

Yelp Ratings Mismatch Review Text Sentiment Across Cuisines

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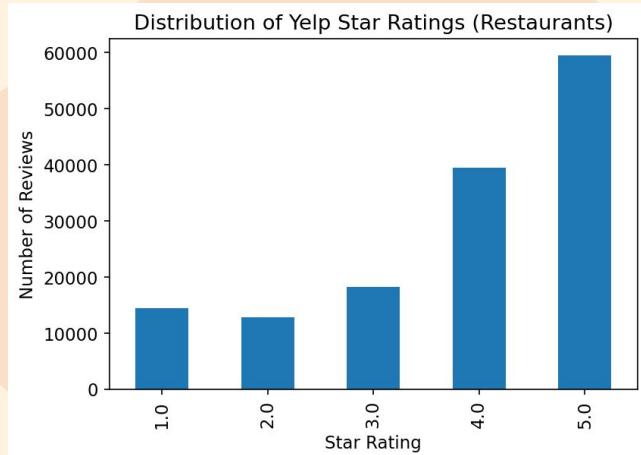
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Motivation + Research

Question

- Online reviews influence consumer decisions
- Star ratings summarize complex text
- Do ratings fully reflect written sentiment?
- Are mismatches systematic across cuisines?
- Hypothesis: Cuisine category is associated with the degree of sentiment-rating mismatch
- Research Question: Do some cuisine categories exhibit greater mismatches between textual sentiment and star ratings than others?
- Modeling Approach: Sentiment analysis + normalized ratings + statistical comparison across cuisines

Data & Acquisition



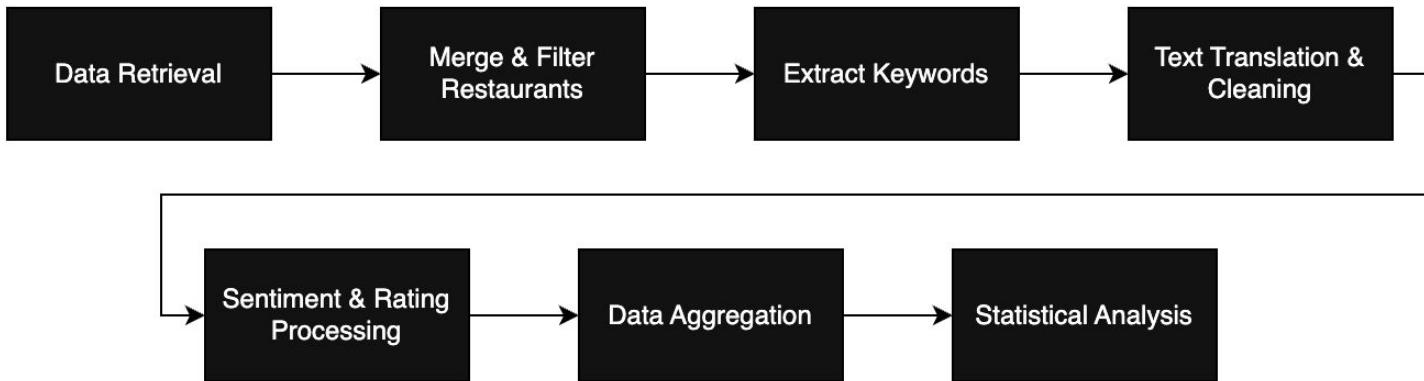
Data Source: Kaggle

- Kaggle Yelp Dataset
- 200,000 reviews (limited)
- Review dataset + Business dataset
- Focused on restaurants only

Final Dataset

- Review text
- Star rating
- Extracted cuisine tags
- Sentiment score (VADER)
- Normalized rating (0-1)
- Mismatch & direction metrics

Analysis Pipeline



Analysis Decision Making

Problem

- Many restaurants have multiple cuisine tags
 - Pick one? Pick most popular?
- Categories is stored as a String
- Reviews in different languages
- Handling large amounts of data

Impact

- Impacts ANOVA validity
- Affects statistical conclusions
- Strengthens robustness of findings

Our Approach

- Convert Categories to an array
- Identify and filter non-English reviews
- Limit review dataset to 200,000 entries
- Run statistics on exploded data set on cuisine and compare on multiple data set iterations with randomly assigned tags

Bias & Uncertainty

Bias Considerations

- Selection bias in Yelp reviews
- Translation inaccuracies (googletrans_py)
- Sentiment tool limitations
- Unequal cuisine sample sizes

Uncertainty Handling

- ANOVA at $\alpha = 0.05$
- Tukey HSD post-hoc tests
- Report top & bottom cuisines

Results and Conclusions

- As hypothesized, average sentiment-rating mismatches differed across the various cuisines (ANOVA, $p < 0.001$)
- Most cuisines carried slightly greater star rating than text sentiment on average
- No pattern sentiment-rating mismatch across cuisines from similar regions of the world (e.g. Thai, Chinese, Japanese)
- **Rating is an imperfect translation of review sentiment**

Top 5 Cuisines
(by mean mismatch)

Cuisine	Mismatch	Direction
Halal	0.198	-0.033
French	0.228	-0.039
Greek	0.229	-0.017
Korean	0.234	-0.008
Med.	0.238	0.000

Cuisine	Mismatch	Direction
Chinese	0.295	-0.021
Italian	0.278	-0.001
Mexican	0.274	-0.006
Kosher	0.271	-0.070
Japanese	0.270	-0.006

Bottom 5 Cuisines
(by mean mismatch)

Next Steps



Incorporate
geography



Explore cultural
explanations



Use other
sentiment
model

References

- GitHub Repository: <https://github.com/pallavim8/Project-1-Cavalier-Kaggles>
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- [4] “Translate”, [googleapis.dev](https://googleapis.dev/nodejs/translate/latest/v2.Translate.html), n.d. [Online]. Available:
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Questions?

make price menu look definite better back came
rice dish sushi review like come
realalli got medi delici best disappoint chicken
sweet mock dont fri see terrac soup
pad time tast order sauc
great litt love eat go great think
ask also even siam
go t nice tofu
spicy much live get noodl roll
basil food spici would one
favorit friend lunch curri good though duck