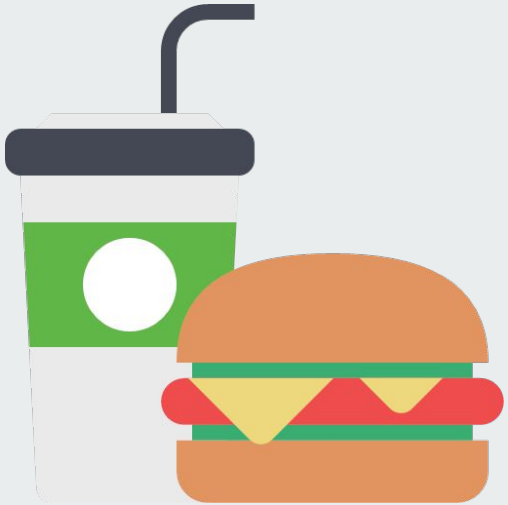
How to avoid the close-down of fast food restaurants?

Module 3–Group 11
Jiaqi Xia, Yutong Zhang, Midhun Satheesh



Goal&Outline

- Attribute analysis
- Review analysis
- Recommendations
- Shiny app

Attribute Analysis

Logistic Regression Model

$$P(Y = 1 \mid X)$$
$$= logistic(1.76 + 3.22*Delivery - 1.13*TakeOut - 1.88*Price - 1.45*Reservations - 0.29*GoodForGroups)$$
$$= \frac{exp(1.76 + 3.22*Delivery - 1.13*TakeOut - 1.88*Price - 1.45*Reservations - 0.29*GoodForGroups)}{1+exp(1.76 + 3.22*Delivery - 1.13*TakeOut - 1.88*Price - 1.45*Reservations - 0.29*GoodForGroups)}$$

Status of Fast-Food Restaurant	**Delivery**	**Take Out**	**Price Range**	**Reservations**	**Good For Groups**
Open(low star ratings) = 1 Closed = 0	Provide delivery service or not	Provide take out service or not	Price range from 1-2	Accept reservation or not	Good for groups or not

Interpretation & Prediction

- Among fast food restaurants with identical selected attributes except delivery service, if the restaurant provides delivery service, the odds of avoiding close-down will increase by 25.03%.

- The probability of remaining open for a fast food restaurant with delivery service, takeout service and the lowest price range is estimated to be about 87.7%.

Review Analysis

Review Cleaning

- ❏ Convert text into words
- ❏ Convert words abbreviation into full words (wasn't=was not, can't=can not)
- ❏ Lowercase all reviews and remove numbers, punctuations and stopwords
- ❏ Replace the negations with their synonyms (not worth = expensive, never disappointed=satisfied)
- ❏ Split the words in reviews into positive and negative ones

idx	name	stars	positive	negative
2	Hardee's	1.78	['love', 'delicious']	['horrible', 'negative', 'bad', 'angry', 'negative', 'pathetic', 'with']

Sentiment Analysis

- Select the top 6 fast food nouns by counting the words frequency
- Define customer attitude score = # positive review of a food noun / # all review words of that food noun
- Do a Chi-Square Test to see whether the six food nouns and customer attitude score are independent or not (p-value < 0.05).

name	pos_count	neg_count	attitude_score
cheese	37196	9858	0.790
hot	39944	10330	0.795
pizza	16565	3347	**0.832**
salad	32736	7674	0.810
taco	18182	4901	0.788
burger	27139	7487	**0.784**

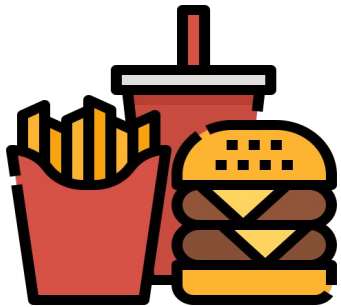
Recommendations & Shiny App

Recommendations

- ❏ Provide delivery service:
  Why? If the fast food restaurant provides delivery service, the odds of avoiding closure will increase by 25.03%.
- ❏ Introduce competitive pricing and great deals
  Why? Food with a lower price range will improve 6.55 times the odds to let restaurants remain open.
- ❏ Cancel the reservation needs
  Why? Cancel the reservation will increase the probability of fast food restaurants remaining open by 4.26 times.
- ❏ Provide more space for the people who come individually to follow the trend of the fast pace of modern society
  Why? Fast food restaurants which suitable for eating alone tend to have a higher probability(95.67%) to remain open than Fast food restaurants which unsuitable for eating alone (94.31%).
- ❏ Improve the quality and taste of burgers
  Why? Burger has the lowest customer attitude score equal to 0.784 among the food menu.

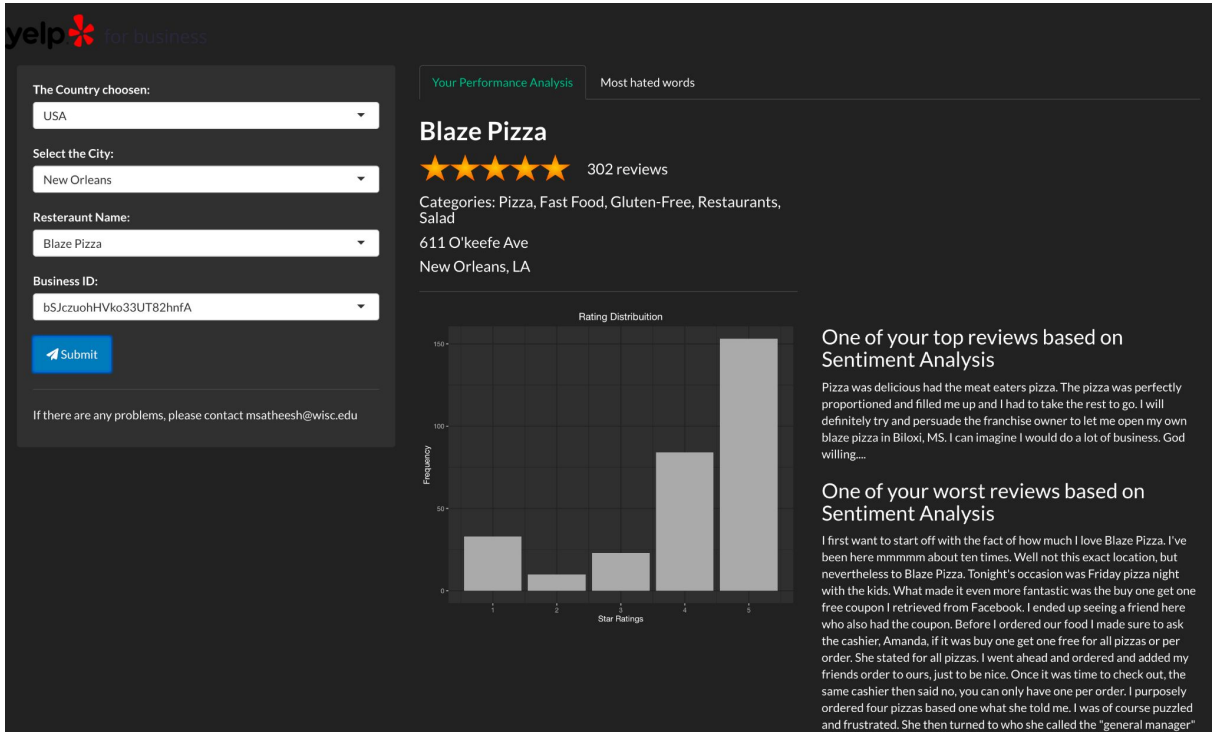
Limitations and Future Work

- Since our recommendations are only based on the proportion of attributes, they are not comprehensive enough for fast food restaurants.
- Our recommendations limit how to help a fast food restaurant avoid closure.
- Introducing Aspect Based Sentiment Analysis (ASBA) and Natural Language Inference (NLI) models for a comprehensive study. Using advanced transformer bases NLP models like GPT-3



Shiny App

https://msatheesh.shinyapps.io/Module-3/



Thank you！