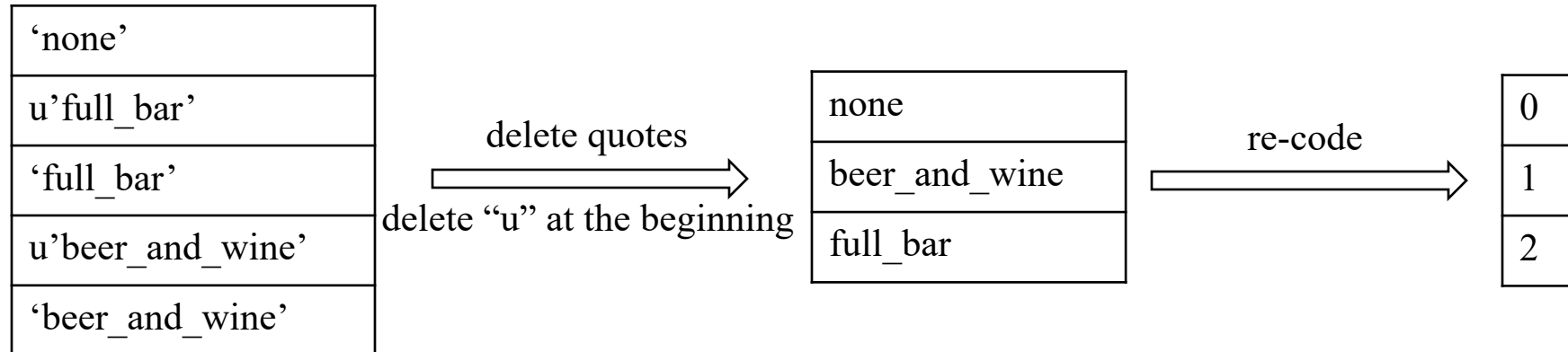
# Data Pre-processing

- Split attributes from steakhouse business data.
- Keep the attributes whose missing records are less than 10% of total records:
  - Alcohol, Ambience, BusinessParking, GoodForKids, HasTV, OutdoorSeating, RestaurantsAttire, Restaurant Delivery, RestaurantsPriceRange2, RestaurantsReservations, RestaurantsTakeOut
- Factorize the attributes
  - GoodForKids, HasTV, OutdoorSeating, RestaurantsDelivery, RestaurantsReservations, RestaurantsTakeout: 1-True, 0-None/False

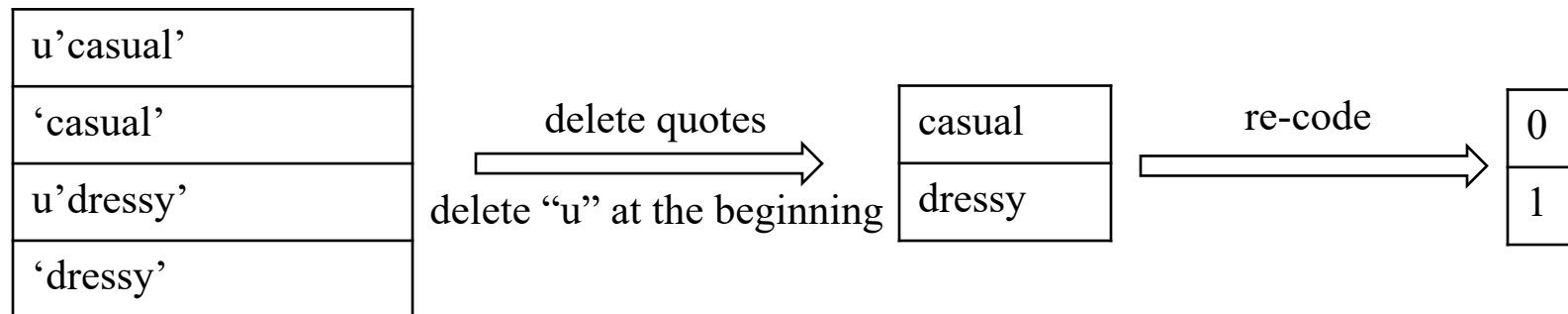


# Data Pre-processing

- Alcohol



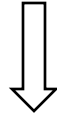
- RestuarntsAttire



# Data Pre-processing

- Ambience

```
"{'romantic': False, 'intimate': False, 'classy': False, 'hipster': False, 'divey': False, 'touristy': False, 'trendy': False, 'upscale': False, 'casual': True}"
```



```
{"romantic": 0, "intimate": 0, "classy": 0, "hipster": 0, "divey": 0, "touristy": 0, "trend": 0, "upscale": 0, "casual": 1}
```



romantic	intimate	classy	hipster	divey	touristy	trend	upscale	casual
0	0	0	0	0	0	0	0	1

- BusinessParking is processed in the same way



# Attributes Analysis

- Do ANOVA to find significant attributes
  - Alcohol, Ambience.casual, Ambience.classy, GoodForKids,
  - RestaurantsAttire, RestaurantsDelivery, RestaurantsReservations
- Do linear regression on star ratings against selected attributes
- Comments

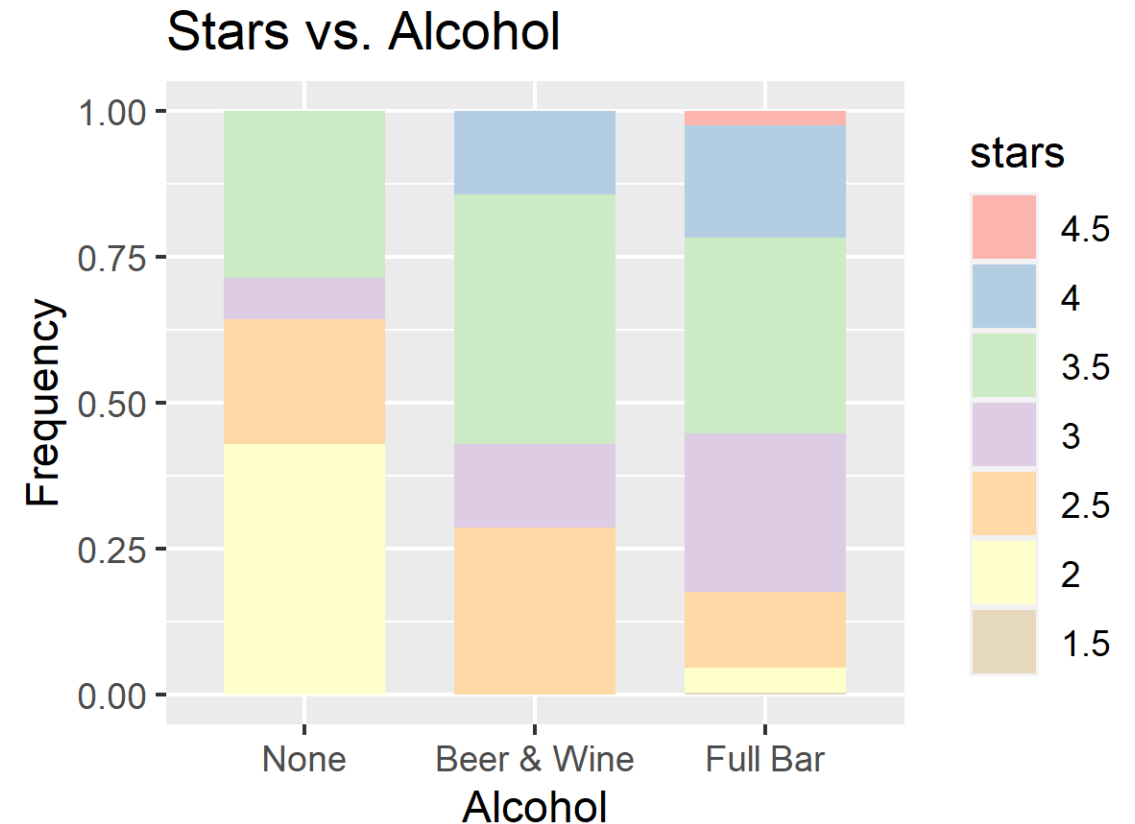
Our goal is to find contributions of the attributes, not to predict star ratings of steakhouse businesses.



# Attributes Analysis Results

With all the other attributes fixed, average star ratings will

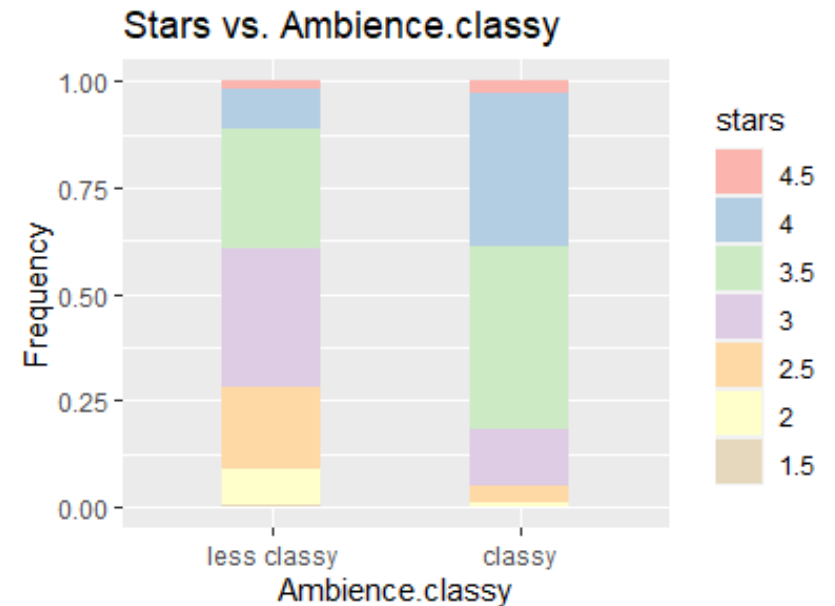
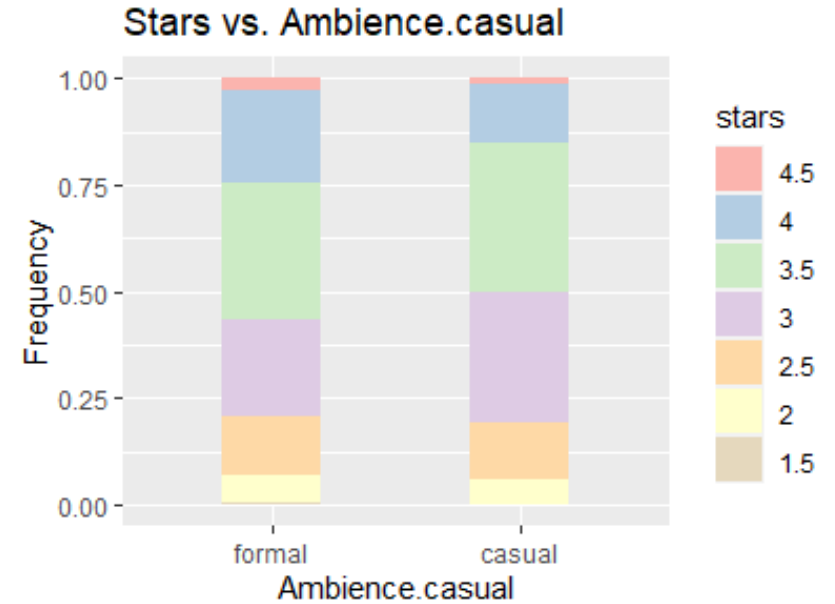
- increase 0.5789 if the steakhouse business provides only beer and wine
- increase 0.4049 if the steakhouse business provides all types of alcohol as a full bar



# Attributes Analysis Results

With all the other attributes fixed, average star ratings will

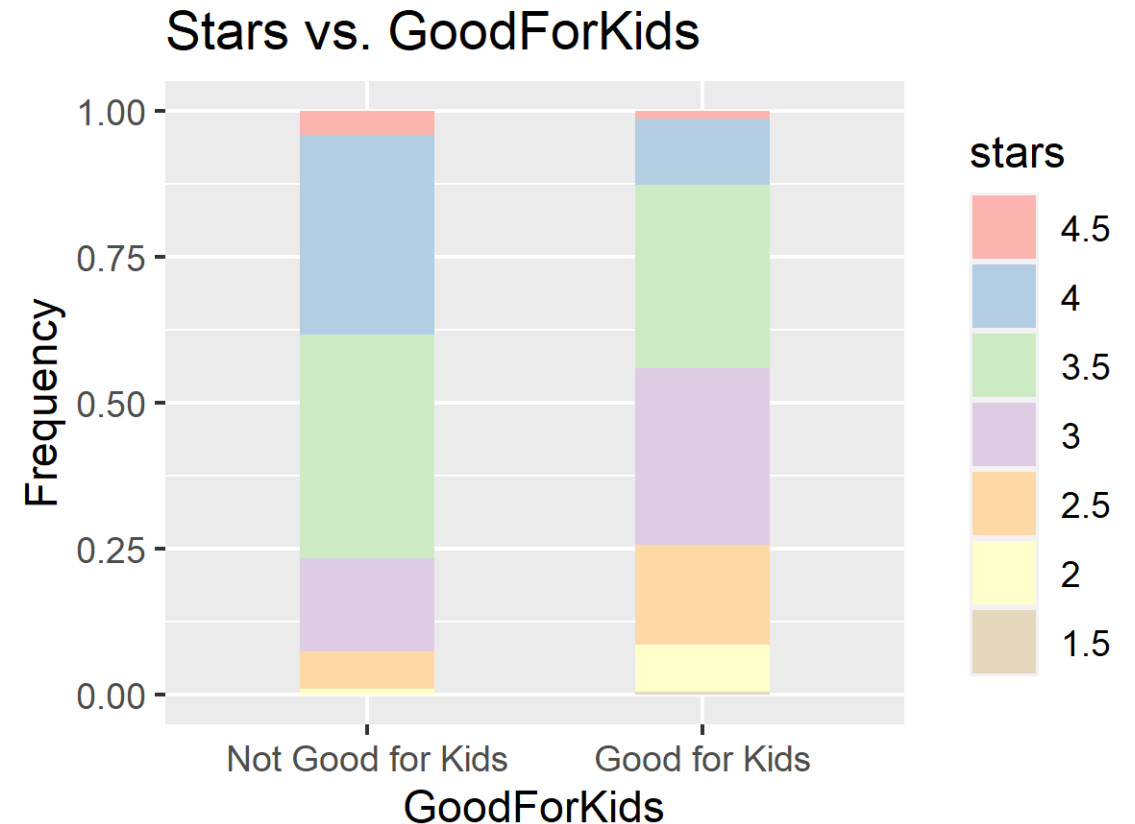
- increase 0.1991 if the ambience is more casual
- increase 0.3301 if the ambience is classier



# Attributes Analysis Results

With all the other attributes fixed, average star ratings will

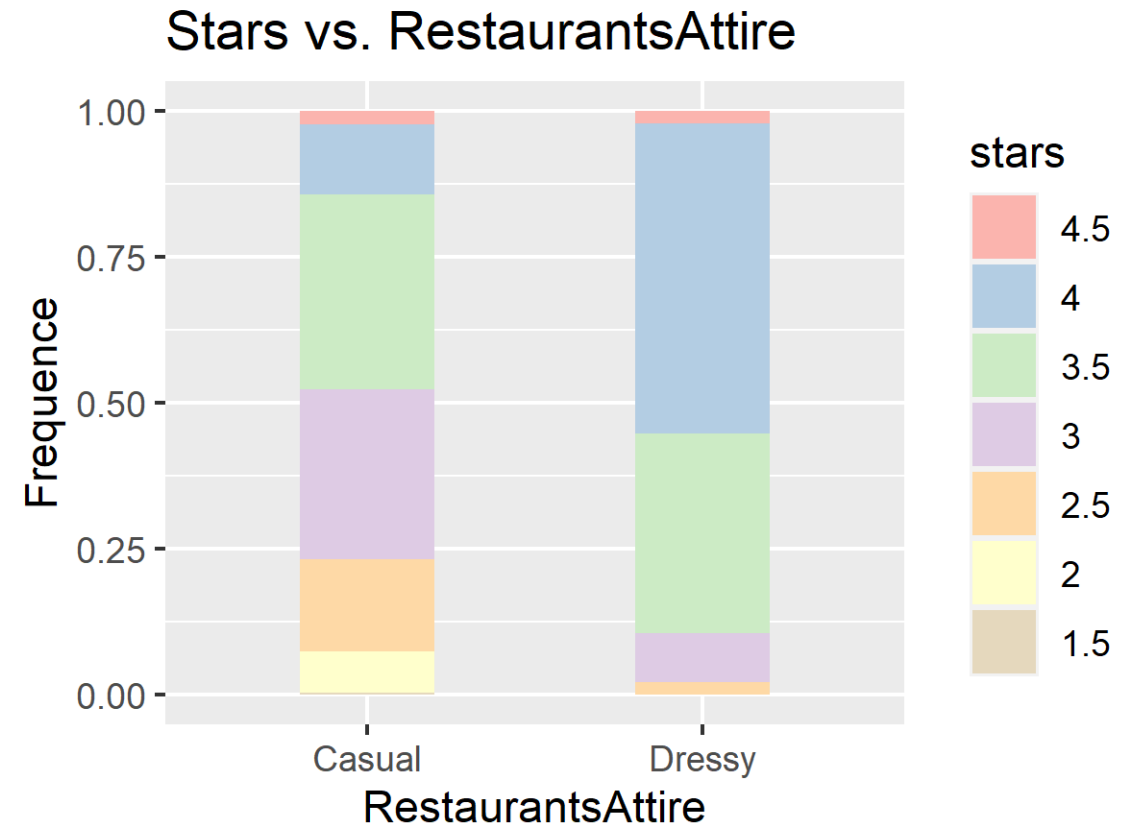
- decrease 0.1579 if the steakhouse business is good for kids



# Attributes Analysis Results

With all the other attributes fixed, average star ratings will

- increase 0.2031 if waiters in the steakhouse business dress more formally

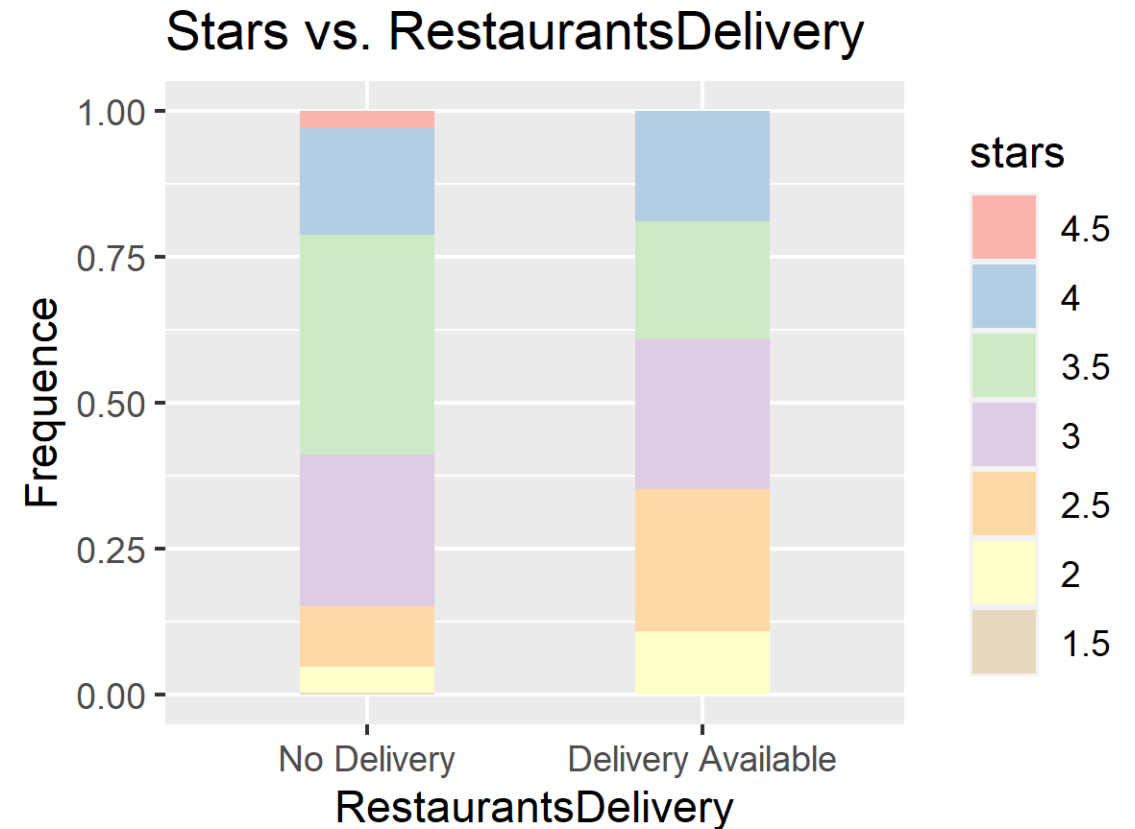




# Attributes Analysis Results

With all the other attributes fixed, average star ratings will

- decrease 0.1437 if delivery is available;



# Attributes Analysis Results

With all the other attributes fixed, average star ratings will

- increase 0.1605 if reservation service is available;



# Attributes Based Suggestions

Steakhouse business owners should

- provide information on type of ambience, alcohol provided, whether the restaurant is good for kids on Yelp
- ask the employees to dress more formally
- provide reservation service



# Shiny App

Link: <https://rhuang95.shinyapps.io/shiny/>

1. Star Rankings and Popularity
2. General Advice
  1. Food-related
  2. Service-related
3. Customized Business Advice

## Yelp Steakhouse Business Analysis

Guide


Rankings

General Food Advice

General Service Advice

Customized Business Advice

### Guide for this app



This app is designed to provide valuable information and actionable advice about the steakhouses in OH, PA, WI, and IL. The main functions are as follow:

Rankings— —You can have an intuitive understanding of the star ranking and popularity ranking of your steak house in the city located. At the same time, through the selecting function of the sidebar, you can obtain the distribution of star ratings and review counts of a specified city or state, to better understand the position of restaurant operations in the entire industry.

General Food Advice--You can intuitively understand which attributes of the steakhouse are more crucial in terms of food through the word cloud diagram. And accordingly, specific food-related suggestions for the entire steakhouse industry are provided.

General Service Advice--You can intuitively understand which attributes of the steakhouse are more crucial in terms of service through the word cloud diagram. And accordingly, specific service-related suggestions for the entire steakhouse industry are provided.

Customized Business Advice--This is the most valuable part of this app, where you will get very detailed and actionable suggestions on your steakhouse to improve the operations.

Please choose your steakhouse:

**State:**

All

**City:**

All

**Steakhouse Name:**

All

If any question, please contact us:

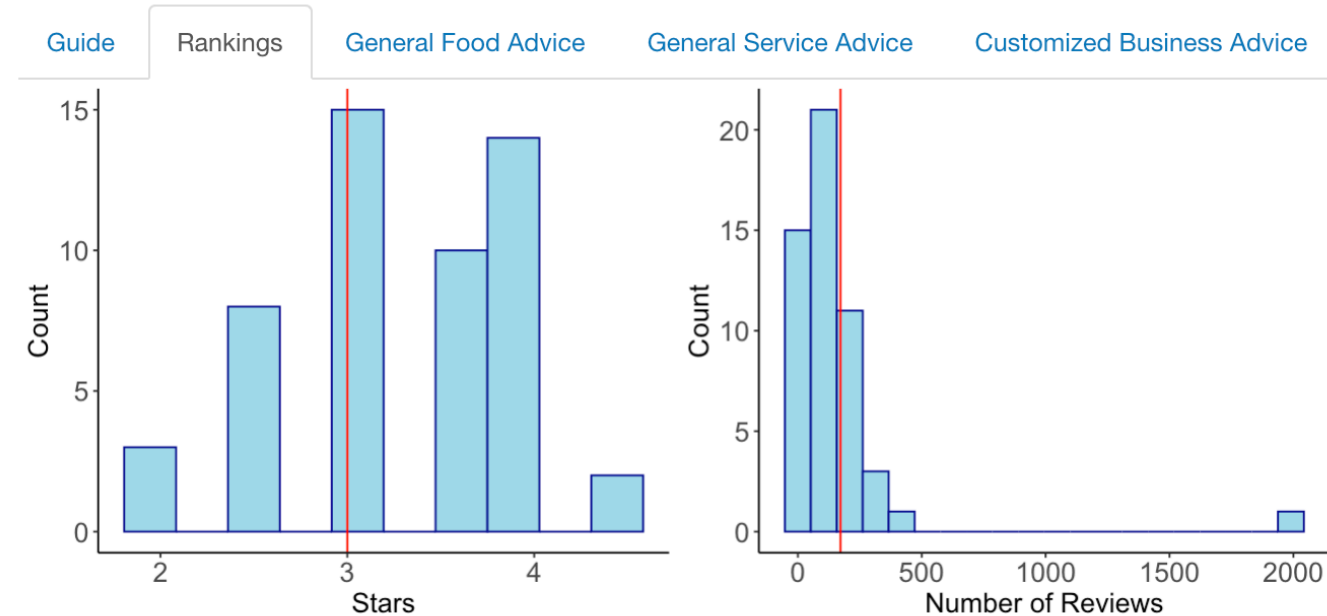
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# Yelp Steakhouse Business Analysis



Please choose your steakhouse:

**State:**

PA

**City:**

Pittsburgh

**Steakhouse Name:**

Grandview Saloon

If any question, please contact us:

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## Stars Ranking:

The distribution of stars of all steakhouses in the selected city is shown in the left figure. Your steakhouse is a 3 star restaurant. You have beaten 21.2 % steakhouses in the city, 19.8 % steakhouses in the states, and 20 % steakhouses in all four states. You may have a look at the distribution of the stars by reselecting in the sidebar.

## Popularity:

The distribution of review\_counts of all steakhouses in the selected city is shown in the right figure. Your steakhouse has 172 reviews in total. You have beaten 71.2 % steakhouses in the city, 79 % steakhouses in the states, and 87.2 % steakhouses in all four states. You may have a look at the distribution of the stars by reselecting in the sidebar.



# Yelp Steakhouse Business Analysis

[Guide](#)[Rankings](#)[General Food Advice](#)[General Service Advice](#)[Customized Business Advice](#)

## Food-related Keywords



## Food-related Suggestions

**Steak Quality!** For a steak house, the priority is to ensure the quality of the steak. This is what customers pay most attention to.

**Design your desserts!** Please pay attention to the whole procedure of the dinner, including appetizer, side dish, soup, salads. Especially, we found customers have special interests in desserts, so serving creative desserts may greatly help to attract customers.

**Serve sea foods!** Besides beef, customers often consider our type of meats. We found sea foods is seafood is the most popular besides steaks. It will be a good idea to serve crabs, shrimps, tuna, salmon and oysters.

**Special foods are a good idea!** We found sushi is very popular to the customers. Serving some special foods like Asian foods or Italian foods can make your restaurant unique to the others.

**Good Drinks!** A good bartender can bring a lot of praise to the restaurant. Please pay extra attention to make good martinis, people like them!

Please choose your steakhouse:

**State:**

PA

**City:**

Pittsburgh

**Steakhouse Name:**

Grandview Saloon

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# Yelp Steakhouse Business Analysis

## Guide

## Rankings

## General Food Advice

## General Service Advice

## Customized Business Advice

## Service-related Keywords



## Service-related Suggestions

Service well! Service is always important for a fine restaurant. Please serve friendly and quickly. Offering convenient reservation and delivery will also help a lot.

Nice Atmosphere! Atmosphere is found to be the most important non-food factor for a steak house. Comfortable music, warm lighting and beautiful tableware etc., will make a pleasant dining atmosphere.

Make prices reasonable! People always cares about prices. We recommend setting relatively high prices for high-quality ingredients and designing some affordable dishes. This allows customers to choose for themselves.

Special foods are a good idea! We found sushi is very popular to the customers. Serving some special foods like Asian foods or Italian foods can make your restaurant unique to the others.

Brunch is a good idea! Customers like brunch and it will bring extra income to the restaurant.

Please choose your steakhouse:

**State:**

PA

City:

Pittsburgh

Steakhouse Name:

Grandview Saloon

If any question, please contact us:

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# Yelp Steakhouse Business Analysis

[Guide](#)[Rankings](#)[General Food Advice](#)[General Service Advice](#)[Customized Business Advice](#)

## Suggestions:

Already a good Steakhouse! Several suggestions that will improve your star ratings:

You should only provide beer and wine.

You do not need to make great efforts to attract young customers.

You waiters should dress more formally. Avoid casual attires.

Try to make the atmosphere more casual.

You should create a classier ambience. This will leave an elegant impression on your customers.

Please choose your steakhouse:

**State:**

PA

**City:**

Pittsburgh

**Steakhouse Name:**

Grandview Saloon

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# Conclusions

1. Essential information about the ambience, alcohol provided and good for kids.
2. Formal dress code for waiters
3. Provide reservation service



# Strength and Weakness

- Strength:

- Simple methods
- Easy to implement
- Easy to interpret

- Weakness:

- Violate normality assumption
- Fail to include the information of users

- Improvement:

- Add weight or explanatory variables extracted from the unused dataset



Thank you

