

Data-Driven Suggestions for Pizza Hut and Shiny App

Stats 628 Module 3 Group 8

Recall from last time

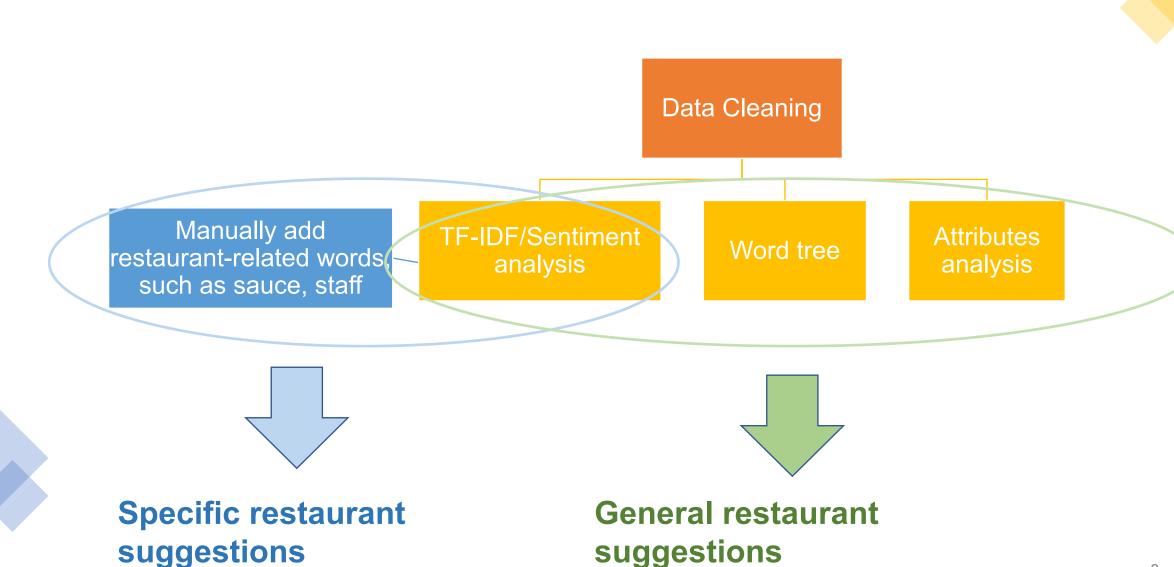
Sentiment Analysis:

- Extract sentences from reviews with important features
- Analyze each sentence's sentiment level by Nltk package in Python
- Calculate the average compound sentiment score for each features
- Compound score is a metrics to measure the sentiment between -1(most extreme negative) and +1(most extreme positive)
- Generally Pizza Hut has the lowest scores!

	Location	Delivery	Service
Dominos	0.054	0.039	-0.032
Pizza Hut	0.019	-0.014	-0.064
Little Caesars	0.108	0.144	0.141
Papa Johns	0.045	0.061	0.007
California Pizza Kitchen	0.255	0.162	0.278
Papa Murphy's	0.224	0.167	0.302
Sbarro	0.189	0.266	-0.045
Marco's Pizza	0.19	0.142	0.188
Chuck E. Cheese	0.276	-0.01	0.186
Cici	0.183	-0.157	0.361

New Target: Give suggestions to help Pizza Hut

Our project overview



Data Cleaning

- Filter business names with keyword "Pizza Hut"
- Merge business, review and attributes datasets by business_id
- Review's part: find suitable stop words; lemmatization; Only keep nouns and adjectives
- 145 different Pizza Hut restaurants in 64 cities with 3186 reviews

Extract Detailed Attributes





TF-IDF/Sentiment analysis

wing	management	rude	service	business_id
0	None	-0.5709	-0.37615	kqhHw_9KA30_RYk66mMbJA
-0.31415	-0.8481	-0.2386	-0.196945	hWRZaOk4JWUPFhcomdOLwA
0.109283	0	-0.89144	-0.170167	6EwA03Jcw5VaPc8BNiwrpw
0.00128667	None	-0.7184	0.333382	HUEZLPIM64cDZnfHE1H3AA
0.0695571	-0.5267	-0.743	0.0113625	_zy93iWV8Z-YmfvjWPcfAQ
0.3951	None	-0.700633	-0.135733	I_x49glkQuAz9kg-Cw4RXA
-0.13775	None	0.0258	-0.0910667	grYs6eZRJnQFts_6lZfSpw
-0.38585	-0.7702	-0.50375	-0.266025	iWslEebATIwbQXa4VIYOaQ
-0.148	-0.6122	-0.73326	-0.526636	8xbSg5zjg9Z92hPjEsXy4w
-0.5106	None	-0.7717	-0.397475	cNil4ExqTvXBkd9arVGx1g

TF-IDF

 Help us find keywords in reviews, not just the most frequently occurring words

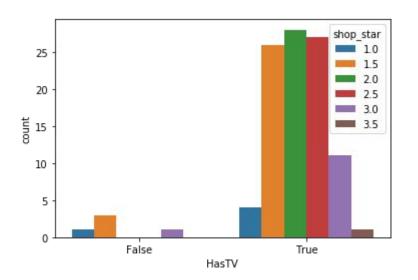


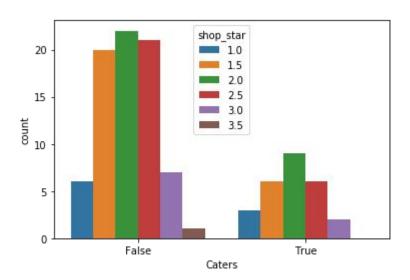
Word Tree: find connection between words

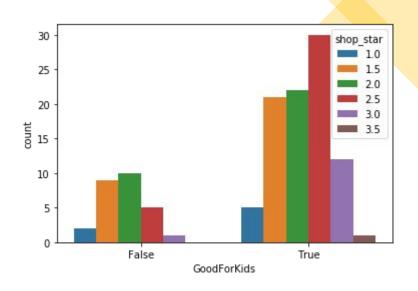
word tree Shift-click to make that word the root disrespectful. I w . He threw the pizza on the coun nice and we git our anchovies very fastPizza Hut yo helpful and informative. We are very happy not on from the very star after my third called she stated with my girlfriend and told her the buffet was "ove rude ! No apology! No discount on \$50 purchase. We h as all hell!! Told me there was nothing she could d - . I was very calm speaking to her but d - to me and very annoyed with me . I de confrontational that I did not even get past the ordering upset at my request of 2. 07 cent for my blue cheese the working at the moment, she said there is nothing she not apologetic or seemed to care about our inconvenience at all interested in offering any customer service but 1 ruder to him and did not let him speak and he got 6 even disrespectful and unapologetic when I went in to ta to handle situation. I mean.... What so difficultn either m no way apologetic.\n\nThey even got my pizza wrong on kind, and the staff was also friendly. I get it. We\ super stressed out and mean. Told me they were closed and polite. They got our food out in 10 min. I can\'t manager nice was . She ended up giving me the other two pizzas for fre tiny person and said the pizza still was not ready after I car lady, so who was this guy, probably the other man who was give me a \$15.00 (good for 30 days) credit t \'call me back\' but that never happened. \r unaware on how to appropriately dea adament on tolling mo it was my fault. Anyway, I was putting in my

word tree delivery time is Shift-click to make that word the root, (always longer) and to **NEVER** accurate , pizza is always cold, 2 plus hours and when you receive the delivery it\'s delivery—time—is always about 2 hours and when you get the food it\'s alway around the same, so irresponsable and unprofessional, the two pizzas was cold at an HOUR MINIMUM! (Tonight it was est 75min!) \n\nSecond; customer s

Attributes analysis







- Only retain attributes with a missing rate below 20%
- Some attributes are almost the same in all shops, such as "HasTV"
- For some features, the distributions of restaurant ratings are very similar, such as "Caters"
- Finally, we choose two attributes, "GoodForKids" and "GoodForGroups", as for these two, the distributions of restaurant ratings are quite different

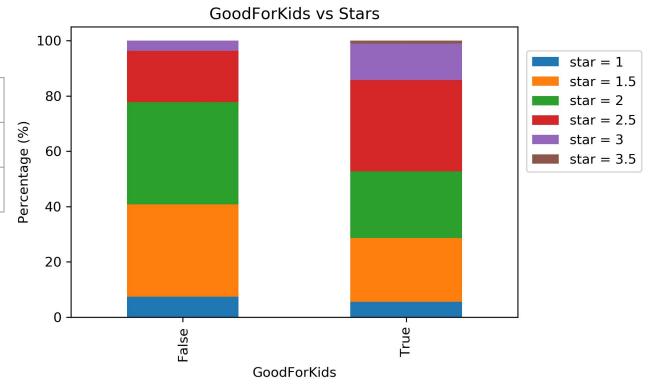
General Action Plan for Service

Make the Restaurants Kids Friendly:

	GoodForKids	NotGoodForKids	
average ratings	2.14	1.89	
t-test p-value	0.014		



- children's seats in the store
- set up a children's play area
- enrich types of children's meals
- set up family toilets



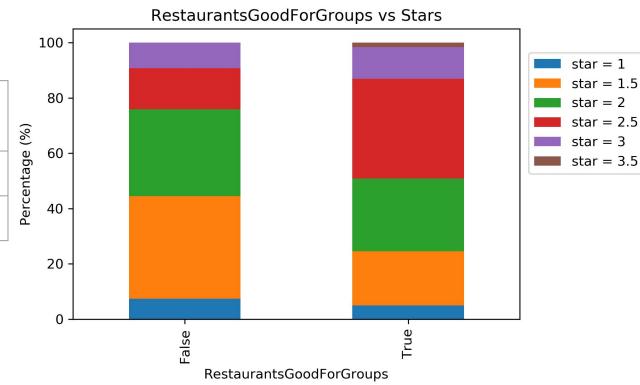
General Action Plan for Service

Make the Restaurants Groups Friendly:

	GoodForGroups	NotGoodForGroups	
average ratings	2.17	1.91	
t-test p-value	0.006		

recommendations:

- the number of large tables in the store
- launch a set menu for groups



General Action Plan for Service

Train Managers More Friendly:

	manager	with "friendly" in "manager"	
average ratings	1.41	3.04	
p-value	10^(-4)		

• A representative review from customer:

"Their manager is rude and obnoxious."

recommendations:

- Strengthen the training of restaurant managers
- organize the selection of the friendliest employees



General Action Plan for Delivery

Make Delivery Faster and On-time:

	deliver	with "wait/slow" in "deliver"
average ratings	1.75	1.33

• A representative review from customer:

"ZERO PERCENT RECOMMENDED. Very slow service. Took 34 minutes to get my breadsticks 50 minutes to for my pizza."

recommendations:

- better food delivery platforms
- own delivery team



General Action Plan for Food

Keep the Food Warm for Eating:

- 358 out of 3186 reviews mention the adjective "cold" (11.2%)
- The average sentiment score associated with "cold" is -0.096
- A representative review from customer:

"There is no way I want a discount for cold pizza. It is unacceptable and really upsets me."

recommendation:

• Use an incubator during delivery



Specific Action Plan Example

Except above 5 significant features, we also find some features having differentiation ability and including enough reviews like "wing", "cheese", "pepperoni", "bread".

	wing	cheese	pepperoni	bread
example restaurant	-0.31	-0.16	0.64	0.35
average sentiment score	0.07	0.02	0.09	0.11

Weaknesses and Future work

- normality assumption in hypothesis test
- Subjectively selected features
- Use other Pizza chains' data

Shiny App:

•https://wangcongming95.shinyap ps.io/PizzaHut/



