Insights into Customer Perception

Topic Modeling and Sentiment Analysis of Yelp Reviews

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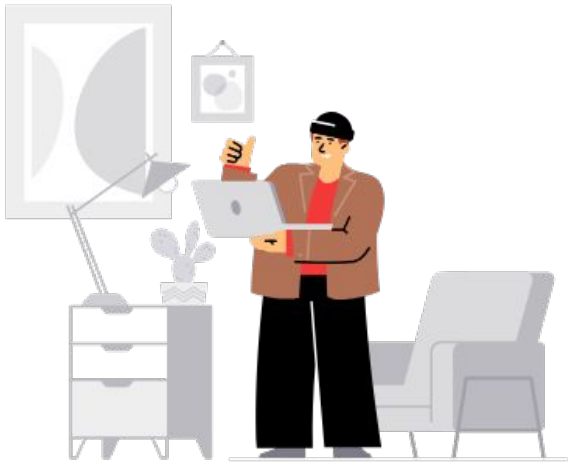


What makes a restaurant 4 star on Yelp?

Why do we want to understand this?

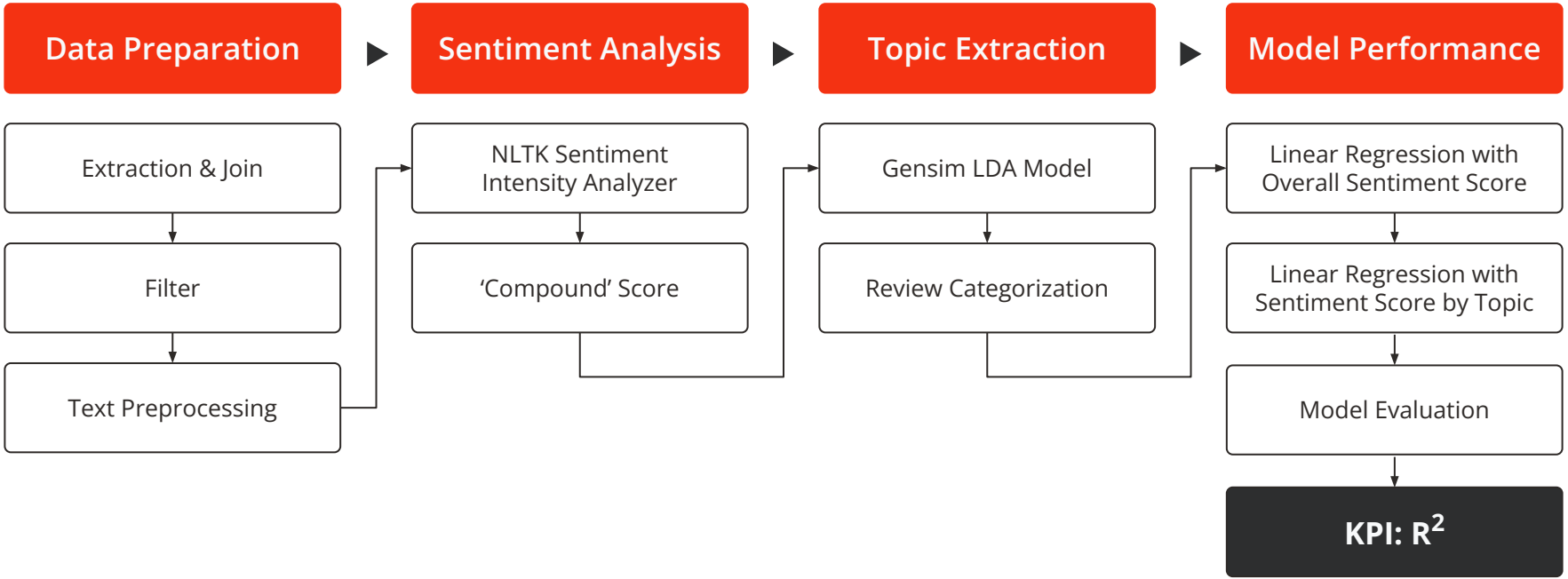
For Businesses — Understand which aspects to improve on when having a low rating

For Customers — Make informed decision based on personal priorities and preferences

Our hypotheses

1. Review sentiment score is correlated with the overall star rating.
2. Sentiment about certain aspects have more influence than others.

Analysis Methods



Data Source & Cleaning

Yelp Academic Dataset

Business Dataset

- 150,346 businesses
- Columns: name, stars, review counts, categories...

Review Dataset

- 6,990,280 reviews
- Columns: stars, text, date, useful, funny...

Filtered dataset

- California: 588 businesses + 167,698 reviews
- Columns: business name, review, user_stars

Text Preprocessing

Filtered dataset

Word tokenize

➔ Break reviews into tokens

Lowercase

➔ Lowercase each token

Removing non-alphanumerics & stop words

➔ Retain only alphanumeric characters and remove stop words

Stemming

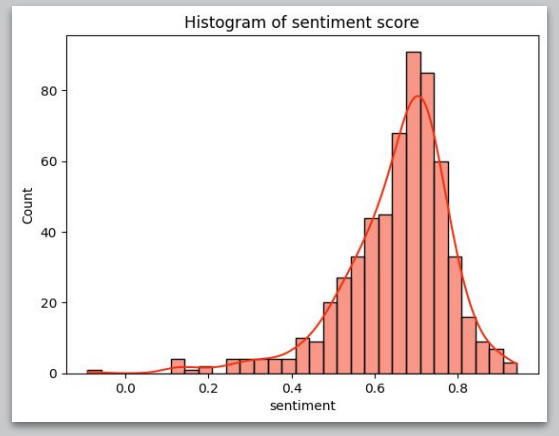
➔ Reduce tokens back to common base form

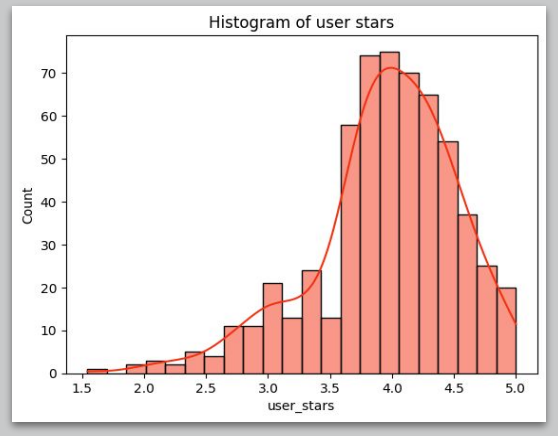
Luke's Sports Shack Bar & Grill

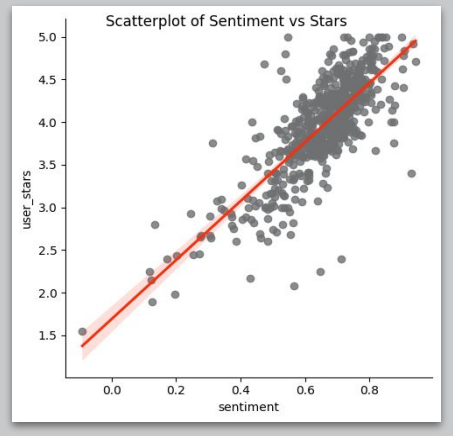
Exploratory Analysis | Sentiment Score

Sentiment compound score

- Aggregate 3 polarity scores
- Range from -1 to 1

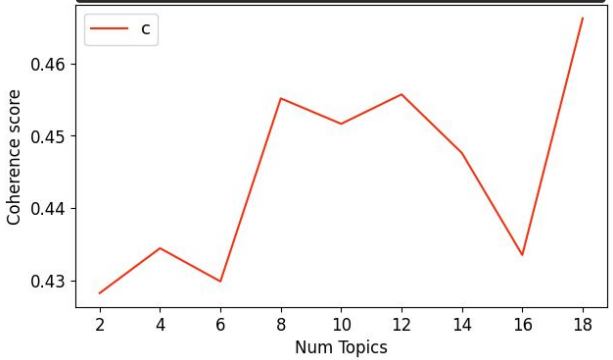






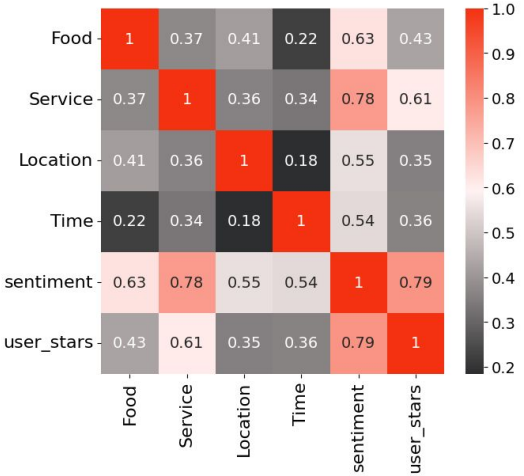
Exploratory Analysis | Topic Extraction

Coherence Score

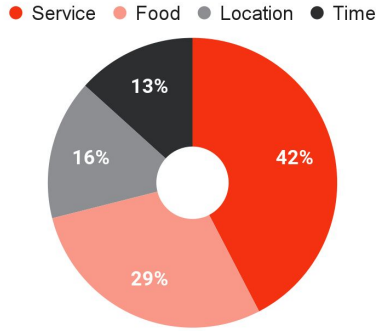


Gensim LDA Topic Labeling

Topic 1	Topic 2	Topic 3	Topic 4
great	fish	place	order
servic	seafood	seat	wait
friendli	good	park	servic
staff	shrimp	locat	time
serv	salad	restaur	minut
star	chicken	street	tabl
Service	**Food**	**Location**	**Time**



Topic Ratio



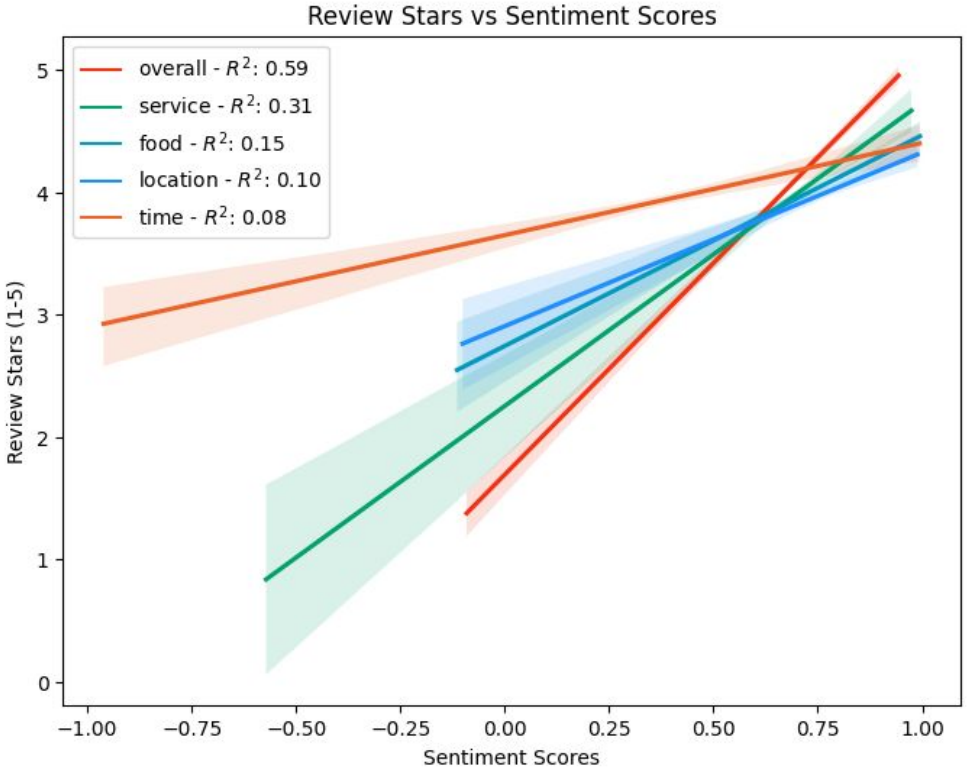
Key points

1. Maximum coherence score achieved at 18 topics
2. 18 LDA topics are grouped & hand-labelled into 4 meaningful categories
3. Each reviews are assigned to one topic with the highest probability from LDA model
   → 'service' is the main topic, accounting for 42%
4. 'service' and 'food' have the highest correlation with stars rating

Linear Regression

Cross-validation: Mean R^2	
Overall Sentiment	**59%**
Sentiment with all Topics	**36%**
Service	31%
Food	15%
Location	10%
Time	8%

- R^2 dropped after taken into topic extraction due to imbalance sentiment aggregation
- "Service" is most important to restaurant ratings



Limitations

1. **Dataset**
   - Generalization: Geographically skewed dataset → ineffective generalization, poor performance and potential misleading sentiment scores
     - ~76% of reviews came from restaurants in Santa Barbara
2. **Sentiment score**
   - Context: Contextual nuances pose challenges for sentiment analysis algorithms
3. **LDA**
   - Inefficient Topic Assignment: Iterative processes is computationally expensive and time-consuming
   - Assign topics manually: Topic labeling is done by examining dictionary of frequently used words

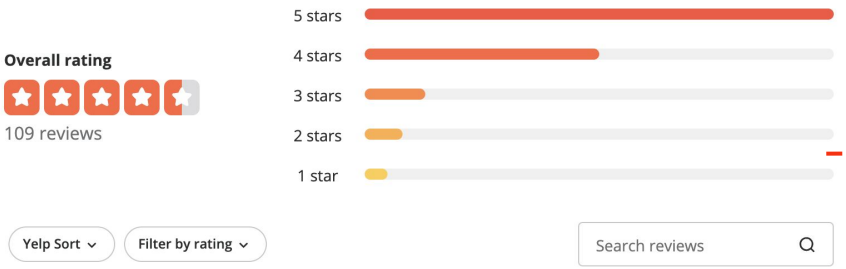
Sentiment Score: 0.77

Super slow service, "salads" are not very good and really overpriced. Won't be returning.

Sentiment Score: -0.59

Order the breakfast sandwich with avocado. I've probably had it about 20x. To die for. And an affordable price considering the area.

Insights & Recommendations



Rating Breakdown

- Launching rating breakdown and summary of review for to improve **customer experience**
- Restaurants understanding areas for improvement and higher ratings

Review Overview

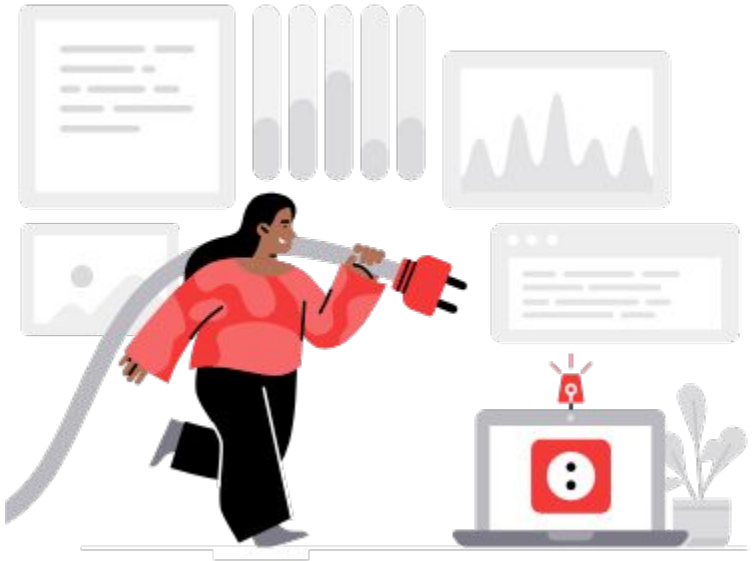
Customers say

Customers like the protein content of the drink, saying it provides 30 grams of protein. They also say it's a great way to get extra protein without any nasty after flavors. Customers also like the caffeine content, quality, and taste. However, some customers have reported issues with the smell and texture. They say the drinks smell like spoiled milk and have slimy chunks all throughout. Customers disagree on texture, and value.

AI-generated from the text of customer reviews

Taste | Quality | Protein content | Filling | Caffeine content | Value | Texture | Smell

Thank You!



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