How to raise your rating on Yelp - for bubble tea shop

Group 11

Zhengyuan Wen, Jiaying Jia, Qilu Zhou

Github: https://github.com/wennroy/Stat628_Module3_Group11

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Intro

We select bubble tea shops from the whole Yelp data set by filtering shops which category includes "bubble tea"

- Delete 10 shops without business id
- Delete 2 shops offer paid WiFi
- Delete shops which open hours are less than 15 hours a week

Our data contains 686 shops including basic information about shops, 34 attributes and key words information in reviews

Attributes Analysis

We conduct an ANOVA to find out important attributes on affecting stars.

- WiFi, weekly open hours, Outdoor Seating, Wheelchair Accessible, Noise Level

We separate some of the attributes in several levels and do linear regression to see how they affect stars

- Free WiFi would increase stars by 0.39
- Weekly open hours less than 56 would increase stars by 0.40
- Quiet shops would be 1 star higher than very loud shops

Linear Regression Table

Table 1: Regression Estimate of Significant Attributes

Variable	Estimate	Std. Error	t value	P value
Intercept	3.90	0.17	23.09	<2e-16
Weekhour 56-84	-0.09	0.05	-1.83	0.07
Weekhour > 84	-0.31	0.10	-3.10	0.002
WiFi no	-0.16	0.06	-2.63	0.009
WiFi none	-0.23	0.07	-3.59	0.003
BusinessAcceptCreditCards	3.12	1.56	5.24	0.006
OutdoorSeating None	0.20	0.05	3.68	0.0003
OutdoorSeating True	0.10	0.06	1.76	0.0798
NoiseLevel quiet	0.20	0.07	2.76	0.006
NoiseLevel very_loud	-0.85	0.39	-2.19	0.03

Review Analysis

Model: BERT
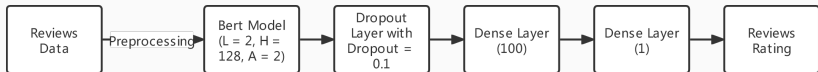**Input:** Review
Output: Rating of a review

Figure 1: Structure of model

Model

- Split the dataset in a ratio of 2:8 for validation and training
- Batch Size: 32
- Optimizer: Adamw optimizer with 10% warm up steps
- Loss function: MSE

Table 2: Training and validation loss (MSE)

Epochs	1	2	3	4
Training Loss	0.7899	0.4795	0.3810	0.3415
Validation Loss	0.5445	0.5255	0.4958	0.4957

Examples

1. *This is my FAVORITE place to get bubble tea——4.9756384——(5)*

2. *Great selection of bubble tea. Taste good. Just a bit SLOW on service. When we came place is packed and it's 9:15pm. Not enough space to sit.——3.4802856——(3)*

3. *No flavor AT ALL!! Their milk tea is like water. Paying $5 for a cup of water is NOT WORTH it. Don't come here——1.0761615——(1)*

Give sentiment scores for sentences.

1. *Great selection of bubble tea.——4.5920970*

2. *Taste good.——3.9835355*

3. *Just a bit SLOW on service.——2.5831962*

4. *When we came place is packed and it's 9:15pm. Not enough space to sit.——2.0814338*

We defined 6 aspects to describe the overall performance (rating, score) of a bubble tea shop.

Atmosphere
atmosphere; ambience; environment

Price
price

Service
service

Food
food; drink

Ingredients
tora; bubble; boba; herbal; rainbow

Tea Types
black tea; oolong tea; green tea; matcha; jasmine

Sentiment Scores Table

Table 3: Sentiment Scores (Ratings) for all 686 bubble tea shops

Aspects	Atmosphere	Price	Service	Overall
Scores	4.213204	3.376005	3.704744	3.736795
Aspects	Food	Ingredients	Tea Types	Overall
Scores	3.460416	3.777528	3.888872	3.736795

Suggestions

- **Method:** Welch's t test
- Calculate the sentiment scores for each key word and compare them with the overall level at 5% significance level
- Put the word into our suggestions or strengths since results suggest that it do better or worse than the overall level

Finding

Oolong tea (4.142) is the best tea types compared to green tea (4.104), black tea (4.015), matcha (3.864) and jasmine (3.838)

Shiny App

Our shiny app realizes the three major functions.

- **Basic Information:** star rating, number of reviews, detailed address, open hours, bar plot of the star ratings from six aspects
- **Rating Analysis:** four radar plots comparing the shop with all shops from 4 aspects: overall, ingredients, tea types and dessert
- **Performance:** customized strengths and suggestions

Link to Shiny App
https://uadvip-jiaying-jia.shinyapps.io/shinyapp/

Conclusion

Conclusion

Strengths

- Clear and easy to interpret
- Detailed, thorough and customized suggestions from tea types, ingredients to ambiance and Wifi
- Shop owners can accurately improve their performance

Weaknesses

- The algorithm we use would run for a long time
- Use sentence sentiment scores (might contain several words) to substitute word sentiment scores
- Some of the ANOVA and LR results are hard to interpret