MIAMI HERBERT
BUSINESS SCHOOL

Restaurants

Recommender System

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Introduction

Motivation

- Practical
- Interesting

Objective

- Recommend restaurants to **users**
- Help **restaurants** improve ratings

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Introduction

Dataset

- **Restaurants info**

  -Parking, Payment, Cuisine, Alcohol, Dress code…

- **Users profile**

  -Budget, Dress preference, Drink level…

- **Rating**

  -Overall, Food, Service

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Introduction

Procedures

- **Data Preparation**
  - -Data cleaning (Cuisine, Payment, Parking…)
- **Exploratory Analysis**
- **Models**
  - -Recommender System
  - -XGBoost (SHAP)
- **Application**

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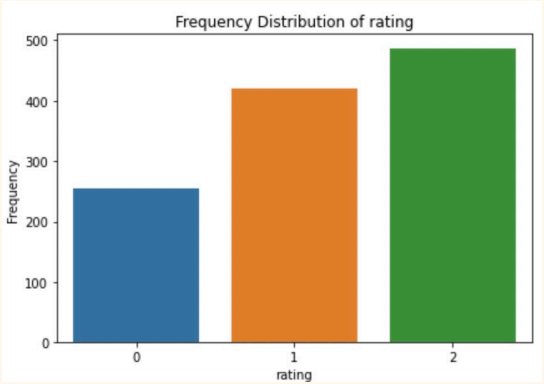
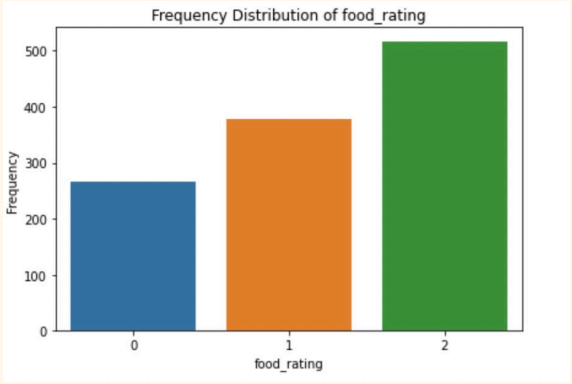
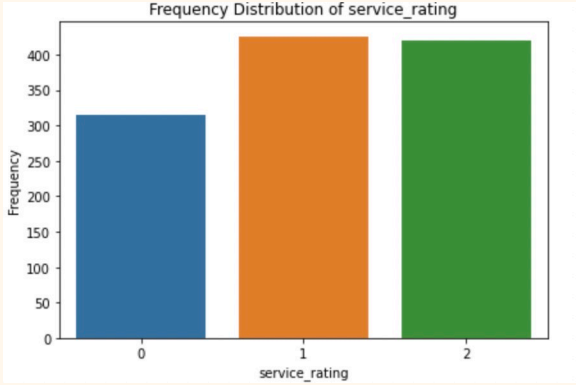
Exploratory Analysis

Distribution of Rating







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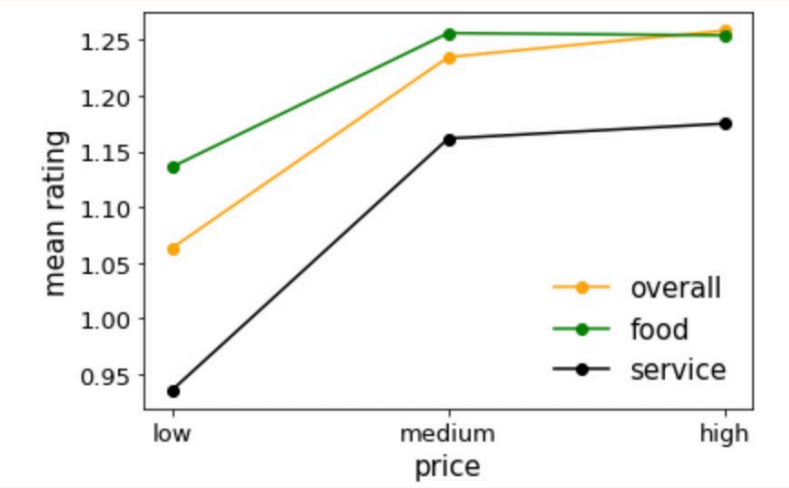
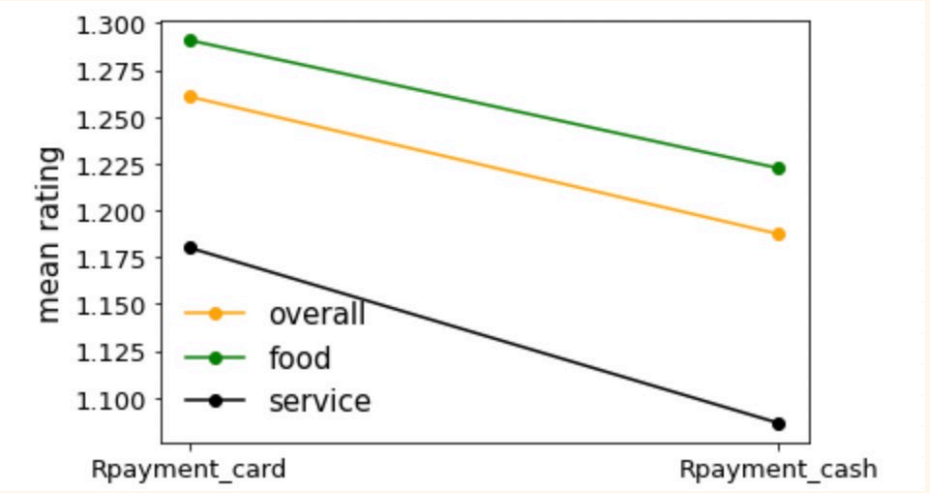
Exploratory Analysis

Rating by Price



Rating by Payment



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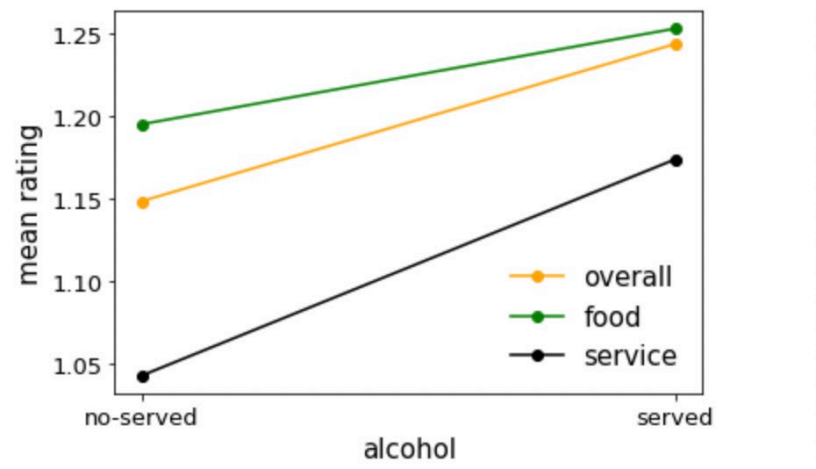
Exploratory Analysis

Rating by Alcohol



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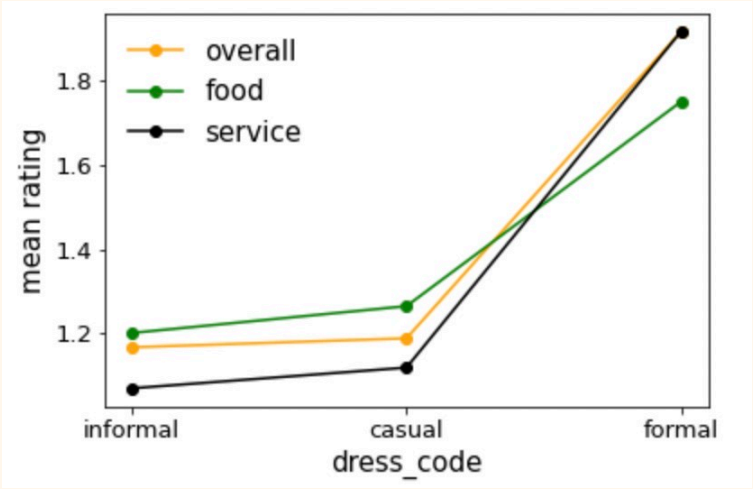
Exploratory Analysis

Rating by Dress Code



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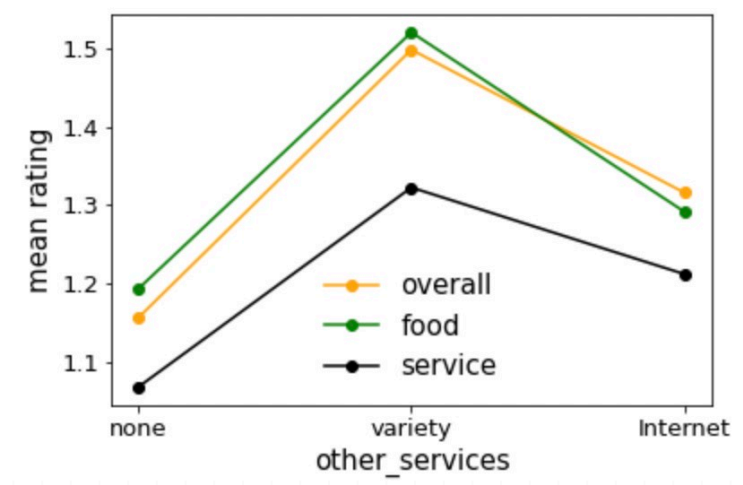
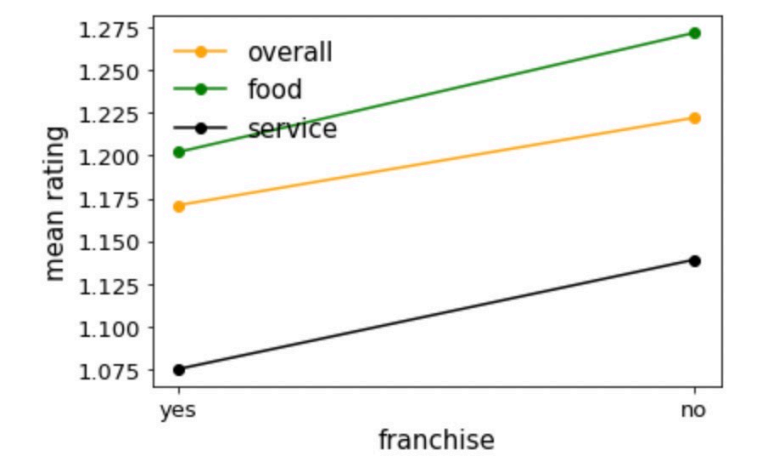
Exploratory Analysis

Rating by Service



Rating by Franchise



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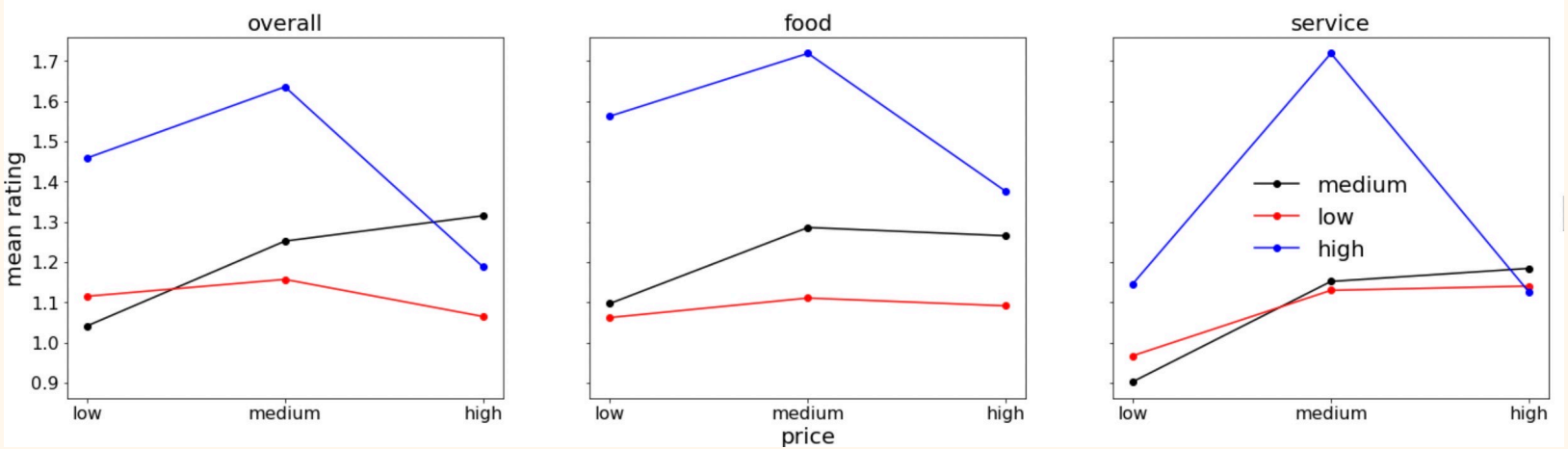
Exploratory Analysis

Rating by Customer Budget



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Recommender System

GridSearchCV

	RMSE	
SVD	0.579570	
KNN_Basic	0.583880	Item-based
KNN_Zscore	0.590160	User-based
KNN_Means	0.614932	User-based

SVD HAS LOWEST RMSE!

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Application

Randomly pick a userID (e.g. U1054)

Get restaurants with predicted rating higher than 1.5

Recommend to User U1054

Generating Recommendations for Users using SVD

	Restaurants	Rating (0-2)
0	La Cantina Restaurante	2.0
1	Restaurante Guerra	2.0
2	rockabilly	2.0
3	Log Yin	2.0
4	emilianos	2.0
...	...	...
116	Pollo_Frito_Buenos_Aires	1.55
117	Restaurante 75	1.52
118	pizza clasica	1.52
119	Taqueria EL amigo	1.52
120	Gorditas Doa Gloria	1.51

Filter Top 10

	Restaurants
0	La Cantina Restaurante
1	Restaurante Guerra
2	rockabilly
3	Log Yin
4	emilianos
5	La Estrella de Dimas
6	la Cochinita Pibil Restaurante Yucateco
7	El cotorreo
8	Dominos Pizza
9	Gorditas Dona Tota

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XGBoost

Identify characteristics of high-rating restaurants

Provide suggestions on how to improve ratings

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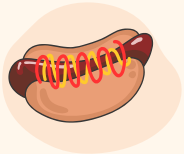
XGBoost

Optimal parameters obtained by GridSearchCV

OPTIMAL PARAMETERS	
COLSAMPLE_BYLEVEL	0.5
LEARNING_RATE	0.05
MAX_DEPTH	3
N_ESTIMATORS	100

Train Data Lowest RMSE: 0.338



Test Data Lowest RMSE: 0.373

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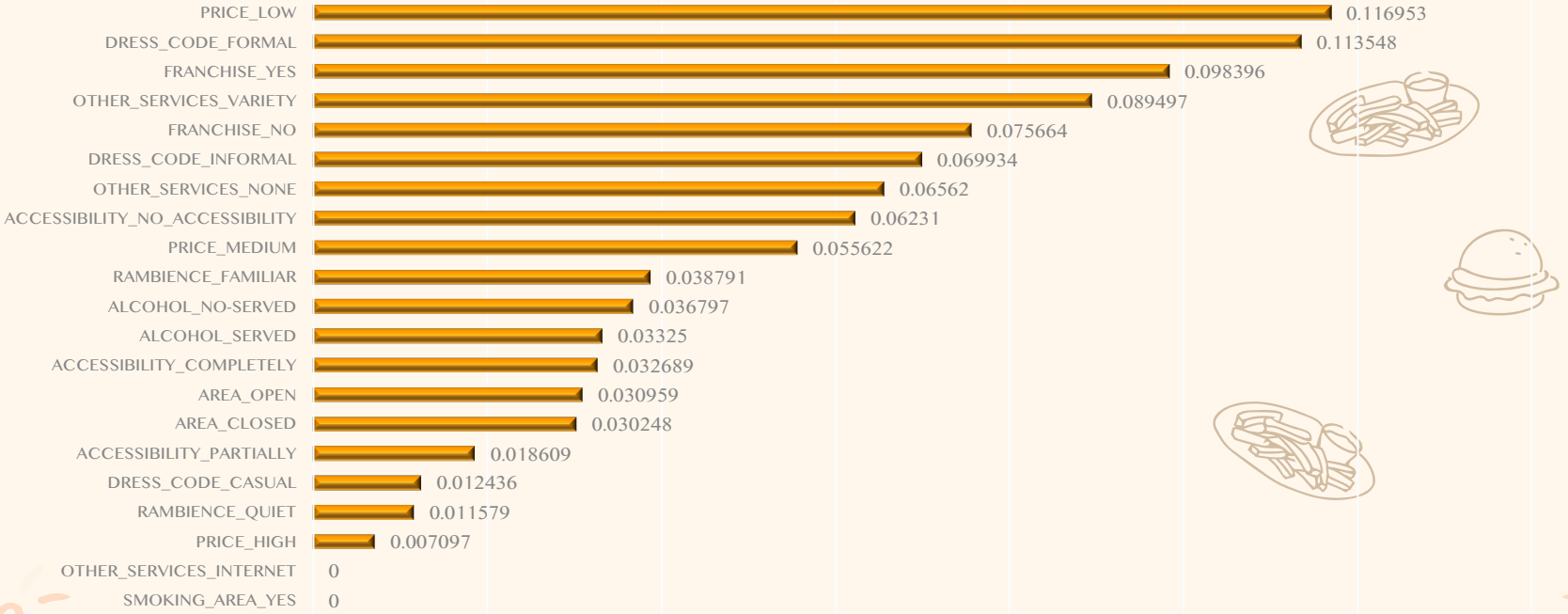
XGBoost

Feature importance



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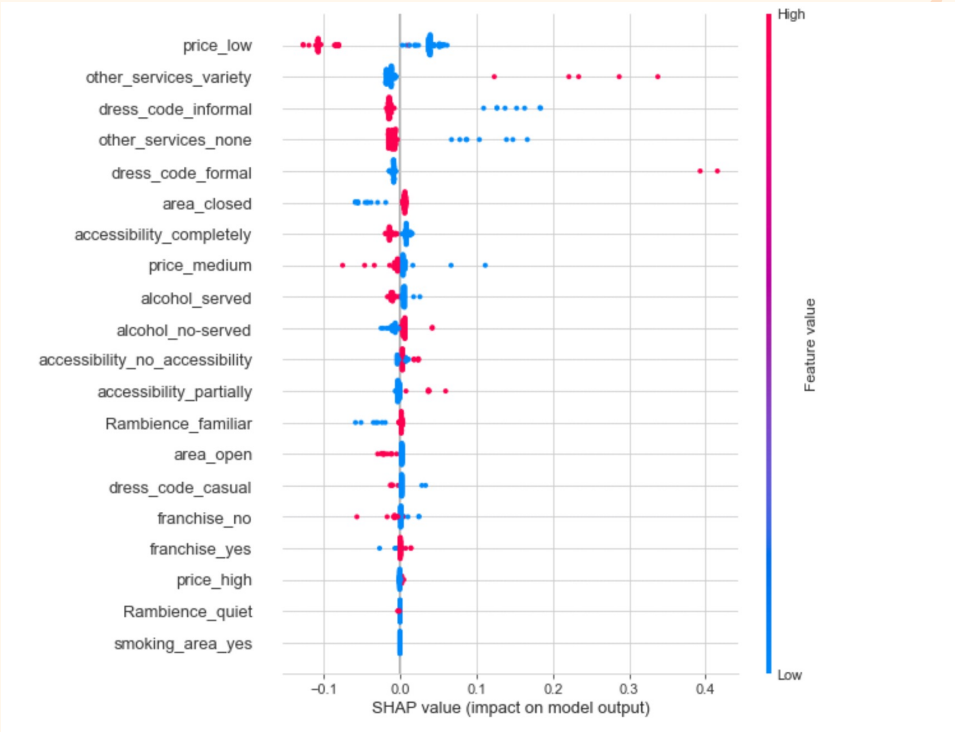
XGBoost

Introduce shape value to determine the positive and negative coefficients of variables

E.g. When the price of the restaurant belongs to ‘low price’, the rating will be relatively lower



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Application

XGBoost Modeling

Top 4 Characteristics of high-rated restaurants

- ✓ Low Price
- ✓ Formal dress code
- ✓ Franchise
- ✓ Variety service

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Which restaurant do you like?